Influenza in the Nursing Home

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Although influenza affects persons of all ages, the Centers for Disease Control and Prevention has identified several groups who are at increased risk for complications. One such group is residents of nursing homes or other long-term care facilities. During influenza epidemics, mortality rates among nursing home residents often exceed 5 percent. To lessen the impact of this infection, the influenza vaccine is recommended as the primary way of preventing the illness and its complications. Many studies have shown that vaccination of nursing home residents and staff can significantly decrease rates of hospitalization, pneumonia, and related mortality. When an influenza outbreak occurs in a nursing home, several measures can be implemented by the treating physician. Treatment and prophylaxis can be accomplished using antiviral medications such as amantadine, rimantadine, and oseltamivir. The antiviral medication zanamivir can be used in the treatment of influenza, but not for prophylaxis. Once an outbreak has been established, control measures, including vaccination of unvaccinated residents and employees, and limitations on resident movement and visits, can be implemented. (Am Fam Physician 2002;65:75-8. Copyright© 2002 American Academy of Family Physicians.)

See page 72 for definitions of strength-of-evidence levels contained in this article.

Patients with influenza, an acute respiratory disease caused by infection with influenza viruses, typically present with systemic signs of infection, including fever, myalgias, headache, sore throat, and cough *(Table 1)*.[1,2] Outbreaks occur nearly every year during the winter months and significantly increase morbidity and mortality from all causes, especially cardiovascular and pulmonary diseases, and certain metabolic conditions.

Populations at high risk for complications from influenza are very young children, persons 65 years of age and older, and persons of any age who have an underlying health condition.[2] Within these high-risk populations, influenza may cause lower respiratory tract infection or predispose persons to subsequent bacterial pneumonia.

Impact of Influenza

In 1997, pneumonia and influenza constituted the sixth leading cause of death in the United States.[3] Persons older than 65 years accounted for more than 90 percent of the deaths attributed to influenza.[4] Among persons older than 65 years, nursing home residents are at particular risk for the complications of influenza. In addition to heightened susceptibility because of age and comorbid conditions, such residents also have a higher risk of exposure. Nursing home staff, personal visitors, volunteers, and other visitors from the community provide numerous sources of exposure to the influenza virus.[5]

As a result of these risks, influenza has a major impact on residents of nursing homes, where influenza attack rates typically range from 20 to 30 percent, and even higher rates have been documented.[6] In addition, mortality rates during such influenza outbreaks often exceed 5 percent.[6]

Influenza Prevention

Administration of the influenza vaccine is the primary method of preventing the disease and its severe complications [Evidence level A, meta-analysis].[7] In the 2000 report from the Advisory Committee on Immunization Practices, the primary target group for the influenza vaccine is persons 50 years of age and older.[2] A specific subgroup consists of residents of nursing homes and other long-term care facilities that house persons of any age who have chronic medical conditions.

The vaccine has been shown repeatedly to decrease the serious complications of influenza in the nursing home setting. Although it is only 30 to 40 percent effective in preventing upper respiratory illness,[5] the efficacy of the vaccine improves with the more serious effects of influenza infection. One

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recent meta-analysis[7] has shown vaccine efficacy of 50 percent in preventing hospitalization, 53 percent in preventing pneumonia, and 68 percent in preventing death.

A number of studies have also shown that nursing homes with high rates of vaccinated residents have fewer outbreaks of influenza than nursing homes with lower vaccination rates.[5] A similar correlation exists among the staff members of nursing homes. The higher the proportion of staff receiving the influenza vaccine, the lower the incidence of influenza among staff and residents during an outbreak.[6,8] In addition, vaccination of both residents and staff can lead to herd immunity. To achieve this goal, the vaccination rate among residents and staff should exceed 80 percent.[4]

Because of these data, the Centers for Disease Control and Prevention (CDC) has targeted residents and staff of nursing homes as recipients of the influenza vaccine.[2] With the concurrence of the attending physician, all consenting nursing home residents should receive the vaccine at the same time before the influenza season begins. Nursing home staff should also receive the influenza vaccine at this time. New nursing home staff and new nursing home residents admitted between October and March should be offered the influenza vaccine [Evidence level C, consensus opinion].[2]

The optimal time to give the influenza vaccine is from early October to mid November. This timing allows for adequate immunity to develop before the peak influenza season of late December through March.[2] However, a recent CDC policy recommends immunizing populations at high risk for influenza complications during September and October. This recommendation was made because of the short supply of the influenza vaccine.[9]

TABLE 1
Comparing the Symptoms of Influenza and the Common Cold

Symptom	*Influenza*	*Common cold*
Onset	Abrupt	More gradual
Fever	Common: 37.7 to 40°C (100 to 104°F)	Uncommon or an increase of only about 0.5°C (1°F)
Myalgia	Severe, common	Uncommon
Arthralgia	Severe, common	Uncommon
Anorexia	Common	Uncommon
Headache	Severe, common	Mild, uncommon
Cough (dry)	Common, severe	Mild to moderate
Malaise	Severe	Mild
Fatigue, weakness	More common, lasting two to three weeks	Very mild, short-lasting
Chest discomfort	Common, severe	Mild to moderate
Stuffy nose	Occasional	Common
Sneezing	Occasional	Common
Sore throat	Occasional	Common

Adapted with permission from Montalto NJ, Gum KD, Ashley JV. Updated treatment for influenza A and B. Am Fam Physician 2000;62:2469; based on information from Dolin R. Infectious disease. In: Fauci AS, et al., eds. Harrison's Principles of internal medicine. 14th ed. New York: McGraw-Hill, 1998:1112-6; and Is it a cold or the flu? Retrieved October 2001, from: http://www.niaid.nih.gov/publications/cold/sick.htm.

There are several contraindications to the influenza vaccine. Patients with a known anaphylactic hypersensitivity reaction to eggs should not be vaccinated. Patients with an acute febrile illness should not receive the vaccine until their symptoms have resolved. In addition, patients with previous reactions, including anaphylaxis, to the influenza vaccine should not be vaccinated.[2]

Most vaccine side effects involve local reactions, such as soreness at the injection site, that may last up to two days. More serious reactions occur less frequently, and anaphylactic reactions are rare. The 1976 swine flu vaccine was associated with an increased frequency of Guillain-Barré syndrome. A recent study[10] showed that the risk of Guillain-Barré syndrome was 1.7 times higher in the six weeks following the administration of the influenza vaccine in 1992 and 1993. This risk level translates into less than one extra case of Guillain-Barré syndrome per 1 million vaccinated persons.

Treatment

Two categories of antiviral medications, ion channel activity blockers and neuraminidase inhibitors, are currently available in the United States for use against

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TABLE 2
Influenza Medications

Agent	*Influenza type*	*Treatment or prophylaxis*	*Dosage in nursing home residents**	*Duration of therapy*	*Cost†*
Amantadine (Symmetrel)	A	Both	100 mg per day (Pro and Tx)	Until 24 to 48 hours after symptom resolution	$ 2.00
Rimantadine (Flumadine)	A	Both	100 mg per day (Pro and Tx)	Until 24 to 48 hours after symptom resolution	10.00
Zanamivir (Relenza)	A and B	Treatment	10 mg twice per day (Tx only)	Five days	48.00
Oseltamivir (Tamiflu)	A and B	Both	75 mg twice per day (Pro and Tx)‡	Five days	60.00

Pro = prophylaxis; Tx = treatment.

**—Dosage is usually 200 mg per day for amantadine and rimantadine for prophylaxis and treatment unless the patient is older than 65 years or has significant renal impairment.*

†—Based on five-day course of therapy at regular dosage level, rounded to the nearest dollar. Estimated cost to the pharmacist based on average wholesale prices in Red book. Montvale, N.J.: Medical Economics Data, 2001. Cost to the patient will be higher, depending on prescription filling fee.

‡—In patients with impaired renal function, 75 mg per day.

Information from references 2, 11, and 12.

influenza. The ion channel activity blockers, amantadine (Symmetrel) and rimantadine (Flumadine), appeared on the market before the neuraminidase inhibitors zanamivir (Relenza) and oseltamivir (Tamiflu).

Amantadine and rimantadine are currently approved by the U.S. Food and Drug Administration (FDA) for the prophylaxis and treatment of influenza A in adults *(Table 2)*.[2,11,12] These medications are active against influenza A viruses but not against influenza B viruses.[2] The medications inhibit the uncoating of influenza A viruses by blocking the ion channel activity of the viral M2 protein.[13]

When used in the treatment of influenza A, amantadine and rimantadine can reduce the duration of uncomplicated influenza A illness. However, these drugs must be administered within two days of the start of the illness to be effective.[13] Treatment should continue until 24 to 48 hours after the symptoms disappear. Because of renal clearance, the daily dosage of amantadine and rimantadine in persons older than 65 years should not exceed 100 mg per day for treatment or prophylaxis.[2]

Chronically ill and elderly persons have a higher incidence of side effects while taking amantadine and rimantadine. Both medications can cause gastrointestinal effects such as anorexia and nausea. However, amantadine has significantly more side effects relating to the central nervous system than rimantadine, including confusion, anxiety, insomnia, hallucinations, and falls in nursing home residents[4,14] [Reference 14: Evidence level B, clinical cohort study]. Amantadine also has significantly higher discontinuation rates (up to 17 percent).[14] Because of this higher incidence of adverse effects and higher discontinuation rates, rimantadine should be the drug of choice in the prophylaxis and treatment of influenza A in nursing home residents.

Two neuraminidase inhibitors, zanamivir and oseltamivir, received FDA approval in 1999 for use in the treatment of influenza.[2] These medications exhibit activity against influenza A and B infections *(Table 2)*.[2,11,12] Recently, oseltamivir was approved for use in the prophylaxis of influenza A and B in patients older than 13 years.[9]

As with amantadine and rimantadine, treatment with zanamivir and oseltamivir must begin within two days of the onset of illness, preferably within 30 hours of the appearance of symptoms. Studies have shown that when taken within 30 hours of symptom onset, oseltamivir and zanamivir can reduce the symptoms of uncomplicated influenza by one and one half to three days.[11,15]

The recommended duration of treatment for zanamivir and oseltamivir is five days. In nursing home residents with impaired renal function, the dosage of oseltamivir should be decreased to 75 mg per day. Limited data exist on the effects of zanamivir in patients with impaired renal function.[2]

Fewer side effects occur with the neuraminidase inhibitors than with amantadine and rimantadine. Zanamivir can cause nasal irritation, nausea, and vomiting.[15] The most common side effects of oseltamivir are headaches, nausea and vomiting.[12]

Because amantadine has a higher incidence of adverse effects and higher discontinuation rates, rimantadine should be the drug of choice in the prophylaxis and treatment of influenza A in nursing home residents.

TABLE 3
General Containment Measures for Influenza Outbreaks in Nursing Homes

Resident measures*
Isolate residents with influenza or influenza-like illness[1,6]
Isolate residents receiving amantadine (Symmetrel) or rimantadine (Flumadine) because they may shed resistant virus[6]
Decentralize activities to separate symptomatic residents from asymptomatic residents[1]
Re-offer vaccine to unvaccinated residents[6]
Staff measures*
Encourage symptomatic staff to take sick leave[4]
Staff who remain at work should wear masks and wash hands frequently[4]
Re-offer vaccine to unvaccinated staff[4]
Physician measures*
Begin chemoprophylaxis as early as possible when influenza A outbreaks are confirmed or suspected[6]
Have approved, preprinted orders on hand to facilitate the rapid administration of treatment and chemoprophylaxis[4]
Laboratory confirmation
Viral culture[6]
Direct fluorescent antibody and enzyme immunoassay methods (rapid, results within a few hours, many commercial kits available)[6]
Nasal, nasopharyngeal, or throat swabs (difficult to perform in a nursing home, serodiagnosis requires two to four weeks)[6]

*—Evidence level C, expert opinion.

Information from references 1, 4, and 6.

Management of Outbreaks

Recognizing an influenza outbreak in a nursing home can be difficult. The clinical presentation of influenza can vary in these patients. Symptoms may range from the classic influenza symptoms mentioned in *Table 1*[1,2] to a simple functional decline. Fever and respiratory symptoms may or may not be present.[4] In addition, illnesses with other etiologies such as parainfluenza, respiratory syncytial virus, adenovirus, allergies, and bacterial pneumonia can have symptoms similar to those of influenza. In general, a clinical outbreak is defined as three or more residents in an individual nursing unit with an influenza-like illness and an oral temperature of at least 37.7°C (100°F) or a rectal temperature of at least 38.3°C (101°F) within a three-day period.[4,6]

Anytime a nursing home resident presents with influenza-like symptoms or another respiratory illness, the possibility of an influenza outbreak should be considered. An outbreak should be defined clinically and by laboratory testing. Once an outbreak is clinically suspected, several laboratory tests and viral cultures can be used to confirm the outbreak and distinguish influenza from other etiologies. These tests generally have sensitivities as high as 90 percent. If an outbreak of influenza is confirmed, several measures to prevent further transmission and reduce susceptibility should then be implemented by nursing home staff and physicians *(Table 3)*.[1,4,6]

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