SUPPLEMENT TO
MANAGED Care

Influenza Vaccination: Trends, Recommendations, And Best Practices

Based on the Influenza Vaccine Expert Roundtable, April 19, 2007, Chicago

HIGHLIGHTS

- Burden of Influenza and Strategies for Prevention
- Influenza Virus Mutation and Transmission
- Best Practice From a Health Plan Standpoint
- Real-World Experience of a Family Practitioner
- Virginia's Stay on Track Daycare Initiative
- Panel Discussion: Overcoming Barriers to Immunization

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SELF-STUDY CONTINUING EDUCATION ACTIVITY

Influenza Vaccination: Trends, Recommendations, and Best Practices

A statement of credit is offered to health care professionals who read pages 2 through 19 of this publication, and submit the assessment and evaluation form on page 20. CME and CPE credit are available. Estimated time to complete this activity is 2.0 hours.

A statements of credit will be awarded upon successful completion of assessment questions (70 percent or better). If a score of 70 percent or better is not achieved, no credit will be awarded, and the registrant will be so notified. There is no fee for this activity.

Target audience

This program is targeted to medical directors, physicians, and pharmacists in managed care organizations.

Purpose and overview

This publication is based on the Influenza Vaccine Expert Roundtable held in Chicago on April 19, 2007.

The high morbidity and mortality caused by influenza in the United States cannot be overemphasized. According to estimates by the Institute of Medicine's Committee to Study Priorities for Vaccine Development, influenza causes 54 million illnesses each year. Despite the long-standing availability of vaccines, annual all-cause mortality from influenza in the United States is greater than 51,000.

The economic toll of influenza is impressive. The direct and indirect costs may be as high as $14 billion annually in the United States. Further, absenteeism that results from influenza represents 22 percent of missed workdays from all acute conditions.

To help managed care decision makers develop sound policies that are consistent with advances in vaccine development and evidence-based strategies for preventing the spread of influenza, this program brings together clinical researchers, practitioners, third-party payers, and health educators to identify opportunities for reaching public health goals for immunization.

Educational objectives

After reading this publication, participants will be able to:

- Improve vaccination rates in managed care.
- Review strategies used for influenza prevention, diagnosis, and management, especially in vulnerable populations.
- Assess burden of disease associated with influenza in all populations.
- Evaluate the economic impact of influenza.

Accreditation and designation

This activity is has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education, through the joint sponsorship of The Chatham Institute and Managed Care Strategic Solutions. The Chatham Institute is accredited by the ACCME to provide continuing medical education for physicians. The Chatham Institute designates this educational activity for a maximum of 2.0 *AMA PRA Category 1 Credits.*™ Physicians should claim credit commensurate with the extent of their participation in the activity.

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This supplement is supported by an educational grant from MedImmune. The material in this supplement has been independently peer reviewed. The grantor played no role in reviewer selection.

The Burden of Influenza And Strategies for Prevention

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Influenza continues to be a common cause of morbidity and mortality in the United States and worldwide. Thompson (2003) reported that the number of influenza-related deaths in the United States rose 83 percent from the 1976–1977 through 1997–1998 influenza seasons. The study investigators estimated that 36,155 people die annually from respiratory and circulatory causes associated with influenza, and that influenza is associated with an estimated 51,203 (direct and indirect) deaths from all causes each year. The aging of the population is partially responsible for the increase in influenza-related deaths during the past two decades. Persons 85 years of age and older are 32 times more likely to die from influenza-associated underlying pneumonia and influenza death than people between 65 and 69 years of age (Thompson 2003). Among children younger than 5 years of age, influenza-related hospitalization rates are highest for those less than 1 year old and are equal to or higher than rates among adults age 65 and older (Neuzil 2000, CDC 2001, Thompson 2004).


ROBERT B. BELSHE, MD

Because it is highly contagious, influenza is responsible for 30 to 60 million infections annually (Nichol 1995), resulting in 25 million physician visits (Couch 2000) and an estimated 114,000 to 142,000 hospitalizations each year (CDC 2003). The annual direct medical costs of influenza are estimated at between $3 and $5 billion (Patriarca 1999). In working-age adults, influenza accounts for 2.8 to 3.4 lost workdays per episode (Nichol 2001), and may be responsible for as many as 75 million lost workdays annually in the United States (Benson 1998).

Historically, we have focused on preventing influenza morbidity and mortality with vaccine, chiefly in the elderly and high-risk populations. Today, however, the larger public health objective is to prevent the underlying influenza epidemic with complementary immunization strategies, which can include herd protection by way of vaccinating individuals who spread viruses to those whom are at highest risk of complications and poor outcomes. Children appear to be the catalysts of most influenza epidemics, initially spreading infection to school-age companions, family members, and subsequently to the community at large. Schools provide an important pathway for interfamily spread, which ultimately leads to an epidemic as the wider community becomes infected.

Trivalent defense

Vaccines currently approved in the United States to prevent influenza infection are trivalent inactivated influenza vaccine (TIV), administered as an intramuscular injection, and live attenuated influenza vaccine (LAIV), administered by nasal spray. Both the inactivated and live attenuated vaccines contain three strains of influenza virus representing the strains likely to be in circulation during the upcoming winter. The U.S. Food and Drug Administration, in consultation with experts from the World Health Organization, academia, and industry, annually selects strains for domestic manufacture. In about half of the years over the past decade, however, the rapid evolution of influenza has resulted in a poor antigenic match between the strains selected for vaccine and the circulating virus, despite annual strain updates of one or more of the component antigens in the vaccine. Representative viruses of H1N1 and H3N2 influenza A and one variant of influenza B are selected for inclusion in the vaccine each year.

Persons recommended to receive vaccine

The groups recommended by the Centers for Disease Control and Prevention Advisory Committee on Immunization Practices (ACIP) to receive an annual influenza vaccination for immunization are listed in Table 1. In addition, anyone over the age of 6 months may receive vaccine as a means of avoiding influenza.

This year brought revision to several recommendations, such as expansion in the ages of children and older adults who should receive influenza vaccine. In addition, ACIP now recommends that children receive 2 doses of vaccine the first time they are vaccinated. Chil-

dren should receive both doses before influenza appears in the community, which means starting relatively early in the year to accommodate this dosing schedule. If a child received 1 dose in the previous year, he or she would still need 2 doses in the fall. When children have received 2 priming doses in 1 year, they subsequently can receive single doses on an annual basis (CDC 2006).

The efficacy of a single dose depends on the vaccine. One dose of the inactivated vaccine offers little, if any, protection to previously uninfected children. The second dose provides the efficacy. With the LAIV, data show that the first dose provides substantial efficacy, depending on the strain — greater than 80 percent efficacy against H3N2, and lesser efficacy for H1N1 and type B strains (Belshe 1998, MedImmune 2007). The second dose of LAIV provides additional efficacy.

The 2-dose requirement is age dependent in children younger than 9 years of age. The seronegative child requires both doses of inactivated vaccine. In seropositive children who have been naturally infected with influenza, the inactivated vaccine effectively boosts the existing antibodies, thus only 1 dose is needed. Age 9 is selected because it is believed that by this age, children will have had natural infection with all three strains of influenza. In part, this probably explains why inactivated influenza vaccine is less effective than LAIV in children, a group that is less likely to be primed by previous natural infection. More complete immune responses from LAIV relative to TIV (secretory IgA and cell-mediated immune responses in addition to serum antibodies) likely are important in understanding the differences in vaccine efficacy in children.

Of special note is the CDC recommendation to vaccinate health care workers. Potter (1997) demonstrated the importance of this recommendation. The study, conducted during the winter of 1994–1995, included 1,059 patients from 12 geriatric medical long-term care facilities. Of the 1,078 health care workers in those facilities, 653 (61 percent) agreed to be vaccinated. Vaccination of health care workers was associated with decreases from 17 percent to 10 percent in patient mortality (odds ratio [OR] 0.56; 95% confidence interval [CI] 0.40 to 0.80) and in influenza-like illness (OR 0.57; CI 0.34 to 0.94) (Figure 1, page 4). However, the study did not establish a correlation between vaccination of patients and a significant effect on mortality. The researchers primarily vaccinated ward nurses — those with the closest contact with residents and who were most likely to spread influenza infection (Potter 1997).

TABLE 1
Groups recommended by ACIP for influenza vaccination

- Adults age 50 years and older*
- Children age 6 months to 59 months†
- Adults and children who are residents of nursing homes or other chronic care facilities
- Adults and children with chronic pulmonary or cardiovascular disorders, including asthma
- Adults and children with chronic metabolic disorders, including diabetes mellitus, renal dysfunction, and hemoglobinopathies
- Children age 6 months to 18 years receiving long-term aspirin therapy and thus would be at increased risk of Reye's syndrome
- Women who will be in the second or third trimester of pregnancy during the influenza season
- All household members of the populations named above
- All health care workers

*This represents a change from previous years, when the high-risk age threshold was defined as 65 years or older.

†This change from 6–24 months arises from ACIP recognition that children are the major vectors of influenza. Next year, ACIP is expected to discuss a recommendation that all children 6 months to 18 years of age be vaccinated annually for the prevention of influenza.

ACIP=Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention.

SOURCE: CDC 2006

ACIP recommends that vaccine be offered throughout the influenza season. It also advises against the use of amantadine and rimantadine because of the high level of resistance that has been observed in recent years (CDC 2006). This year, however, it has been noted that the H1N1 strain appears to be susceptible to amantadine and rimantadine, but the H3N2 has been resistant to those medications.

Efficacy of TIV

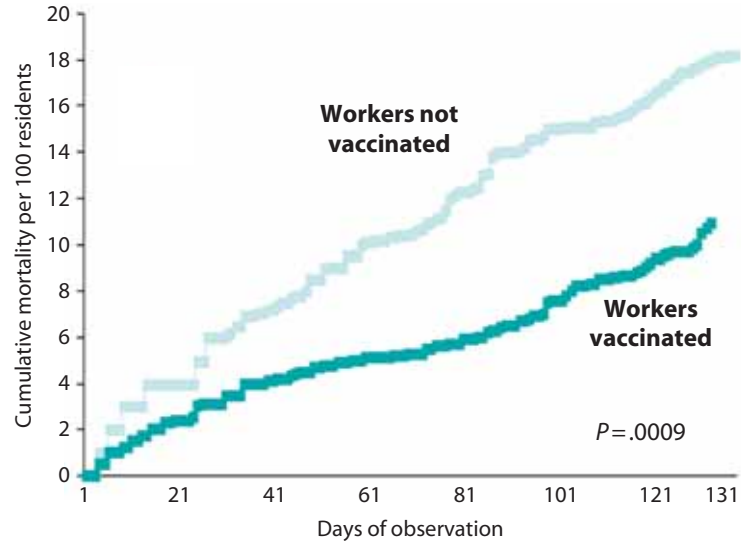
Numerous studies have been conducted on the efficacy of influenza vaccine in students, military recruits, healthy working adults, and health care workers. These studies have shown that inactivated influenza vaccine that is well matched antigenically with the circulating strains of virus is 70 percent to 90 percent effective in reducing confirmed influenza. This rate drops when the virus strains in the vaccine are poorly matched with those in circulation that actually cause infection (CDC 2001).

The elderly (65 years and older) tend not to respond as well as the general population to vaccination, possibly due to immune senescence (Remarque 1999) and, therefore, remain susceptible to influenza-related upper respiratory tract infections. However, vaccination significantly can prevent the secondary complications of in-

fluenza and lower the risk for influenza-related hospitalization and death. Among the nursing home population, the vaccine can be effective in preventing hospitalization or pneumonia in up to 60 percent of those who are immunized, prevent death in 80 percent, and prevent influenza-like illness in 30 percent to 40 percent (CDC 2001).

Inactivated vaccine has fairly modest efficacy in children, as demonstrated in a meta-analysis of the five published studies involving 50 or more children 9 years of age or younger (Table 2). Taken together, these five studies — all modestly sized — yield an overall efficacy of 63 percent (Zangwill 2004).

FIGURE 1
Mortality reductions in the institutionalized elderly through vaccination of health care workers



SOURCE: POTTER 1997

LAIV characteristics and indications

LAIV allows us to take advantage of specific characteristics of influenza to prevent the disease. The two principal characteristics of flu are its rapid antigenic variation, in part due to its segmented genome, and the fact that it is highly transmissible by droplets, unlike most respiratory viruses, which are spread by fomites. We can take advantage of the rapid antigenic variation and update the live attenuated vaccine by substituting in the new hemagglutinin and neuraminidase on an annual basis. It is very difficult to prevent aerosol-transmitted diseases, such as influenza, with behavior modification alone.

Although hand washing should be encouraged, hand washing and wearing masks probably have limited efficacy in preventing influenza, and, therefore, vaccines are essential to assist in the prevention of influenza. Use of LAIV nasal spray vaccine to induce local immunity is a logical approach to prevent influenza in populations for which it is approved.

LAIV is approved for healthy persons 5 to 49 years of

TABLE 2
Meta-analysis of trivalent inactivated influenza vaccine efficacy trials

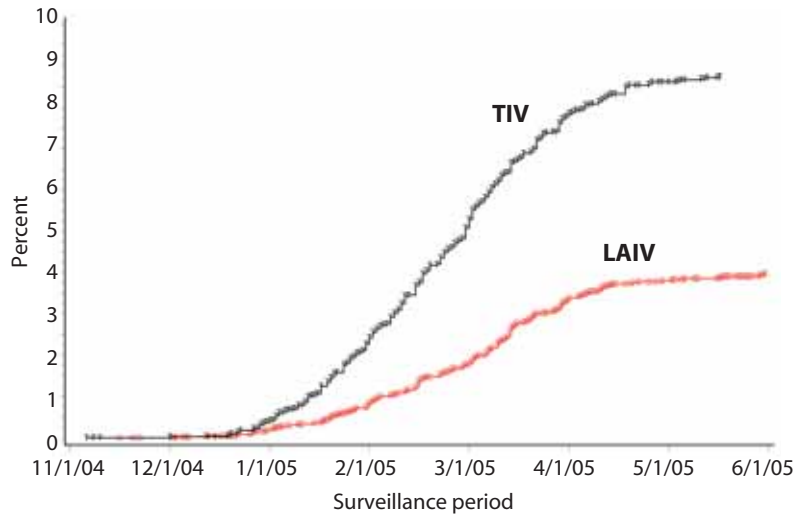
Published studies involving more than 50 children under age 10

Study	Virus isolated	Age range	Confirmed cases of infection or illness (of total in subgroup)		Vaccine effectiveness* (%)
			Treatment group	Placebo group	
Gruber 1990	B	3–9 years	5(45)	15(55)	53
Clover 1991	H1	3–9 years	4(30)	10(33)	56
Heikkinen 1991	H1/H3	1–3 years	5(187)	29(187)	82
Hoberman 2003†	H1/H3	6–24 months	15(273)	22(138)	66
Hoberman 2003‡	H1/B	6–24 months	9(252)	4(123)	–7§

*Combined efficacy 63%.
†1999–2000 influenza season.
‡2000–2001 influenza season.
§Decline in efficacy in second year of study was believed to be the result of a low attack rate that year.

ADAPTED FROM ZANGWILL 2004

FIGURE 2
Attack rate of influenza, TIV versus LAIV
Time to first culture-confirmed influenza caused by any wild-type strain



LAIV=live attenuated influenza vaccine, TIV=trivalent inactivated influenza vaccine.
SOURCE: BELSHE 2007. COPYRIGHT 2007, MASS. MEDICAL SOCIETY. ALL RIGHTS RESERVED.

age. Children 5 to 8 years of age who are being vaccinated with LAIV for the first time (unless vaccinated with TIV in previous years) should receive 2 doses, 6 to 10 weeks apart; children age 5 to 8 years who previously have been vaccinated need 1 annual dose. Persons who are 9 to 49 years of age need 1 annual dose. LAIV is not approved for persons with underlying chronic disease, including children with asthma (CDC 2006).[1]

Comparison of TIV and LAIV in children

The efficacy and safety of both inactivated and live vaccine in children were recently compared in a large clinical trial (Belshe 2007). Children 6 to 59 months of age, without a recent episode of wheezing illness or severe asthma, were randomly assigned in a 1:1 ratio to receive either LAIV or TIV. Cultures were used to monitor influenza-like illness throughout the 2004–2005 influenza season.

Among the 7,852 children who completed the study according to the protocol, there were 54.9 percent fewer cases of cultured-confirmed influenza in the group that received LAIV than in the group that received TIV (153 vs. 338 cases, $P<.001$) (Figure 2). Among previously unvaccinated children, wheezing within 42 days after the administration of the first dose was more common with LAIV than with inactivated vaccine, primarily among children up to 11 months of age. In this age group, 12 more episodes of wheezing were noted within 42 days after receipt of the first dose among those children given LAIV (3.8 percent) than among recipients of inactivated vaccine (2.1 percent) (CI, –0.18 to 3.53; $P=.076$). Hospitalization rates for any cause during the 180 days after vaccination were higher among the recipients of live vaccine who were 6 to 11 months of age (6.1 percent) than among the recipients of inactivated vaccine in this age group (2.6 percent) (CI, 1.4 to 5.8; $P=.002$) (Belshe 2007).

The trial demonstrates that among young children, LAIV had significantly better efficacy than inactivated vaccine. An evaluation of the risks and benefits indicates that LAIV is a highly effective, safe vaccine for children 12 to 59 months of age who do not have a history of asthma or wheezing. Until additional data are available, the observations related to medically significant wheezing and rates of hospitalization will restrict the use of live attenuated vaccine in children less than 1 year of age and in children age 12 to 47 months who have a history of asthma or wheezing (Belshe 2007).

LAIV effectiveness in adults

Effectiveness trials in adults also show live vaccine to be of significant benefit. Nichol (1999) investigated the efficacy of live vaccine in 4,561 healthy, working adults age 18 to 64. LAIV significantly reduced the incidence of severe febrile illnesses (18.8 percent reduction; CI 7.4–28.8, $P=.002$) and febrile upper respiratory tract illnesses (23.6 percent reduction; CI 12.7 to 33.2, $P<.001$). Vaccination also led to fewer days of illness across all illness syndromes (22.9 percent reduction for febrile illnesses, 27.3 percent reduction for severe febrile illnesses [$P<.001$ for both]); fewer days of work lost (17.9 percent reduction for severe febrile illnesses [$P=.01$], 28.4 percent reduction for febrile upper respiratory tract illnesses [$P<.001$]); and fewer days with health care provider visits (24.8 percent reduction for severe febrile illnesses, 40.9 percent reduction for febrile upper respiratory tract illnesses [$P<.001$ for both]). Use of prescription antibiotics and over-the-counter medications also was reduced across all illness syndromes. Vaccine recipients were more likely to experience a runny nose or a sore throat during the first 7 days after vaccination, but serious adverse events between the groups were not significantly different (Nichol 1999).

[1] As of press time, the U.S. Food and Drug Administration was considering an expanded age indication for LAIV in children as young as 1 year of age who do not have a history of wheezing or asthma.

Conclusion

Improved understanding of the contagion of influenza has fostered new immunization strategies, such as vaccinating healthy children, adults, and health care workers. These strategies, coupled with a new intranasal vaccine for healthy children and adults 5 to 49 years of age, bring renewed hope for reducing the burden of influenza. As the elderly population in the United States increases, it will become important to develop additional approaches for interrupting influenza transmission to prevent morbidity and mortality rates from rising.

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Influenza Virus Mutation and Transmission

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Influenza — a term used in 15th century Italy to describe an illness influenced by the stars and the planets — is a single-stranded, helically shaped RNA virus enveloped within two surface glycoproteins known as hemagglutinin (H) and neuraminidase (N). Influenza viruses belong to the Orthomyxoviridae family. Three types of influenza virus have been classified — A, B, and C — on the basis of antigenic differences. Influenza A and B viruses contain eight single-stranded, negative-sense RNA segments that encode at least 10 polypeptides, of which eight are structural viral proteins and two are found in infected cells.

The influenza A virus was isolated in 1933 (Smith 1933) and has been since divided into subtypes on the basis of serologic and genetic differences in their surface glycoproteins. Investigations have identified 15 subtypes of hemagglutinin (H1–H15) and 9 subtypes of neuraminidase (N1–N9). Hemagglutinin is the principal antigen on the surface of the influenza virus. H1 facilitates viral entry into cells, and H2 is important in viral attachment and entry into host cells. The enzyme neuraminidase enables virus particles to escape from a cell and spread through secretions (Cox 1999).

Viruses of all subtypes exist in aquatic birds, in which

they replicate in the respiratory or intestinal tract. Influenza A viruses with hemagglutinin proteins of the H1, H2, and H3 subtypes and neuraminidase of the N1 and N2 subtypes have caused epidemic and pandemic activity in humans during the last century. The large reservoir of all known influenza A subtypes in aquatic birds, coupled with the ability of these viruses to be transmitted to new host species, indicates that influenza cannot be eradicated (Cox 1999). Of the clinically relevant influenza virus types, type A is generally associated with the most severe illness, such as that seen during the pandemics of 1918, 1957, and 1968.

Influenza B, isolated 7 years after influenza A (Francis 1940), is relatively haphazard in its variation, making it impractical to classify strains by families (Schild 1967). Type B strains usually are less severe than type A strains. Influenza C, generally associated with mild or asymptomatic illness, has minimal public health impact.

Influenza *epidemics* occur every year and are generally seasonal, with outbreaks peaking in midwinter. *Pandemics* are worldwide outbreaks of severe disease, which occur infrequently. Annual *interpandemic* outbreaks since the 1977 H1N1 pandemic have had varying degrees of severity and extent (Dolin 2005).

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How the virus changes

Repeated influenza epidemics persist because of antigenic variations that occur in the hemagglutinin and neuraminidase antigens. Such variations produce new viruses against which, in humans, there is little to no immunity despite previous infection by other influenza viruses.

The first variation, or *antigenic drift,* occurs in both influenza A and influenza B viruses and is caused by point mutations in the hemagglutinin and neuraminidase genes (Figure 1, page 8). Antigenic drift occurs as part of the continuing evolution of influenza viruses, and only after a particular viral strain has become established in humans and adapts to the development of host antibodies (Cox 1999). These new strains of influenza prevail for 2 to 5 years, and are eventually replaced by the next emerging strain. This new strain can then trigger a new epidemic, as it is unfamiliar to the antibody repertoire of the population. The development of yet another set of host antibodies eventually protects the population, putting pressure on the virus to drift yet again. The World Health Organization (WHO) and the Centers for Disease Control and Prevention track these changes.

The continual change caused by antigenic drift requires annual reformulation of influenza vaccines (Table). Recommendations for the composition of vaccines from year to year are made on the basis of WHO projections of what strains are expected to circulate most widely,[2] although in some years these projections do not match well with the actual circulating strains, resulting in a large-scale epidemic. The 2003–2004 flu season provides an example, when the Fujian H3N2 strain — which was not a part of that season's standard trivalent flu vaccine — resulted in 153 pediatric deaths in the United States. It was not until

[2] In addition to the WHO vaccine formulation recommendations shown in the Table, for the 2006–2007 season, the WHO also listed two "candidate" viruses in circulation: A/Hiroshima/52/2005 (H3N2) and B/Ohio/1/2005.

TABLE

Influenza vaccines and strain drift in the Northern Hemisphere

Influenza vaccines provide immunity for a limited duration of time. Arrows indicate vaccine strains that continued in use the following year.

Type	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007
A/H1N1	A/Beijing /262/95	A/New Caledonia /20/99	→	→	→	→	→	→
A/H3N2	A/Sydney /5/97	A/Moscow /10/99	→	→	A/Panama /2007/99	A/Fujian /411/2002	A/California /7/2004	A/Wisconsin /67/2005
B	B/Beijing /184/93	→	B/Sichuan /379/99	B/Hong Kong /330/2001	→	B/Shanghai /361/2002	→	B/Malaysia /2506/2004

SOURCE: WHO 2007

FIGURE 1

Antigenic drift (influenza A and B)

Repeated influenza epidemics persist because the type A and type B viruses undergo constant and rapid evolution because of antigenic drift, a gradual change in the virus that occurs through a series of mutations, substitutions, or deletions in amino acids constituting the hemagglutinin or neuraminidase surface antigens.

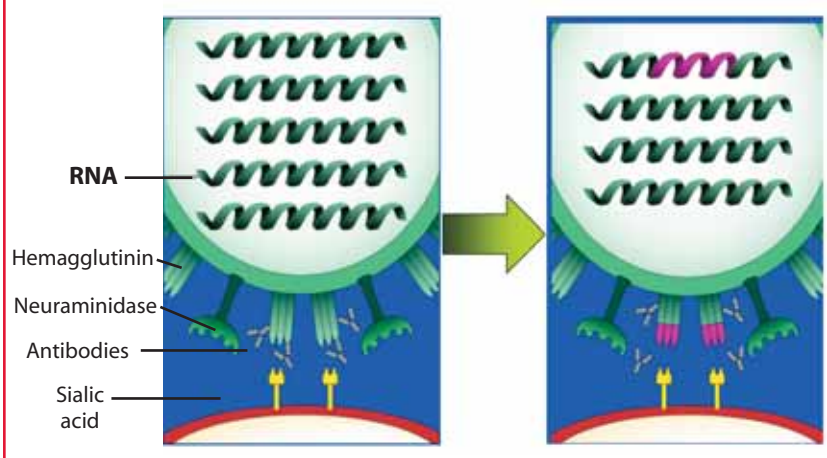
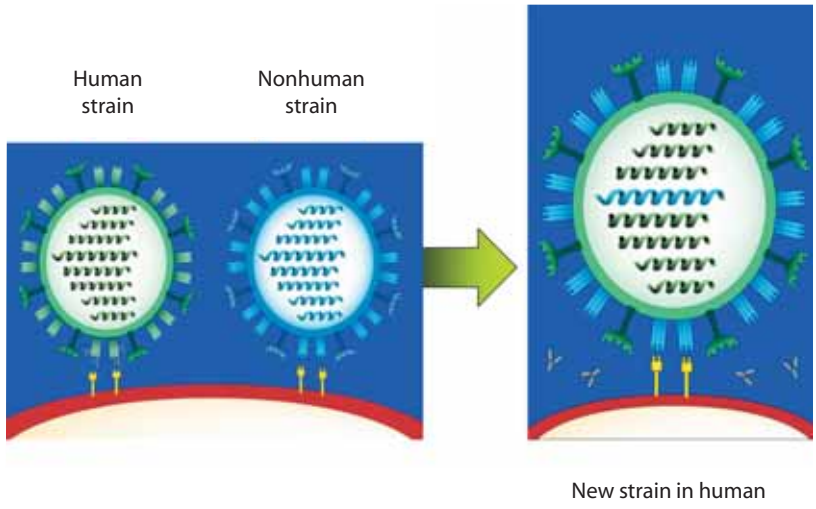


FIGURE 2

Antigenic shift (influenza A only)

Antigenic shift occurs when two strains of influenza combine to form a new subtype. Strains in humans evolve through contact with strains carried by other species, primarily birds.



the following year that the Fujian strain was incorporated into the trivalent vaccine.

In contrast to the gradual evolution of strains subject to antigenic drift, *antigenic shift* is a more profound antigenic variation. It occurs when a type A influenza virus moves into humans from other host species, primarily birds but also via an intermediate host such as swine. This new strain genetically reassorts itself with circulating human influenza virus to create a new and distinct antigenic profile with a novel hemagglutinin or neuraminidase formation (Figure 2).

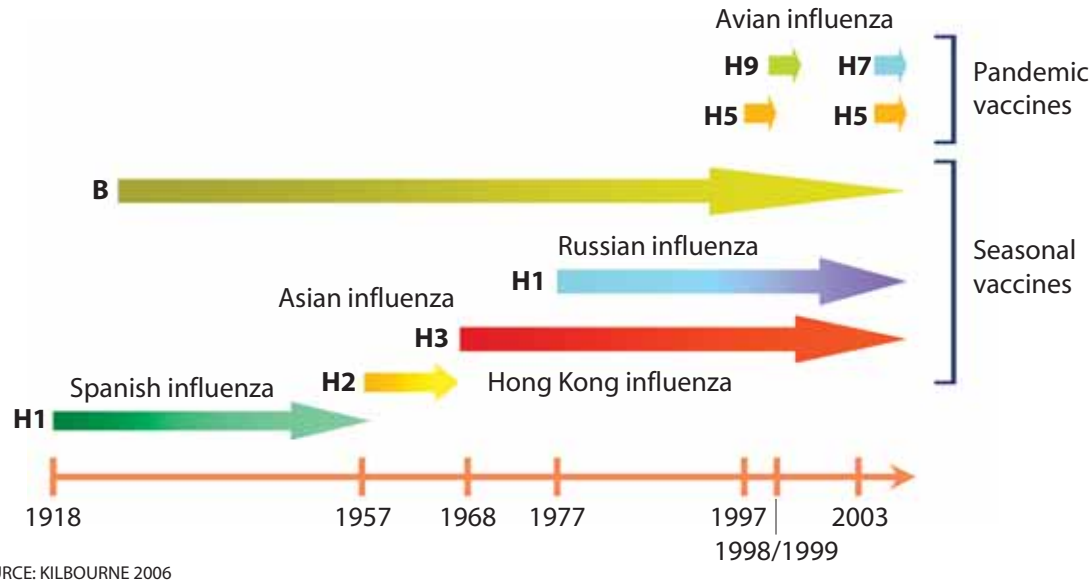
Antigenic shift of type A influenza viruses occurs less frequently than antigenic drift (Figure 3), but with more dramatic impact. The result of global immunologic susceptibility to a new influenza virus may result in a pandemic. The influenza pandemics of 1957 and 1968, for example, were caused by genetic reassortment between human and avian influenza A virus. In 1968, H3N2 replaced H2N2 as a key subtype in circulation, and today H3N2 remains a part of the annual trivalent vaccines in use. Type B viruses have not been subject to antigenic shift (Cox 1999).

Transmission and children

Influenza is spread in humans by direct person-to-person contact. Influenza viruses replicate in the epithelium of the respiratory tract and are spread through small particle aerosols generated during sneezing, coughing, and speaking. The incubation period ranges from 18 hours to approximately 5 days, with an average of 2 to 3 days (Cox 1999, CDC 2006). Age-specific influenza rates are highest in children 5 to 19 years of age (Monto 1993).

Although children rarely die from influenza, those whom it affects consume a disproportionate share of health care resources. During the 2003–2004 flu season, when

FIGURE 3
Emergence of influenza viruses in humans



SOURCE: KILBOURNE 2006

the H3N2 subtype was predominant, 40 state health departments reported 153 deaths in children younger than 18 years (Bhat 2005). Of these deaths, 63 percent occurred in children younger than 5 years of age. Nearly half occurred in children who previously had been healthy and whose presenting complications are normally indicative of nonfatal influenza, including pneumonia, laryngotracheobronchitis, bronchiolitis, and encephalopathy. Only about 1 in 6 of the children who died had been vaccinated according to protocol (Bhat 2005).

Children are a primary vector for influenza spread. Viral titers are generally higher in young children, with shedding lasting 10 days or longer. They do not appear as sick as adults who are infected and subsequently are sent to schools and day care centers. Schools provide an important pathway for interfamily spread, which ultimately leads to an epidemic as the wider community becomes infected. The 1968 pandemic was relatively mild in comparison to that of 1957, in large part because the spread was interrupted by the winter holiday school break.

The lack of recognition of the presence of influenza in children extends to the clinician's office as well. Poehling (2006) studied the 2003–2004 epidemic and found that in children age 5 months or less, 6 to 23 months, and 24 to 59 months, the rates of influenza-associated outpatient visits were about 10, 100, and 250 times higher, respectively, than the hospitalization rates in these age groups. Yet only 17 percent of outpatient visits with laboratory-confirmed influenza infections had a discharge diagnosis of influenza, suggesting that patients with influenza can present with uncommon symptoms. The availability of rapid testing can mitigate the lack of clinical recognition during outpatient visits (Poehling 2006).

The key to preventing the spread of influenza, however, is in vaccination strategies, several of which are described by Belshe (see "Burden of Influenza and Strategies for Prevention," page 2). Chemoprophylaxis always has been a challenge. Policies governing the administration of antiviral medications — particularly to those individuals who are not at highest risk for disease — with the intention of preventing the spread of illness to people in whom infection can be devastating, are developed with careful consideration of the cost/benefit tradeoff. As health care professionals, our challenges are to do a better job of assessing who should receive the available supply and to ensure that those within this group who are missed also receive vaccinations. This will require a cultural shift guided by the understanding that this is an important public health issue.

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Best Practice From a Health Plan Standpoint: The 'Who, How, and When' Of Influenza Immunization

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Health plans must address many challenges with regard to influenza. The first is the low benefit coverage elected by certain employers for some groups at high risk of influenza complications. Second, immunogenicity and effectiveness of vaccines are not optimized, and effectiveness and safety studies are needed on a yearly basis. Third, the implementation of vaccine programs is difficult. Payers, depending upon their structure, must deal with supply delays, the need for flexibility in scheduling and capacity, unpredictable public demand, and perhaps the biggest challenge — communication of our message to our target populations.

This article describes some of the strategies used by Humana and other health plans to improve care.

Who: identifying those needing immunization

Commercial health plans can identify members who would benefit from influenza immunizations by way of many techniques. Analyses of various claims data can aid this process.

Medical claims. Diagnoses using ICD-9 codes can be extremely helpful in targeting patients, such as those with diabetes or asthma, for influenza immunization. Tracking the types of services patients receive also can be useful. We know, for example, that someone who has recently been hospitalized for a cardiac event will probably be at risk for influenza complications and should be considered a potential candidate for immunization. Procedures such as cardiac catheterization, or laboratory tests such as a hemoglobin A_{1C} test or cluster of differentiation (CD)4 and CD8 counts, also will act as flags or triggers for immunization.

Pharmacy claims. In some respects, pharmacy claims address the issue of identification on a real-time basis and provide data more rapidly than medical claims. Even if people do not regularly visit their physicians, we can presume that they are taking their medications if claims for prescriptions are made. Additionally, looking specifically at the national drug codes and the particular medication classes that are being used are other ways to locate patients who are immunization candidates.

Data outside of claims. Outside of the claims realm, data may be located in registries grouped by age (e.g., children or the elderly), diagnoses (which helps to prevent losing track of a member due to a change in employer), and employer characteristics. For example, does the employer offer influenza immunizations on a regular basis? Does it host a health fair on a specific date?

Another aspect to consider is how the employer pays for services. Is the employer fully insured or self-funded? The answer will play a part in the economics of its immunization policies. We also examine member-generated information, including health risk assessments that look specifically at such lifestyle choices as smoking. We will not get that information from claims data, though it will certainly have an impact on risk. Past medical history and information from a previous carrier or vendor also can be helpful.

The bottom line is that although claims are very useful, additional data can help with the sensitivity and specificity of identifying the cohort at greatest need for influenza immunization.

How: engaging enrollees

Once the health plan members who need to be immunized have been identified, the next issue is to determine the best manner by which to engage them. I suggest several rules of engagement. First, the method of contact must reach the member where he or she is located, be it by regular postal mail, secured e-mail, or even voice application technology. Many of our members are not computer savvy or may not have a computer in their home. As a result, they will not have access to any information on our plan's Web site. When we enroll them, we ask them for their preferred method of contact, and we communicate with them in that manner.

We also have to make sure that our external partners, especially those in disease management, are on board with our plans. We can then create patient lists to be mailed to physicians if we are not planning to visit them. Many times, our quality improvement nurses will meet with the physicians, providing them with resources, such as a list of their patients who satisfy the criteria for influenza immunization.

Of course, this information must be provided in a timely manner, ideally before influenza season begins, and it must be accurate. We have to provide new and updated lists on a regular basis, and we must reinforce the importance of the program.

ALBERT TZEEL, MD, MHSA

Reinforcing the rules of engagement

We use several methods of reinforcement when following up on our rules of engagement. One program is called Personal Nurse, in which our nurses — among their many duties — educate members on the benefits of influenza immunization and help them understand how they can take charge of their own health. They use a number of techniques, but the most common is *motivational interviewing,* a well-known, scientifically tested method of counseling developed by Miller and Rollnick (1991) to treat lifestyle problems and disease. Motivational interviewing relies upon identifying and mobilizing an individual's intrinsic values and goals to stimulate behavior change (Rubak 2005).

We also target individuals after a so-called health shock, which takes advantage of both timing and a particular health situation to encourage lifestyle changes or to affect behavior. Health shocks often are used as a method of engaging the member when, for instance, a person has been hospitalized for a heart attack and may be more willing to make healthy lifestyle changes or do something positive — like getting an influenza immunization — to reduce the future risk of illness.

Another way to engage members is to let them know that the health plan will try to provide coverage to the fullest extent under their benefit design, and to make the process as easy as possible.

The role of the physician affiliated with the health plan

Health plans may engage patients through their physicians (Table, page 12). In some cases, health plans have requests to buy influenza vaccine for physicians, but this occurs infrequently. Depending on their location and the market, some physicians are hesitant to buy vaccine that may go unused and cannot be returned. Another opportunity for a health plan to work with physicians is to jointly sponsor a health fair in conjunction with the Visiting Nurse Association or similar group.

Using benefit design to promote immunization

We also can structure benefit design to encourage influenza immunization. One issue here relates to how we define *preventive care* and whether it means routine preventive care across the board or only for certain high-risk populations. That becomes an important issue with consumer-directed and high-deductible health plans. Often, depending on the plan design, preventive care may not be necessarily applied toward the deductible. One solution is to have the vaccination apply toward the deductible and allow the member to use a health savings account (HSA) to cover out-of-pocket costs. Another option is to provide reimbursement coupons for members who are administered the vaccine at locations outside the physician's office, such as retail pharmacies or health fairs.

Incentives can be given that motivate, rather than mandate, patients to adopt healthy behaviors. Some examples used by health plans or by our clients include credits toward a member's premium or an additional contribution to the member's HSA. We have experimented with giving rewards, such as credit toward retail gift cards, to members who take health risk assessments and who engage in preventive care.

Using transparency tools to promote immunization

Humana uses many transparency tools, especially in the Milwaukee market, which serves as a prominent beta test site for transparency in the organization.

We have a large employer coalition with about 160,000 members. Our goal is to promote understanding of how influenza immunization affects both the episode of care and the efficiency of the physician. Thus, if a physician can prevent a patient from being hospitalized for an influenza-related complication, that will, of course, improve the physician's overall efficiency across the board relative to his or her peers. We look at the impact of influenza immunization attainment on specific quality measures for the type of care provided and how the publication of the results promotes physician effectiveness. Pay for performance is also part of the care delivery ex-

perience, as is the member's satisfaction and perception of the experience.

When: getting the message out

Although the flu season is limited in duration, preparation is a year-round event. One reason for this activity is that we must constantly update our information sources. Because of claims lag, we may miss data coming in, making identification an ongoing process. Of course, contacts and immunization are best achieved prior to flu season, but can be helpful even during the flu season.

A CQI process

We need to define our expectations and then measure the outcomes. An outcomes analysis will determine whether we have achieved our goals, and then should be tied to the claims analysis to determine the impact on such utilization metrics as admissions, length of stay, and readmissions. Finally, we need to identify areas that require improvement and strategies to optimize our success.

Ultimately, this is about the impact of influenza on our members and how immunization can prevent negative experiences and outcomes.

TABLE
Working with physicians: How health plans can facilitate immunization

- Provide lists of affected members to physicians, who can use visual aids, such as stickers for charts
- Use e-mail or other engagement media on behalf of physicians
- Consider buying the vaccine for physician offices, with reimbursement only for administration
- Jointly sponsor health fairs, either clinic-based for a given physician group or in conjunction with the Visiting Nurses Association

SOURCE: AUTHOR EXPERIENCE

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Case Study: The Real-World Experience Of a Family Practitioner

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The Department of Family and Community Medicine at the University of Illinois College of Medicine runs four teaching practices, one residency practice, and three medical student practices in our area. We manage a school-based health center as well as the health care program for the county jail system and the juvenile detention center. As a result of our diverse patient populations, we confront a range of immunization issues, including: vaccination of health care workers; public misperceptions about the flu and vaccination; vaccine supply and distribution issues; location and timing of vaccination; competing demands of various vaccine schedules; the costs of maintaining and administering vaccine for private offices; and public health marketing of vaccination.

This article will describe the implications of many of these issues.

Vaccination of health care workers

One of our more critical concerns is the need to vaccinate health care workers, who unwittingly function as vectors for flu transmission. Just as the new guidelines issued by the Advisory Committee on Immunization Practices and the Joint Commission on Accreditation of Healthcare Organizations now require health care workers in the hospital setting to consciously opt out of influenza vaccination, this approach also now needs to be implemented in private offices settings and urgent care facilities, where most people receive their medical care. Although some hospitalized patients may be at higher risk for influenza complications, they actually represent only a very small percentage of the at-risk population.

Addressing patient misperceptions

In our practice setting, we must address many patient

misperceptions about influenza and vaccination. They frequently mistake other illnesses — such as simple upper respiratory infections — for the flu, and conclude that the vaccine did not work. Underestimating the potential seriousness of influenza is a common problem. One of our most difficult issues is the widespread belief that the flu vaccine itself can cause the flu. In this circumstance, persuading the public that the live vaccine is safe may be more of a challenge than offering the inactivated vaccine and may require even more extensive explanation.

ERIC HENLEY, MD, MPH

Challenges in primary care offices

Vaccination programs in primary care present many strategic challenges. Chief among these is having a sufficient supply of vaccine available at the appropriate time. This has been a vexing problem for several years, when vaccine was either not available or it arrived too late. The 2-dose vaccine schedule for first-time immunization in children under age 9 also presents challenges with distribution and timing.

In Illinois, where I practice, many primary care physicians have been disturbed about the way in which vaccine is distributed and believe that, in some years, they have been placed at a disadvantage compared with large retail pharmacies. When pharmacies receive the vaccine before physician practices do, it creates a dilemma for physicians who want to promote vaccination. Physicians feel as if they are failing their patients, and that having to redirect them to a retail pharmacy for medical care is counterintuitive. The financial implications of such a scenario also have the potential to make some physicians hesitant to promote vaccination; by the time a vaccine is made available to physician offices, many of the patients have already received it at a pharmacy or elsewhere, and the office must then absorb a loss on a nonreturnable vaccine.

An interesting question arises of whether vaccine distribution should be centralized. When a primary vaccine manufacturer closed one of its plants several years ago, the Centers for Disease Control and Prevention assumed control of about 25 percent of the nation's undistributed vaccine supply. The CDC distributed vaccine to states based on perceived need, and then each state was responsible for appropriate distribution to their counties, districts, or neighborhoods. Accessible supply is a related issue. During one particular season, our office experienced a delay in delivery when a manufacturer had an inaccessible Web site that was to be used to order vaccine.

Some other challenges faced by physician offices include ordering and storing the vaccine and documenting their administration, all of which takes staff time. The availability of a new version of the live vaccine is helpful in that it can be kept in the refrigerator rather than a freezer. Simplified vaccine storage is a key to easier and more reliable management of staff time and effort.

AAFP task force recommendations

Following the nationwide shortages of flu vaccine in 2004 and 2005, the American Academy of Family Physicians (AAFP) convened a task force to look at the issues surrounding influenza immunization. The task force met with manufacturers, representatives of the CDC, state health officials, and family physicians to develop a series of recommendations (Table). Since the AAFP board of directors accepted these recommendations in March 2006, progress has been made on a number of fronts.

Distribution. The most contentious issue involves supply and distribution. It appears that physicians now have a sufficient supply of vaccine, but distribution issues remain a matter of concern. The questions of when the vaccine should be distributed, who gets it, and is the distribution equitable still remain. The AAFP report made a number of suggestions for accomplishing equitable dis-

TABLE

American Academy of Family Physicians influenza task force recommendations

- Ensure that family physicians receive the influenza vaccine necessary to meet patients' needs in a timely manner
- Create and disseminate an influenza tool kit for use in members' practices
- Advocate that the Centers for Disease Control and Prevention recommend administering annual influenza vaccine in the patient's medical home
- Work with the CDC, news media, and others to communicate the message that influenza immunizations can be given as late as February
- Collaborate with the CDC and physician organizations to develop appropriate public messages at times of vaccine shortage of maldistribution
- Examine the possibility of instituting federal buy-back programs for unused vaccine
- Investigate the feasibility of developing an AAFP group purchasing organization for vaccines

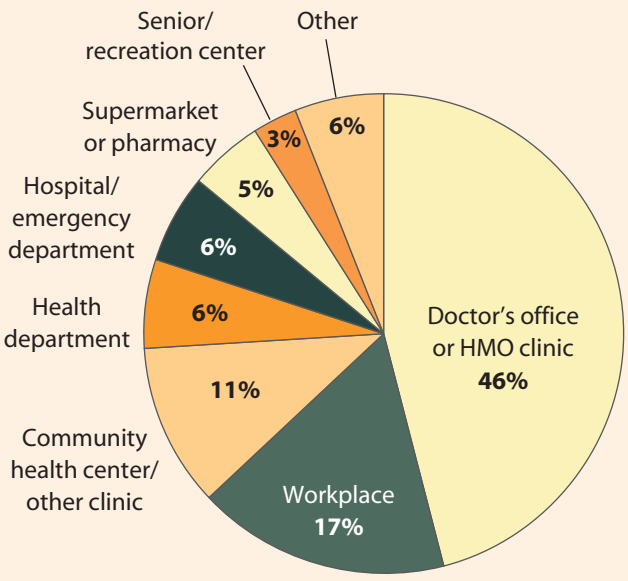
SOURCE: BORGMEYER 2006

Where to get vaccinated?

The county health department in Winnebago County, Ill. (population 300,000) has organized an immunization task force. Hospitals, the Visiting Nurse Association, the community health center, and the University of Illinois College of Medicine are members of this group. When manufacturing problems, short supplies, and unequal distribution posed a threat to protecting high-risk groups, members shared and traded vaccine supplies. In the 2005–2006 season, some physician practices and clinics did not receive any vaccine until late in the season, and the health department loaned its supplies so that patients did not have to be turned away.

The question of where to get vaccinated remains an issue. It is important for options to exist. If the goal is to immunize as broad a population as possible every year, it cannot be accomplished with one method. The concept of primary care as a medical home — where a patient can accomplish other medical discussions or procedures at the time of the immunization visit — versus getting immunization, and only an immunization, at a retail pharmacy requires an ongoing conversation about strategies. Nearly half of people get their vaccinations in physician or HMO offices (Figure).

FIGURE
Where people are vaccinated



SOURCE: CDC 2004

tribution, such as increasing the percentage of vaccine set aside for physicians, prebooking physician orders before opening prebooking to the general marketplace, and guaranteeing timely shipment of vaccine in exchange for prepayment.

Primary care as a medical home. The AAFP, the American Academy of Pediatrics, and the American College of Physicians are developing and distributing a tool kit for practices that addresses the many advantages of using primary care offices as a "medical home" for routine care, including immunizations.

Communications. The AAFP has worked with various stakeholders to communicate that the influenza vaccination period often continues into February. This requires consumer education and marketing similar to the model of the National Institutes of Health National Cholesterol Education Project (NCEP). Before the creation of the NCEP, patients did not accept that lipid levels should be measured regularly and that achieving target levels was good public health policy. As many have come to understand the health benefits of cholesterol monitoring and treatment, so they may come to understand that the influenza vaccine can be administered through late winter and still be effective. In the 2006–2007 season, the CDC made communicating this point a priority for the first time, and this strategy will continue.

Ensuring proper influenza vaccination coverage in the community requires that many parties understand each others' needs and limitations and make the effort to cooperate. It is hoped that the work arising from the vaccine shortages of 2004 and 2005 will facilitate that cooperation for the good of the community.

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Virginia's Stay on Track Daycare Initiative

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This article briefly describes Virginia's Stay on Track Daycare Initiative, which was funded by a grant from America's Health Insurance Plans (AHIP) 2003 Innovations in Immunization Practices. Key stakeholders from Sentara Healthcare, Old Dominion University, and the Virginia Department of Health formed a partnership to pilot this initiative. All stakeholders are members of the statewide immunization coalition called Project Immunize Virginia (PIV).

The primary goals of the Stay on Track Initiative were to:

- Encourage appropriate immunization of children under 24 months of age
- Promote up-to-date record keeping of age-appropriate immunizations
- Decrease exposure to vaccine-preventable illness

SUSAN A. TWEED, MS, RN

Keeping immunization records up to date has several benefits, including prevention of disease outbreaks and provision of assurance to parents that their children are protected from disease. Many states, including Virginia, require parents to provide documentation of age-appropriate immunizations before a child can attend an organized daycare center.[3] Daycare centers also are required to obtain documentation of additional immunizations once every 6 months for children under 2 years of age and documentation of further immunization at least once between the child's 4th and 6th birthdays.

[3] Virginia requires proof of the following immunizations: diphtheria, tetanus, & pertussis; haemophilus influenzae type b; hepatitis B; measles, mumps, & rubella; polio; and varicella, in accordance with vaccination schedules promulgated by the Centers for Disease Control and Prevention, the American Academy of Pediatrics, and the American Academy of Family Physicians (VDH 1999).

Unfortunately, Stay on Track did not involve any of the thousands of children in Virginia who are in informal daycare settings, where no such records exist.

Our investigation revealed that few individuals in the daycare industry were aware of the legal requirements for immunization documentation, and that no standardized tracking mechanisms were in place to ensure that children received the required immunizations when they entered daycare.

Program methods and structure

Fifteen daycare centers from five cities (Virginia Beach, Hampton, Newport News, Norfolk, and Portsmouth) participated in the Stay on Track Initiative between January and September 2004. Cities were selected on the basis of need, a primary consideration being the share of children living below or near the poverty level.

The Institutional Review Board of Eastern Virginia Medical School approved the program structure and methods. Of the 299 children younger than 24 months of age eligible for the study, 185 children (62 percent) participated with parental consent. Individual center participation rates ranged from 39 percent

FIGURE **Intervention story board**

(Portsmouth) to 94 percent (Hampton). Hampton had the greatest need, and its high participation rate is believed to be the result of the presence of an on-site immunization action program (IAP) nurse. In contrast, Portsmouth had no IAP nurse at the time.

IAP nurses and nursing students from Old Dominion University contacted daycare centers and interviewed the directors to determine individual center needs. The Centers for Disease Control and Prevention Immunization Scheduler was used to determine the immunization schedule for each enrolled child. A "tickler" file system also was initiated to track individual immunization compliance for children enrolled in daycare centers without computers.

TABLE
Stay on Track outcomes

Record check	% children up to date in vaccinations (all centers combined)
First check	33
Second check	60
Third check	71
DTaP4	76

SOURCE: SENTARA HEALTHCARE

Intervention steps

The nursing students designed immunization storyboards for display in each center to help educate parents and staff (Figure, page 15). The storyboards were intended to raise parental awareness of the need for immunizations, as well as to help the daycare centers and their staffs appreciate the need for tracking and compliance with state law.

Immunization records were checked monthly at each center. If the child was up to date with vaccinations, a congratulatory letter was sent to the child's parents, along with age-appropriate incentive items such as bibs, rattles, sippy cups, growth charts, and stickers. If immunizations were not up to date, we sent the parents a reminder letter along with an immunization schedule and incentives.

Outcomes and discussion

The Stay on Track Initiative clearly improved the immunization coverage among the participating daycare centers. With the first check of immunization records, we found that only one third of children were up to date; this rate more than doubled by the end of the program (Table). Our primary benchmark was diphtheria, tetanus, and pertussis (DTaP4) in all daycare centers.

It can be asked whether the improvement in outcomes was the result of children actually receiving vaccines or whether records were being reported to daycare centers more accurately. We believe it was a combination of both factors. In many cases, the children may have already received the vaccine, but parents had not produced the updated medical record. This record keeping issue is a reflection of ignorance of the law discussed earlier.

Our study had certain limitations, including a small sample size and a transitory population in the region that makes it challenging to obtain accurate, up-to-date records. We believe the methods, however, have broader applicability to other settings and for other recommended immunizations, including influenza. It should be noted that from a record keeping standpoint, tracking influenza vaccine rates may be more of a challenge than doing so for standard childhood vaccinations because of the many places children can receive a flu shot such as pharmacies, schools, physician offices, and health departments.

Future initiatives

Our primary objective now is to adapt the Stay on Track program to other areas of the state through the PIV coalition. During the course of this program, we also learned that social service departments provide most of the continuing education for daycare workers. As a result, future programs will involve partnerships with social services agencies so that immunization tracking and awareness is a regular component of their training programs. This program will:

- Establish a system of obtaining up-to-date immunization records
- Increase awareness of the need to obtain immunization records every 6 months for children less than 24 months of age and yearly afterward
- Encourage daycare centers to use August and February as immunization record update months

Conclusion

The Stay on Track Initiative helped to improve child immunization rates and parent provision of immunization records largely through heightening awareness in the community. The presence of an IAP nurse may further boost awareness and, subsequently, outcomes. Lessons learned from the pilot program are being incorporated into formal training for daycare workers and can be viewed as an important public health advancement at the local levels and a model for communities to follow.

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Overcoming Barriers to Immunization

How can health care professionals and payers work together to overcome influences that prevent achievement of national influenza immunization goals? The expert panel wrapped up its session with a robust discussion of how to resolve several provider-related barriers to immunization.

The Faculty

Robert B. Belshe, MD (moderator)
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Health Educator
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Albert Tzeel, MD, MHSA
Vice President and Chief Medical Officer
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ROBERT B. BELSHE, MD: There are numerous barriers to vaccination that prevent achievement of national immunization goals. These obstacles fall into three main areas: system barriers, which involve the health care system and economics; health care provider barriers; and patient-perceived or parent-perceived barriers (Table). With respect to overcoming provider-related barriers, what should we think about?

ANN-CHRISTINE NYQUIST, MD, MSPH: I think it is important to look to the physician's office staff to identify the drivers of immunization practices within that office. I suggest that greater than 50 percent of the time, they are not the physicians but the people who check in the patient at the front desk. The first inter-

TABLE
Barriers to immunization

System-related barriers
- Inadequate supply
- Maldistribution of supply
- Gaps in funding (e.g., CDC pays for low-income children's vaccines but not for administration)
- Incentives exist to require multiple visits for single immunizations
- Uninsured population

Provider-related barriers
- Fragmentation of care (e.g., shots given at pharmacy or place of employment)
- Lack of access to prior immunization records
- Time pressures on physicians
- Missed opportunities when patients are present
- Changing recommendations/knowledge deficits
- Lack of EMR or immunization registries to facilitate reminders
- Vaccine storage
- Economics of immunization (e.g., nonreturnable vaccines purchased in advance)
- Administrative hassles involving payers

Patient-related barriers
- Patient beliefs, myths, and fears (e.g., reports about unproven, possible links to autism)
- Confusion about changing immunization schedules
- Cultural barriers/mistrust of health care providers
- Social issues (e.g., poor literacy skills)
- Lack of transportation
- Availability of services during off-work hours
- Expense or misconceptions about benefit coverage
- Frequent illnesses delay immunization schedule
- Inconvenience (two well visits required)
- Lack of patient education
- Legal issues (e.g., illegal residency)

CDC=Centers for Disease Control, EMR=electronic medical record.
SOURCES: PÉCOUL 1999, CHEN 2007, MILLS 2005, OSTER 2005, KIMMEL 2003, KIMMEL 2007, BURNS 2005, ZIMMERMAN 2001, KIMMEL 1996, SALSBERRY 1993.

action with the patient is really the time to engage that person.

ERIC HENLEY, MD, MPH: The nurse often has a more trusted relationship with a patient than the doctor does. But for most preventive things, the biggest driver is the physician's recommendation.

BELSHE: It will take a major education effort to get internists — and every provider who sees adult patients — involved in implementing the new influenza vaccination schedule. I think we're going to get some help from the manufacturers of [adult vaccines] Adacel (Tdap [tetanus, diphtheria, and pertussis]), Gardasil [human papillomavirus], and Menactra [meningococcus]. They will have a vested interest in education and effective implementation. The Centers for Disease Control and Prevention has issued a good checklist of questions[4] that every patient should be asked.

HENLEY: I agree, but there is an unbelievable number of vaccinations. I think the question is how to get this done, because there are competing demands.

BELSHE: The CDC checklist is a good mechanism. Patients get it as they walk in the door so that it can be reviewed by the nurse and discussed with the patient. I think you have to take the physician out of that as much as possible so that that it is built into the system of care.

ALBERT TZEEL, MD, MHSA: I think that a lot of it is leading by example and not just leaving it up to the physician. The point is that if you get your entire office staff immunized against the flu, you demonstrate your commitment. That will have an impact on the patient.

HENLEY: Make the process easy for people who are willing to take the vaccine. So, for example, take people whenever they want to come in. That's really why people go to Walgreens for a flu shot.

NYQUIST: What if we increase availability in schools?

HENLEY: That's a great example, and Susan Tweed talked about daycare-based health centers [see page 15]. But who's going to fund that?

BELSHE: School administrators whose budgets depend on the number of child days of attendance may be interested, but if their budget is coming some other way, it's not as meaningful to school administrators.

STEVEN R. PESKIN, MD, MBA: Will health plans see children as an important focus for influenza vaccination? Or do you think they are on board with influenza immunization?

TZEEL: We have been focused, primarily, on the elderly and high-risk children. We have a pediatric clinical team that follows up on immunizations, but most of that attention is going to be given to children who have comorbidities or who are at increased risk. When the ACIP guidelines are changed, our system is set up to follow the new guidelines and allow for payment for administration of vaccine to 2-year-olds. It's the right thing to do.

SUSAN A. TWEED, MS, RN: In the community health area, I see a big change. Our system is trying to focus more on preventive activities, such as immunization. When you concentrate only on the sick, you're not doing anything to keep the healthy population well. We have to find ways to promote and support living a healthy lifestyle.

HENLEY: I think there is an advantage to being an integrated system when doing that kind of work, because the provider and the beneficiaries are part of your system. So instead of giving a care management fee to the practice, you can develop a community health outreach component within your system that goes out to the practices. A plan that doesn't have an integrated system and is responsible only for beneficiaries may not have the same incentive, because their members are distributed widely and not enough of them are in any one practice.

TZEEL: You are talking about individual groups, but we still look at it from the entire population. There is still an incentive for us to get involved in the community. For example, we worked with a couple of large employers, one of which has a large facility in Kenosha, Wis. We worked with them to develop a community outreach focus for people in the Kenosha area. It wasn't just for their employees, but something that could benefit the entire community — even though many people were not Humana members.

NYQUIST: This kind of community outreach approach was done in the 1970s and 1980s with the mass vaccination of Japanese schoolchildren. In Japan, many schoolchildren live in the same house with their grandparents, so programs to vaccinate schoolchildren were initiated as a means to protect its elderly. The program resulted in annual declines of 10,000 to 12,000 deaths attributed to influenza and pneumonia, and 37,000 to 49,000 deaths from any cause — 1 death for every 420 children vaccinated (Reichert 2001). Eventually, the program was discontinued and excess mortality increased sharply. So, sometimes, the return on investment doesn't seem as direct in one population, but you have to look for the outcomes in another.

BELSHE: The issue that it's not just about individual prevention, but the herd effect — society as a whole — is going to be true for several diseases; by vaccinating children, we can reduce the spread to adults, and vaccination of adults [with the several vaccines mentioned above] is going to protect kids. It is going to work both ways. We anticipate disappearance of meningococcal disease in infants by vaccinating older

[4]See «http://www.cdc.gov/vaccines/recs/schedules/adult-schedule.htm#avacs».

children. So, there are a number of secondary benefits that we expect, and they will need to be demonstrated for pertussis and meningococcus.

TWEED: Provider groups are always asking for the literature on the cost/benefit analysis. What do recent studies show about the cost benefits of influenza vaccination?

BELSHE: There have been several studies published in the last year (Prosser 2006, Salo 2006, Esposito 2006). The benefits are substantial — in the $40 to $50 range — but even these studies do not measure the effects of indirect protection. When you begin measuring a herd effect, then you really see the benefit. Theoretical calculations estimate that 70 percent penetration of vaccine into a population gives you 99 percent protection. If those figures hold true, we are going to see large secondary benefits with this approach.

HENLEY: I think that looking at economic benefits that are not directly measurable in the simplest ways is a very good point. Payers or hospitals need to understand that the return on investment is a little different — there are many indirect benefits for populations you're not thinking about or that will become evident down the line.

BELSHE: This suggests that providers and insurers should come together to discuss the new and emerging vaccines, delineate the expected benefits, and offer recommendations for achieving high penetration in target populations.

PESKIN: There is one other stakeholder — employers, which sometimes are reluctant to be part of the message that health plans and physicians want to convey.

HENLEY: What's the line of thinking?

TZEEL: There are two extremes on this. On one side, you have employers who want to mandate disease management programs and a health risk assessment as a condition of medical coverage. These employers also provide healthy food in their cafeterias and have onsite gyms. Then you have the other group that says, "I'm afraid to do anything, especially for my population that's more ill, because if I do I am discriminating against my healthy population."

TWEED: With premiums rising so high, employers want us to do something to control prices.

TZEEL: Right, but a lot of that is a push on the price side. They still aren't willing to look at return on investment 3, 4 or 5 years down the line. And if they are starting to shop for price, they'll leave my plan and go to plan X or Y, and a year later they'll go to a different one. We don't even have a chance to get our programs up and going.

HENLEY: And the patient may have to move between providers every year.

TWEED: I think that says that, as an insurance system, we must provide preventive care that is standardized. We all would benefit from that.

HENLEY: We would, but not everybody always sees it that way.

TWEED: We have to find ways to promote and support living a healthy lifestyle.

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Influenza Vaccination: Trends, Recommendations, and Best Practices

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EXAMINATION

Place an X through the box of the letter that represents the best answer to each question on pages 21. There is only ONE correct answer per question. Place all answers on this form.

	A	B	C	D	E
1.	☐	☐	☐	☐	
2.	☐	☐	☐		
3.	☐	☐	☐	☐	
4.	☐	☐			
5.	☐	☐	☐	☐	
6.	☐	☐	☐	☐	☐
7.	☐	☐			
8.	☐	☐	☐	☐	
9.	☐	☐	☐	☐	
10.	☐	☐	☐	☐	
11.	☐	☐	☐	☐	
12.	☐	☐	☐	☐	

PROGRAM EVALUATION

So that we may assess the value of this self-study program, we ask that you fill out this evaluation form.

Have the activity's objectives, listed below, been met?

1. Improve vaccination rates in managed care.
☐ Yes ☐ No

2. Review strategies used for influenza prevention, diagnosis, and management, especially in vulnerable populations.
☐ Yes ☐ No

3. Assess burden of disease associated with influenza in all populations.
☐ Yes ☐ No

4. Evaluate the economic impact of influenza.
☐ Yes ☐ No

Was this publication fair, balanced, and free of commercial bias?
☐ Yes ☐ No

If no, please explain: _____

_____

_____

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_____

Did this educational activity meet your needs and contribute to your personal effectiveness? Please indicate your level of agreement:

Strongly agree.....5
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Did it improve your ability to:

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5 4 3 2 1 N/A

Communicate with patients?
5 4 3 2 1 N/A

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5 4 3 2 1 N/A

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_____
5 4 3 2 1 N/A

Effectiveness of this method of presentation:

Excellent	*Very good*	*Good*	*Fair*	*Poor*
5	4	3	2	1

What other topics would you like to see addressed? _____

_____

_____

_____

Comments _____

_____

_____

_____

CONTINUING EDUCATION POST-TEST

Influenza Vaccination: Trends, Recommendations, and Best Practices

Please refer to the combined answer sheet/evaluation form on page 20. On the answer sheet, place an X through the box of the letter corresponding with the correct response for each question. There is only one correct answer to each question.

1. **Vaccines currently approved in the United States to prevent influenza infection are trivalent inactivated influenza vaccine administered via _____, and live attenuated influenza vaccine administered via _____.**
   a. Nasal spray; oral medication.
   b. Intramuscular injection; nasal spray.
   c. Oral medication; intramuscular injection.
   d. Intramuscular injection; oral medication.

2. **The Advisory Committee on Immunization Practices (ACIP) recommends that children receive how many doses of the influenza vaccine the first time they are vaccinated?**
   a. One.
   b. Two.
   c. ACIP makes no such recommendation.

3. **Estimates by Thompson (2003) indicate that influenza is associated with about how many deaths (from all causes) annually in the United States?**
   a. 20,000.
   b. 36,155.
   c. 51,203.
   d. 114,000.

4. **Of the clinically relevant types of influenza virus, type B is generally associated with the most severe illness.**
   a. True.
   b. False.

5. **The incubation period for influenza viruses ranges from 18 hours to approximately ____ days.**
   a. 3.
   b. 4.
   c. 5.
   d. 6.

6. **Which of the following are considered provider-related barriers to immunization?**
   a. Fragmentation of care.
   b. Changing recommendations and knowledge deficits.
   c. The economics of immunization.
   d. All of the above.
   e. Answers a and b only.

7. **In a study by Belshe (2007), which type of influenza vaccine had significantly better efficacy among young children?**
   a. Live attenuated influenza vaccine (LAIV).
   b. Trivalent inactivated vaccine (TIV).

8. **One strategy for engaging patients to help them understand the benefits of influenza immunization is *motivational interviewing*, which relies upon identifying an individual's intrinsic _____ to stimulate behavior change.**
   a. Feelings and emotions.
   b. Strengths and weaknesses.
   c. Values and goals.
   d. Fears and concerns.

9. **As a strategy for preventing the spread of influenza, the concept of "herd protection" involves mass vaccination of:**
   a. Children.
   b. Working-age adults.
   c. The elderly population.
   d. The institutionalized population.

10. **The American Academy of Family Physicians makes several recommendations for accomplishing equitable distribution of the flu vaccine. Which of the following is not one of these recommendations?**
    a. Increasing the percentage of vaccine set aside for physicians.
    b. Prebooking physicians' orders before opening prebooking to the general marketplace.
    c. Providing those practices with the largest at-risk populations early access to the vaccine.
    d. Guaranteeing timely shipment of vaccine in exchange for prepayment.

11. **Nichol (2001) estimated that in working-age adults, influenza accounts for _____ lost work days per episode:**
    a. 1.8 to 2.4.
    b. 2.8 to 3.4.
    c. 3.4 to 4.0.
    d. 4.0 to 5.0.

12. **According to Tweed, one site for the Stay on Track initiative (Hampton) had the highest participation rate among all sites because:**
    a. It had the greatest need.
    b. The presence of an onsite immunization action program nurse facilitated participation.
    c. Immunizations were offered at no charge.
    d. Hampton's staff was more aware of state laws requiring documentation of immunization than staffs at other sites.