Colds and Influenza (the Flu)

WHAT ARE COLDS AND FLU?

Upper Respiratory Tract Infections

Upper respiratory tract infections affect the airways in the nose, ears, and throat. They can be caused by viruses, bacteria, or other microscopic organisms. In most cases these infections are colds or mild influenza (flu) and are temporary and harmless. In rare cases, flu can be severe or the infections may affect the throat, ears, or sinuses or even evolve into pneumonia. [For information on other upper respiratory tract infections, see also *Pneumonia*; *Ear Infections (Otitis Media) in Children*; and *Sinusitis*.]

Organisms that cause these upper respiratory tract infections are generally spread by the following:

- Direct contact (such as hand-to-mouth).
- Coughing or sneezing droplets that contain the organisms in the air.

The Common Cold

The common cold (medically known as infectious nasopharyngitis) is the most common upper respiratory tract infection. More than 200 viruses can cause colds. The most common cause is the rhinovirus, which is responsible for about half of all colds. It usually takes between one and three days from exposure to the virus until symptoms wear off.

A cold usually progresses in the following manner:

- It nearly always starts rapidly with throat irritation and stuffiness in the nose.
- Within hours, full-blown cold symptoms usually develop, which can include sneezing, mild sore throat, fever, minor headaches, muscle aches, and coughing.
- Fever is low-grade or absent. In small children, however, fever may be as high as 103 degrees F for one or two days; it should go down after that and be normal by the fifth day.
- Nasal discharge is usually clear and runny the first one to three days. It then thickens and becomes yellow to greenish.
- The sore throat is usually mild and lasts only about a day. A runny nose usually lasts two to seven days, although coughing and nasal discharge can persist for more than two weeks.

Influenza

Influenza, commonly called the flu, is always caused by a virus. The symptoms usually occur as follows:

- Abrupt onset of severe symptoms, which include headache, muscle aches, fatigue, and high fever (up to 104 degrees F).

- Other symptoms that may occur or not include cough (which is usually dry but can be severe) and sometimes a runny nose and sore throat.

- Children may experience vomiting and diarrhea, as well as other flu symptoms.

The Influenza Viruses. Viruses are basically gene packages wrapped in protein membranes and coated with a fatty envelope spiked with molecules called glycoproteins. Three strains of influenza have been identified according to the make-up of the glycoprotein spikes and whether the viruses have one or two membranes. The two major influenza strains referred to as A and B:

- Influenza A is the most widespread and can even animals and humans. Influenza A is the cause of the major pandemics (worldwide epidemics) of influenza that have occurred. It is usually further categorized by two subtypes based on two substances that occur on the surface of the viruses: hemagglutinin (H) and neuraminidase (N).

- Influenza B infects only humans. It is less common than Type A, but is often associated with specific outbreaks, such as in nursing homes.

Based on a final analysis of the 2001-2002 flu season, nearly 90% were type A and about 10% were type B. Influenza A usually causes more severe disease than type B, but because influenza B has been less common in the past few years, there is some concern that some people, particularly small children, may have fewer antibodies to it and so may be at higher risk for severe infection.

HOW ARE COLDS AND INFLUENZA DIAGNOSED?

Differentiating Between a Cold and Flu

Differentiating between a cold and flu is often one of degree and may be difficult. Cold symptoms are nearly always milder than those of the flu. [*See Table* Comparing Colds and Flus.]

Comparing Colds and Flus

Symptoms	**Cold**	**Flu**
Fever	Rare	Common and high (102-104°F); lasts 3-4 days.
Headache	Rare	Almost always present.
General aches and pains	Mild	Often severe.

Fatigue, exhaustion, and weakness	Mild	Extreme exhaustion is early and severe. Fatigue and weakness can last two to three weeks.
Stuffy nose	Nearly always	Sometimes.
Sneezing	Very common	Sometimes.
Sore throat	Common	Sometimes.
Chest discomfort and cough	Mild to moderate, hacking cough	Common, can be severe.
From National Institute of Allergy and Infectious Disease.		

Diagnostic Tests for Influenza

Tests are available to isolate and identify viruses responsible for some respiratory infections. A test(ZstatFlu) is now available for diagnosing influenza A and B rapidly. They use samples obtained with a swab from one nostril and can provide results in only about 20 minutes.

Ruling out Other Causes of Congestion

Ruling out Allergic Rhinitis. Symptoms of allergic rhinitis include nasal obstruction and congestion, which are similar to the symptoms of a cold. People with allergies, however, are apt to have the following:

- Thin, clear, and runny nasal discharge.
- An itchy nose, eyes, or throat.
- Recurrent sneezing.

There are two forms of allergic rhinitis:

- Symptoms that appear only during allergy season (spring or fall) are called seasonal rhinitis (commonly known as hay or rose fever).
- Allergens in the house, such as house dust mites, molds, and pet dander, can cause year-long allergic rhinitis, referred to as perennial rhinitis.

[For more information see *Allergic Rhinitis and Chronic Nasal Congestion.*]

Ruling out Sinusitis. The signs and symptoms suggestive of true acute sinusitis include the following:

- A return of congestion and discomfort after initial improvement in a cold (called double sickening).
- Purulent (pus-filled) nasal secretion.
- A lack of response to decongestant or antihistamine.
- Pain in the upper teeth or pain on one side of the head.
- On leaning forward, facial pain above or below both eyes.

Children with sinusitis are less likely to have facial pain and headache and may only develop a high fever or prolonged upper respiratory symptoms (e.g., a daytime cough that does not improve for 11 to 14 days). When the diagnosis is unclear or complications are suspected, further tests may be required. [For more information see *Sinusitis*.]

Ruling out More Serious Viral Infections. Respiratory syncytial virus (RSV) and, possibly human parainfluenza viruses (HPV), are proving to be important causes of respiratory infections, including pneumonia in infants and people with damaged immune systems. Both are also causes of milder conditions, including colds and bronchitis. Studies now indicate that RSV may also be a much more common cause of flu-like symptoms than previously thought. In one British study of patients with flu symptoms, RSV was responsible for 22% of the cases and influenza for 32%. And among children under five, RSV was responsible for more flu-like cases than influenza virus itself.

Ruling out Other Causes of Sore Throat

In addition to common cold viruses, other, less frequent causes of sore throat include the following:

- Strep throat. [See Box "Strep Throat."]
- Sore throat related to influenza.
- Foodborne and waterborne infections (Streptococcus C and G). These agents mimic strep throat but are usually less severe and do not cause rheumatic fever.
- Sore throat and tonsillitis caused by an uncommon organism called *Arcanobacterium haemolyticum* . An infection with this bacteria can mimic strep throat and may even cause a rash. It should be suspected in patients with symptoms that suggest strep but there is no laboratory evidence of strep. It can be treated with erythromycin.
- Infectious mononucleosis ("mono"). Mononucleosis is caused by the Epstein-Barr virus. It usually occurs in adolescents and young adults. Sore throat is accompanied by chills, fever, swollen glands, and fatigue. Treatment involves avoiding vigorous activities for the first one or two months and managing symptoms.
- Herpesvirus. The herpesvirus 1 may cause severe sore throat, most often in college students.
- Pneumonias caused by the atypical organisms mycoplasma or chlamydia. These forms of pneumonia typically occur in young adults and may cause sore throat as well as fever and cough.

STREP THROAT

What is Strep Throat?

Group A *Streptococcal* bacteria, known commonly as "strep throat," is the most common bacterial cause of a severe sore throat. Strep throat occurs mostly in school age children, but people of all ages are susceptible. (It should be noted that strep throat constitutes only about 12% of all sore throat cases seen by doctors.)

The symptoms of strep throat include the following:

- A sudden onset of severe sore throat.
- Difficulty in swallowing.
- Fever.
- The patient may also have a headache, stomach pain, and vomiting.

Only about half of patients with strep throat have such clear-cut symptoms, however. Furthermore, half of people who have these symptoms do not actually have strep throat.

How Is Strep Throat Diagnosed?

Most cold-related sore throats are caused by viruses and require no treatment. They usually do not last more than a day. When the sore throat persists and is very painful the physician will want to rule out or confirm the presence of group A *Streptococcal* bacteria, the cause of strep throat, which can be treated with antibiotics.

The physician will take the following steps when strep throat is suspected:

- Look for redness and pus-filled patches on the tonsils and back of the throat. (Enlarged tonsils are less likely to indicate a strep throat.)
- Feel the sides of the neck for swollen lymph nodes. *(If the lymph nodes are not swollen, it is less likely to be a strep throat.)*
- Use a cotton swab to take a sample of pus in the throat for a throat culture.

Throat Culture. A *culture* taken from the throat sample is the most effective and least expensive test for confirming the presence of the *Streptococcal* bacteria.

- The sample is sent to a laboratory, where it is cultured; that is, the sample is added to special substances so that any bacteria

present will reproduce.

- It takes between 24 hours and 48 hours to obtain a result.

Rapid Antigen-Detection Test for Strep Throat. A faster test called the rapid strep antigen test uses chemicals to detect the presence of bacteria in a few minutes. A positive result nearly always means that *Streptococcal* bacteria is the cause of the infection. The test, however, fails to detect between 10% and 20% of cases, and so a culture may still be necessary to catch any missed infections, particularly in children.

How Serious is Strep Throat?

The use of antibiotics has removed the threat of most complications from streptococcus infection in the throat (strep throat). However, untreated strep throat could lead to the following complications:

- Abscess in the tonsils.
- Scarlet fever.
- Rheumatic fever. This condition, although very rare in the US, can injure the heart and have long term serious effects.

How Is Strep Throat Treated?

Throat infections caused by group A *Streptococcal* bacteria (strep throat) require antibiotics. The following are generally used:

- Penicillin is usually the antibiotic of choice unless the patient is allergic. A full 10 days may be necessary. Amoxicillin, a form of penicillin, is proving to be effective when taken in a single daily dose for 10 days.
- Macrolide antibiotics. Erythromycin is known as a macrolide antibiotic and is the first choice for patients with penicillin allergies. A 10-day regimen is needed. Another macrolide, azithromycin, can be given as a single daily dose and may be effective in five days. It is expensive, however, and bacterial resistance to macrolides is growing, so it should not be given as a first choice.
- Cephalosporins are a potent, but expensive, group of antibiotics that are very effective in eradicating the bacteria.

It should be strongly noted, however, that antibiotics are very commonly inappropriately prescribed for non-Strep sore throats. One study reported that estimated 6.7 million American adults visited their physicians because of sore throat between 1989 and 1999. And, 73% of them were given antibiotics. Studies indicate, however, that less than half of adults and far fewer children with even strong signs and symptoms for strep throat actually have *Streptococcal* infections.

Parents should be comforted that a delay in antibiotic treatment while waiting for lab results does not increase the risk that the child will develop serious long-term complications, including acute rheumatic fever. If a patient is severely ill, however, it is reasonable to begin administering antibiotics before the results are back. If the culture is negative (there is no evidence of bacteria), then the physician should call the family to make certain they stop taking the antibiotics and discard any remaining pills.

HOW SERIOUS ARE COLDS AND FLUS?

Complications of Colds

Colds rarely cause serious complications. In about 1% of cases, a cold can lead to other complications, such as sinus or ear infections. It can also aggravate asthma and, in uncommon situations, increase the risk for lower respiratory tract infections.

Ear Infections. The rhinovirus infection, a major cause of colds, also commonly predisposes children to ear infections, possibly by obstructing the Eustachian tube, which leads to the middle ear. Viruses may even attack the ear directly. In one study, 74% of patients with rhinovirus colds had pressure abnormalities in their middle ear. [For more information see *Ear Infections (Otitis Media) in Children*.]

Sinusitis. Between 0.5% and 5% of people with colds develop sinusitis, an infection in the sinus cavities (air-filled spaces in the skull). Sinusitis is usually mild, but if it becomes severe, antibiotics generally eliminate further problems. In rare cases, however, sinusitis can be serious. [For more information see *Sinusitis*.]

Lower Respiratory Tract Infections. The common cold poses a risk for bronchitis and pneumonia in nursing home patients and other people who may be susceptible to infection. Some experts believe that the rhinovirus may play a more significant role than the flu in causing lower respiratory infections in such people.

Aggravation of Asthma. Rhinovirus infections can acerbate asthma in both children and adults and has reported to be the most common infectious organism associated with asthma attacks. Some studies have reported the common cold being associated with between 33% and 71% of severe asthma episodes. Research suggests that colds promote allergic inflammation and increase the intensity of airway responsiveness for weeks.

Complications of Influenza

In general, the flu is usually self-limited and not serious. Influenza is responsible, however, for 15% to 30% of the excess number of hospitalizations that occur in winter. About 1% of people who contract the flu end up in the hospital. An estimated 20,000 people currently die each year of influenza-related complications. Fortunately, the rate of flu-related deaths has been declining. However, some experts predict that as the US population over the age of 65 grows, the actual number of influenza-associated deaths will double over the next 30 years. Influenza A is the most severe strain. Influenzas B and C tend to be milder.

Pneumonia and Other Complications. Pneumonia is the major serious complication of influenza and can be very serious. It can develop about five days after viral influenza. It is an uncommon event, however. It nearly always occurs in high-risk individuals, such as the following:

- People with weakened immune systems, such as AIDS patients. In fact, one study found that AIDS patients have a risk for death from influenza that is up to 14 times higher than that of the general US population.

- Very young children. Children under one year who develop flu have a very high risk for pneumonia. Experts estimate that about 25% of severe lung infections in children are due to influenza. It is often difficult to tell, however, whether pneumonia in small children is related to influenza or caused by respiratory syncytial virus (RSV), which is the major viral cause of infant pneumonia. Influenza also increases the risk for complications in the central nervous system of small children. In a 2001 Chinese study, children hospitalized with influenza A had a higher risk for fever related seizures than children with other upper respiratory tract infections. In rare cases influenza can lead to meningitis and encephalitis (inflammations in central nervous system). The risks decline after age one but is still elevated in children aged three to five.

- The elderly, particularly those with chronic lung disease. Nursing homes patients are especially hard-hit by flu epidemics, with fatality rates as high as 30%.

- Hospitalized patients and anyone with serious medication conditions, such as diabetes or heart, lung, or circulation disorders. Chronic lung disease poses a very high risk, particularly for children and the elderly. In a 2002 study, influenza and respiratory synscytial virus were responsible for 15% to 33% of hospitalizations in children with asthma and 9% of deaths in adults over 65 with chronic lung disease.

- Drug abusers who use needles.

Combinations of these factors increase the risk. It should be noted that pneumonia is an uncommon outcome of influenza in healthy adults.

Pandemics. Every year, influenza strikes millions of people worldwide. Influenza epidemics are most serious when they involve a new strain against which most people are not immune. Such so-called *pandemics* can infect more than one fourth of the world's population within a three-month period. For example, the Spanish flu in 1918 and 1919 killed 20 million people in the US and Europe and 17 million in India. Although pandemics are still of great concern, there have been major improvements in private and public health since then, including the discovery of antibiotics to treat bacterial complications, new anti-viral agents and vaccines, and intensive world-wide surveillance of outbreaks.

WHO GETS COLDS AND FLUS?

Everyone gets a cold or upper respiratory infection at some time:

- On average, every American has two to four colds a year.

- Each year, there are between 18 to 20 million cases of respiratory infections caused by influenza.

Age

The very young and the very old are at higher risk for upper respiratory tract infections and for complications from them.

Children. Young children are prone to colds and may have eight to 12 bouts every year. In

addition, 13 to 16 million cases of influenza develop in American children and adolescents each year.

Before the immune system matures, all infants are susceptible to infections, with a possible frequency of one cold every one or two months. Smaller nasal and sinus passages also make children more vulnerable than older children and adults. Infections gradually diminish as they grow, until at school age their rate is about the same as an adult's. There is almost never cause for concern when a child has frequent colds unless they become unusually severe or more frequent than usual.

Parental smoking increases the risk of respiratory infections. Day care centers also increase the rates of colds. Interestingly, however, a 2002 study suggested that although children in day care centers incur higher rates of the common cold in the preschool years, they have *lower* cold rates in their first years of regular school. The colds they catch in day care, then, may bestow some immunity to future colds for a few years. By age 13, such protection has worn off. There is also some evidence that frequent colds in young children may help protect against future allergies and asthma.

The Elderly. The elderly have diminished cough and gag reflexes and faltering immune systems and are at greater risk for serious respiratory infections than are young and middle-aged adults.

Exposure to Smoke and Environmental Pollutants

The risk of respiratory infections is increased by exposure to cigarette smoke, which can injure airways and damage the cilia (tiny hair-like structures that help keep the airways clear).

Toxic fumes, industrial smoke, and other air pollutants are also risk factors.

Medical Conditions

People with AIDS and other medical conditions that damage the immune system are extremely susceptible to serious infections.

Cancers, especially leukemia and Hodgkin's disease, put patients at risk. Patients who are on corticosteroid (steroid) treatments, chemotherapy, or other medications that suppress the immune system are also prone to infection.

People with diabetes are at higher risk for flu.

Certain genetic disorders predispose people with these problems to respiratory infections. They include sickle-cell disease, cystic fibrosis (which causes mucus abnormalities), and Kartagener's syndrome (which results in malfunctioning cilia).

People under Stress

Much evidence suggests that stress increases one's susceptibility to a cold. In one study, people with high stress levels averaged 2.7 upper respiratory infections during a six-month period and those reporting low stress averaged 1.5 infections. Stress appears to increase the risk for a cold regardless of lifestyle or other health habits. And once a person catches a cold or flu, stress can exacerbate symptoms.

It is not clear why these events occurs. Some experts believe that stress alters specific immune factors, which cause inflammation in the airways. One 2001 study reported that the only people

who got sick after experiencing short stress were those whose body responded to stress with high levels of cortisol, a stress hormone, coupled with a low immune response.

Excessive Exercise

Although long-term effects of regular exercise are known to improve health, the immediate effect of exercise on the immune system is uncertain:

In people who already have colds, exercise has no effect on the illness' severity or duration of the infection. People should avoid strenuous physical activity when they have high fevers or widespread viral illnesses, however.

High-intensity or endurance exercises appear to suppress the immune system while they are being performed. Some highly trained athletes, for instance, report being susceptible to colds after strenuous events; very low fat diets appear to support this negative effect on the immune system. A higher fat-diet may help redress this imbalance (omega-3 fatty acids, found in fish and canola oil are preferred). Whether carbohydrate loading provides much additional value is not clear.

Seasonal Incidence

Colds and flus occur predominantly in the winter. Flu season typically starts in October and lasts into mid March. In 1999, for example, doctors' office visits significantly increased beginning in December and influenza activity peaked during the first two weeks in February.

The reasons for this seasonal bias are not due to the cold itself, but to other factors. Certainly, flus and colds are more like to be transmitted in winter because people spend more time indoors and are exposed to higher concentrations of airborne viruses. Dry winter weather also dries up nasal passages, making them more susceptible to viruses. Some experts theorize that the high rates of viral infections in winter may be due to certain immune factors, which react to light and dark and affect a person's susceptibility to viruses.

WHAT LIFESTYLE HABITS CAN HELP PREVENT UPPER RESPIRATORY TRACT INFECTIONS?

There are many misconceptions about how flus and colds are spread. They are *not* transmitted by touching inanimate objects, such as subway poles or toilet seats. (Bacteria or viruses do not thrive on such objects.) The role of cold weather itself is currently under scrutiny. Although colds themselves are probably not caused by not wearing enough clothes or going outside with wet hair, a 2002 study reported that in older adults cold temperatures can thicken the blood and may increase the risk for respiratory infections and even circulatory and heart problems. (This danger does not appear to affect people under 55 years of age.)

Good Hygiene and Preventing Transmission

A very common method for transmitting a cold is by shaking hands. Everyone should always wash his or her hands before eating and after going outside. Ordinary soap is sufficient. Waterless hand cleaners that contain an alcohol-based gel are also effective for every day use and may even kill cold viruses. (They are less effective, however, if extreme hygiene is required, In such cases, alcohol-based rinses are needed.) Antibacterial soaps add little protection, particularly against viruses. In fact, one study suggests that common liquid dish washing soaps

are up to 100 times more effective than antibacterial soaps in killing respiratory syncytial virus (RSV), which is known to cause pneumonia.

Healthy Diet

Daily diets should include foods such as fresh, dark-colored fruits and vegetables, which are rich in antioxidants and other important food chemicals that help boost the immune system.

Researchers are also studying the possible protective value of certain strains of lactobacilli, bacteria found in the intestines. Some of these strains, particularly acidophilus, are used to make yogurt. According to one Finnish study, children attending day care who ate milk containing the strain lactobacilli GG could reduce respiratory infections in these children by 10% to 20%. More research is warranted. (The strain used was not the kind found in most commercial yogurt products.)

Other Factors Associated with a Lower Risk for Respiratory Infections

Breastfeeding. Some evidence suggests that women who breastfeed reduce the risk of respiratory infections in their children.

Low Stress and Active Social Life. More than one study has reported that people with low stress who also have an active social life have fewer colds than people who have high stress levels or those who have low stress and few social connections.

HOW ARE SYMPTOMS OF COLDS AND MILD FLU TREATED?

Dietary Suggestions

The following are some food and fluid recommendations. Most will not cure a cold but may help a person endure it:

- Drinking plenty of fluids and getting lots of rest when needed is still the best bit of advice to ease the discomforts of the common cold. Water is the best fluid and helps lubricate the mucous membranes. (There is *no* evidence that drinking milk will increase or worsen mucus, although milk is a food and should not serve as fluid replacement.)

- Chicken soup does indeed help congestion and body aches. The hot steam from the soup may be its chief advantage, although laboratory studies have actually reported that ingredients in the soup may have anti-inflammatory effects. In fact, any hot beverage may have similar soothing effects from steam. Ginger tea, fruit juice, and hot tea with honey and lemon may all be helpful.

- Spicy foods that contain hot peppers or horseradish may help clear sinuses.

- Foods rich in vitamins A and C are always recommended and may be helpful during a respiratory infection. They include oranges, kiwi, and tomatoes for C and sweet potatoes, spinach, and broccoli for A.

Zinc

Zinc appears to have certain important effects on the immune system and it may have a direct effect on viruses. How it works is not entirely clear, however. Zinc preparations in lozenge or nasal gel form are now available as cold treatments. Studies are very mixed on the effects of zinc on colds. The variance may be due to different zinc preparations. Studies are underway to determine advantages, if any. Some examples include the following:

- A nasal gel (Zicam), which contains zinc gluconate, has shown some early success, possibly because the gel sticks to the nasal passages long enough for the zinc to interact with the virus. In one 2000 study, patients with colds who used it achieved full recovery in an average of 2.3 days compared to nine days in patients using a "dummy" nasal preparation. More studies are underway.

- Zinc lozenges are showing mixed results. One 2000 study suggested that the use of zinc *acetate* lozenges (e.g., Fast-Dry, Galzin) may be more effective and have a better taste than other formulations, such as zinc *gluconate* (Cold-Eeze, Orazinc). In the study, this preparation reduced both duration and severity of symptoms compared to a dummy pill. The two zinc lozenge preparations were directly compared in another 2000 study, however, and neither was effective.

- A small 2001 study on a nasal spray preparation found no benefits. The spray preparation had less zinc than the nasal gel.

In any case, no one with an adequate diet and a healthy immune system should take zinc for prolonged periods for preventing colds.

Side Effects. Side effects include the following:

- Dry mouth.

- Constipation.

- Nausea.

- Bad taste (possibly only with zinc gluconate lozenges).

- Overdose may cause severe vomiting, dehydration, and restlessness. Call a physician if any of these symptoms occur.

- In rare cases, an allergic response may occur.

Food and Drug Interactions. Zinc may also interact with drugs or other elements.

- It may reduce absorption of certain antibiotics.

- Foods high in calcium or phosphorus may reduce zinc absorption.

- In high doses and for long periods of time zinc can cause copper deficiencies.

Medications for Mild Pain and Fever Reduction

Many people take medications to reduce mild pain and fever. Adults most often choose aspirin, ibuprofen (Advil), or acetaminophen (Tylenol).

The following are recommendations for children:

- Acetaminophen (Tylenol) or ibuprofen (usually Advil or Motrin) is the pain-reliever of choice in children. Most pediatricians advise such medications for children who run fevers over 101 degrees F. Some suggest alternating the two agents, although there is no evidence that this regimen offers any benefits, and it might be harmful.

- Aspirin and aspirin-containing products are virtually never recommended for children or adolescents. Reye's Syndrome, a very serious condition, has been associated with aspirin use in children who have flu symptoms or chicken pox.

- should be noted that some studies are suggesting that these anti-fever agents may actually reduce the body's immune response against cold and flu viruses and prolong symptoms. A 2000 study, for example, reported a longer flu duration in people who took aspirin or acetaminophen (although people still felt better). (In the study, these drugs did not appear prolong other illnesses, including Rocky Mountain spotted fever and shigellosis.) Nevertheless, most doctors strongly recommend lowering fevers in children, since high fevers can sometimes cause seizures.

Nasal Strips

Nasal strips (Breathe Right) are placed across the lower part of the nose and pull the nostrils open. These strips may open the nasal passages and ease congestion due to a cold or hay fever. As of yet, there is no scientific evidence that they offer such benefits.

Nasal Wash

A nasal wash can be helpful for removing mucus from the nose. A saline solution can be purchased at a drug store or made at home. One study reported that neither a homemade solution (using one teaspoon of salt and one pinch of baking soda in a pint of warm water) nor a commercial hypertonic saline nasal wash had any effect on symptoms. Further, one preliminary study found that over-the-counter saline nasal sprays that contain benzalkonium chloride as a preservative may actually worsen symptoms and infection.

Some physicians, however, advocate a traditional nasal wash that has been used for centuries and is different from that used in the study. It contains no baking soda and uses more fluid for each dose and less salt. The nasal wash should be performed several times a day.

Simple method for administering a nasal wash is the following:

- Lean over the sink head down.

- Pour some solution into the palm of the hand and inhale it through the nose, one nostril at a time.

- Spit the remaining solution out.

- Gently blow the nose.

The solution may also be inserted into the nose using a large rubber ear syringe, available at a pharmacy. In this case the process is the following:

- Lean over the sink head down.

- Insert only the tip of the syringe into one nostril.

- Gently squeeze the bulb several times to wash the nasal passage.
- Then press the bulb firmly enough so that the solution passes into the mouth.
- The process should be repeated in the other nostril.

Nasal-Delivery Decongestants

Nasal-delivery decongestants are applied directly into the nasal passages with a spray, gel, drops, or vapors. Nasal forms work faster than oral decongestants and have fewer side effects. They often require frequent administration, although long-acting forms are now available. Ingredients and brands of nasal decongestants include the following:

Long Acting Nasal-Delivery Decongestants. They are effective in a few minutes and remain so for six to 12 hours. The primary ingredient in long-acting decongestant is the following:

- Oxymetazoline: Brands include Vicks Sinex (12-hour brands), Afrin (12-hour brands), Dristan 12-Hour, Good Sense, Nostrilla, Neo-Synephrine 12-Hour.
- Xylometazoline: Inspire, Otrivin, Natru-vent.

Short-Acting Nasal-Delivery Decongestants. The effects usually last about four hours. The primary ingredients in short-acing decongestants are the following:

- Phenylephrine: Neo-Synephrine (mild, regular, high-potency), 4-Way, Dristan Mist Spray, Vicks Sinex).
- Naphazoline (Naphcon Forte, Privine).

Dependency and Rebound. The major hazard with nasal-delivery decongestants, particularly long-acting forms is a cycle of dependency and rebound effects. The 12-hour brands pose a particular risk for this effect. This effect works in the following way:

- With prolonged use (more than three to five days), nasal decongestants lose effectiveness and even cause swelling in the nasal passages.
- The patient then increases the frequency of their dose. The congestion worsens and the patient responds with even more frequent doses, in some cases to as often as every hour.
- Individuals then become dependent on them.

Tips for Use. The following precautions are important for people taking nasal decongestants:

- When using a nasal spray, spray each nostril once. Wait a minute to allow absorption into the mucosal tissues, and then spray again.
- Keep the nasal passages moist. All forms of nasal decongestants can cause irritation and stinging. They also may dry out the affected areas and damage tissues.
- Do not share droppers and inhalators with other people.

- Use decongestants only for conditions requiring short-term use, such as before air travel or for a single-allergy attack. Do not take them more than three days in a row. With prolonged use, nasal decongestants become ineffective and result in the so-called rebound effect and dependence.

- Discard sprayers, inhalators, or other decongestant delivery devices when the medication is no longer needed. Over time, these devices can become reservoirs for bacteria.

- Discard the medicine if it becomes cloudy or unclear.

Oral Decongestants

Oral decongestants also come in many brands, which mainly differ in their ingredients. The most common active ingredient is pseudoephedrine (Sudafed, Actifed, Drixoral). The alternative decongestant, phenylpropanolamine (PPA) was taken off the market. [*See Warning Box,* Decongestants and Phenylpropanolamine.]

Side Effects of Decongestants

Decongestants have certain adverse effects, which are more apt to occur in oral than nasal decongestants and include the following:

- Agitation and nervousness.

- Drowsiness (particularly with oral decongestants and in combination with alcohol).

- Changes in heart rate and blood pressure.

- Avoid combinations of oral decongestants with alcohol or certain drugs, including monoamine oxidase inhibitors (MAOI) and sedatives.

Individuals at Risk for Complications from Decongestants. People who may be at higher risk for complications are those with certain medical conditions, including disorders that make blood vessels highly susceptible to contraction. Such condition include the following:

- Heart disease.

- High blood pressure.

- Thyroid disease.

- Diabetes.

- Prostate problems that cause urinary difficulties.

- Migraines.

- Raynaud's phenomenon.

- High sensitivity to cold.

- Emphysema or chronic bronchitis. (Such individuals should particularly avoid high-potency short-acting nasal decongestant.)

- People taking medications that increase serotonin levels, such as certain antidepressants, anti-migraine agents, diet pills, St. John's Wort, and methamphetamine. The combinations can cause blood vessels in the brain to narrow suddenly, causing severe headaches and even stroke.

Anyone with these conditions should not use either oral or nasal decongestants without a doctor's guidance. Other groups who should also use these agents with caution are the following:

- Anyone who is pregnant should not use these agents without consulting a physician.
- Children appear to metabolize decongestants differently than adults. Decongestants should not be used at all in infants and small children, who are at particular risk for side effects that depress the central nervous system. Such symptoms cause changes in blood pressure, drowsiness, deep sleep, and, rarely, coma.

Warning Box: Decongestants and Phenylpropanolamine (PPA)

In response to reports of an increased risk of stroke in young women who took products, including oral decongestants, containing phenylpropanolamine (PPA), the Food and Drug Administration (FDA) began taking action to ban it from the US market in November of 2000.

Many agents contained this product. Nearly all, however, have now been withdrawn from the market or reformulated. A number of brands that previously contained PPA have now substituted other active ingredients (usually pseudoephedrine) and are safe to use. They include, but are not limited to the following:

- Alka-Seltzer Plus Cold Medicine.
- Coricidin D Cold, Flu and Sinus Tablets.
- Dimetapp DM, Dimetapp Elixer.
- Robitussin CF.
- Contac Day/Night Allergy & Sinus.
- All Triaminic products.

Anyone with old forms of these medications or any decongestant should check the labels and discard them if they contain phenylpropanolamine.

It should be noted that the incidence of stroke tended to occur in people who took diet suppressants containing PPA rather than decongestants with the ingredient. In any case, serious events were still very rare. Furthermore PPA has been used in dozens of medications for over 50 years. Extreme concern, therefore, is unwarranted.

Combination Cold and Flu Remedies and Antihistamines

Dozens of remedies are available that combine ingredients aimed at more than one cold or flu symptom. In general, they do no harm, but they have the following problems:

- Some ingredients may produce side effects without even helping a cold.
- In some cases, the ingredients conflict (such as a cough expectorant and a cough suppressant).
- In other cases, a patient may wish to increase the dosage to improve one symptom, which serves to increase other ingredients that do no good and, in higher doses, may cause side effects.

Note on Antihistamines. Many combination remedies contain antihistamines. Antihistamines are used for allergies and not generally recommended to relieve the symptoms of the common cold. Some evidence suggests, however, that they may have some value:

One study has indicated that older so-called first-generation antihistamines may reduce cold symptoms, experts postulate that their benefits for the cold are likely to be due to the drowsiness they cause. Such antihistamines include Benadryl, Tavist, and Chlor-Trimeton. The newer, second-generation antihistamines (Claritin, Allegra, Zyrtec) do not have these effects and also appear to have no benefits against colds.

Another interesting study reported high levels of histamine in the urine of patients infected with type A influenza, suggesting that anti-histamines may actually have some real value for viral infections, include flus and colds. More research is needed, however, before the significance of these findings is known. [For more information see, *Allergic Rhinitis (Hay Fever and Rose Fever) and Other Chronic Rhinitis Disorders.*]

Cough Remedies

A major analysis of 15 trials suggests that most over-the-counter cough medicines are not very effective, but they are also not harmful. Nevertheless, they may helpful in certain cases:

- For thick phlegm, patients may try cough medications that contain guaifenesin (Robitussin, Scot-Tussin Expectorant), which loosens mucus. Patients should not suppress coughs that produce mucus and phlegm; it is important to expel this substance. To loosen phlegm, patients should drink plenty of fluids and use a humidifier or steamer.
- For patients with a dry cough, a suppressant may be useful, such as one that contains dextromethorphan (Drixoral Cough, Robitussin Maximum Strength Cough Suppressant). Well-conducted studies have reported that products containing both dexbrompheniramine and pseudoephedrine (Drixoral) have reduced coughs-related to colds.

Medications that contain both a cough suppressant and an expectorant are not useful and should be avoided. Medicated cough drops that contain dextromethorphan are not very useful. A patient is just as likely to find relief from hard candy or lozenges.

Remedies for Sore Throat Associated with Colds

Sore throats that are associated with colds are generally mild. The following may be helpful:

- Cough drops, throat sprays, or gargling warm salt water may help relieve sore throat and reduce coughing.

- Throat sprays that contain phenol (e.g., Vicks Chloraseptic) may be particularly helpful. Phenol has anti-bacterial properties. In one study, patients with sore throat who used the spray experienced faster resolution of the cold itself, including fever, headache, and other symptoms compared to a dummy medication. None were taking antibiotics.

- Cough drops that contain menthol and mild anesthetics, such as benzocaine, hexylrescorincol, phenol, and dyclonine (the most potent), may soothe mild sore throat.

- One health professional suggested that people with sore throats from postnasal drip might try taking a teaspoon of liquid antacid. They shouldn't drink anything afterward, since the intention is to coat the throat and help neutralize the acid in the mucus that might be causing pain.

If soreness in the throat is very severe and does not respond to mild treatments, the patient or parent should check with the physician to see if a strep throat is present, which would require antibiotics. [*See Box* Strep Throat.] It should be noted, however, that in one study only 17% of sore throats in adults were caused by Group A streptococcis, the bacterium responsible for strep throat. Nevertheless, antibiotics were prescribed in 73% of patients.

Vitamins

Different studies have found that large doses of vitamin C reduce the duration of a cold by a range of 5% to 50%. Large doses of vitamin C, however, do not appear to protect against getting a cold in the first place, even after exposure to a cold virus. (It may help protect specific people, however, such as in poor health or who endure regular heavy physical stress.)

Some precautions against taking high doses of vitamin C include the following:

- High doses of vitamin C may cause headaches and intestinal and urinary problems and even kidney stones.

- Because ascorbic acid increases iron absorption, people with certain blood disorders, such as hemochromatosis, thalassemia, or sideroblastic anemia, should particularly avoid high doses.

- Large doses can also interfere with anticoagulant medications, blood tests used in diabetes, and stool tests.

There is no evidence that other vitamins, such vitamin E, are helpful. In fact, one small study conducted by military doctors suggested that that older individuals who regularly took a multivitamin had *less* protection from the flu vaccine. (The supplement contained only vitamins and no trace elements, such as zinc.)

Echinacea

The herbal remedy echinacea is now commonly taken to prevent onset and ease symptoms of cold or flu. There are three species:

- *Echinacea* (*E.*) *purpurea.*

- *E. pallida.*

- *E. augustifolia* .

In some studies, people who took extracts of either *E. purpurea* or *E. augustifolia* experienced no protection against colds. Preparations themselves vary, however, and effectiveness may depend on whether the root, herb, or whole plant is used. For example, in a 1999 study, a root and herb preparation of *E. purpurea* (Echinoforce) reduced cold symptoms while another E. purpurea root preparation did not. Preparations made with 50% alcohol and from fresh root or fresh root and cone are preferred. The drying process also effects the active chemicals in the herb. (Freeze-drying may be best.) At this time there are no standards or quality controls available for echinacea (including what part of the plant to use) or any other herbal remedies.

- *Precautions.* Some precautions are as follows:

- Allergic reactions have been reported. People with autoimmune diseases or who have plant allergies should particularly avoid it.

- There have been some reports of a reaction called erythema nodosum associated with echinacea. This involves a rash, sometimes accompanied by fever, headache, muscle and joint aches, and sore throat.

No one should take untested so-called natural remedies without a doctor's approval. No studies have confirmed the benefits of these medications and many can cause toxic side effects in large doses. [See Warnings on Alternative and So-Called Natural Remedies.]

Warnings on Alternative and So-Called Natural Remedies

It should be strongly noted that alternative or natural remedies are not regulated and their quality is not publicly controlled. In addition, any substance that can affect the body's chemistry can, like any drug, produce side effects that may be harmful. Even if studies report positive benefits from herbal remedies, the compounds used in such studies are, in most cases, not what are being marketed to the public. There have been a number of reported cases of serious and even lethal side effects from herbal products. In addition, some so-called natural remedies were found to contain standard prescription medication.

The following are special concerns for people taking natural remedies for colds:

- Grapeseed extract is sometimes touted as a natural antihistamine. A 2002 study, however, reported no benefits from it.

- Aller Relief Chinese herbal cold and allergy contains trace amounts of aristolochic acid, a chemical that is toxic to the kidneys and a carcinogen. Products containing aristolochic acid have been associated with several reports of kidney failure in Europe. Of specific concern are studies suggesting that up to 30% of herbal patent remedies imported from China having been laced with potent pharmaceuticals such as phenacetin and steroids. Most problems reported occur in herbal remedies imported from Asia, with one study reporting a significant percentage of such remedies containing toxic metals.

The following website is building a database of natural remedy brands that it tests and rates. Not all are available yet. http://www.ConsumerLab.com. The Food and Drug Administration has a program called MEDWATCH for people to

report adverse reactions to untested substances, such as herbal remedies and vitamins (call 800-332-1088).

Experimental Therapies for Colds

A number of agents have been under investigation for curing the common cold, but to date none have gone beyond trials. For example, two investigative drugs, tremacamra and pleconaril (Picovir), inhibited attachment of the rhinovirus in the nasal passage. Studies were promising, but tremacamra has now been shelved, and pleconaril was unanimously turned down by the FDA because its side effects and potential drug interactions, particularly in asthma patients, far outweighed the drug's benefits.

WHAT ARE SPECIFIC DRUGS FOR TREATING AND PREVENTIVE SEVERE INFLUENZA?

For mild influenza, symptom relief is similar to that for colds. [*See* What Are the Treatments for Symptoms of Colds and Mild Flu?] Antiviral agents have now been developed to treat influenza A, B, or both. There are two classes of agents: M2 inhibitors and neuraminidase inhibitors. In addition vaccines are available to prevent influenza. In some cases the antiviral agents may also be used for prevention. [*See Box* Antiviral Drugs for Prevention of Influenza.]

Anti-Viral Drugs: M2 Inhibitors

Brands and Benefits. Amantadine (Symmetrel) and rimantadine (Flumadine) are M2 inhibitors. They have the following benefits:

- Both offer protection against influenza A and prevent severe illness if a person contracts the infection. (To be effective it must be administered within two days of onset.)
- They may shorten the duration and lessen the severity of the flu if given within 48 hours of onset of symptoms.

Limitations. Drawbacks of M2 inhibitors include the following:

- M2 inhibitors are not effective against influenza B. (Although less common than influenza A, type B may have a severe effect on some people, particularly on small children, who have not been exposed to this strain and so have not developed any immunity to it.)
- Viral resistance to these agents is rapidly emerging.
- Neither has proven to reduce the risk for complications, including pneumonia and bronchitis.

Side Effects, Both agents occasionally cause nausea, vomiting, and indigestion. Amantadine affects the nervous system and about 10% of people experience nervousness, depression, anxiety, difficulty concentrating, and lightheadedness. Rarely, amantadine can cause hallucinations and seizures, usually in elderly people already at risk for psychiatric symptoms.

Anti-Viral Drugs: Neuraminidase Inhibitors

Brands and Benefits. Zanamivir (Relenza) and oseltamivir (Tamiflu) are called neuraminidase inhibitors. They are newer agents that have been designed to block a key viral enzyme, neuraminidase, which is involved with viral replication.

Both zanamivir and oseltamivir have the following benefits:

- Neuraminidase inhibitors are effective for treating both A and B strains of influenza. (M2 inhibitors are only effective against type A.)
- They shorten the duration of the flu by one to three days.
- They may help reduce transmission of the virus, although evidence is needed to confirm these finding.
- They may have a lower risk than M1 inhibitors for emerging viral strains that are resistant to their effects.
- They may reduce complications of influenza, although this needs to be confirmed. It is not yet known if they have any effect on overall survival rates.
- They have fewer serious side effects than the M2 inhibitors.
- Both have some benefits for preventing influenza. Only oseltamivir has been approved for this purpose, however, and only in people over 13. [*See Box* Antiviral Drugs for Prevention of Influenza.]

Limitations and Side Effects. Although they have many advantages compared to the M2 inhibitors, they are much more expensive. They also need to be taken within two days of symptoms to be effective. There are also some differences between the two agents that could be significant for some individuals:

- Zanamivir (Relenza) is administered as a nasal spray or inhaler. People with asthma or other lung disorders may experience airway spasms and should use this drug with caution. Side effects are generally minor in most patients. Of concern, however, was a 2001 British study, which found that a majority of elderly patients were not able to properly use the zanamivir (Relenza) inhaler device, making the medicine virtually ineffective in these cases. The study was small, however, and other reports suggest that zanamivir is sill effective in this older group.
- Oseltamivir comes in capsule and liquid form. Side effects are also minor but about 10% to 15% of patients experience nausea and vomiting. Patients with kidney dysfunction should take lower doses.

Candidates. Their current use in different age and patient groups are as follows:

- Adults. Both are approved for treatment in adult patients.
- Children. Oseltamivir is approved for use in children age one and older. Studies report significant reduction in symptoms and in the incidence of ear infections. Zanamivir is approved for children over seven, and studies are currently underway to determine its safety in younger children.
- High-Risk Patients. Recent studies indicate they are safe and effective in patients with serious medical problems or other conditions that put them at risk for complications of flu.

Antiviral Drugs for Prevention of Influenza

Although they are not substitutes for vaccines, all antiviral agents have some preventive properties. To date both M2 inhibitors and oseltamivir have been approved for prevention of influenza.

- *M2 inhibitors.* Amantadine and rimantadine protect against the influenza A infection itself in about half of individuals. Rimantadine is preferred for prevention during outbreaks of influenza A because it has fewer adverse side effects.

- *Neuraminidase Inhibitors.* Both zanamivir (Relenza) and oseltamivir (Tamiflu) help prevent both influenza A and B. Only oseltamivir has been approved for this purpose, however, and only in people over 13. It appears to be very effective in preventing influenza in people who have been exposed to family members with the flu.

These agents might be used for prevention in the following cases:

- In combination with the flu vaccine during seasons where there is a poor match between the virus and vaccine.

- During two-week periods after a vaccination when antibodies are developing and the individual is still vulnerable to the virus.

- As supplementary protection for vaccinated people in high-risk groups, such as the elderly or people with compromised immune systems.

- In people who cannot have vaccinations for whatever reason.

- For people who prefer an antiviral agent to a vaccine.

Viral Influenza Vaccines

Effectiveness and Benefits. Vaccinations now protect against influenza in between 70% and 100% of healthy adults when the virus and the vaccine are well matched. In the absence of a match and among the elderly and children, they are fully protective in 30% to 60% of people. Even in people with a weaker response, the vaccine is usually protective against serious flu complications, particularly pneumonia, if such people get the flu. Additionally, studies are finding that the more people that are vaccinated, the healthier the community at large.

Description of Vaccines. Vaccines are designed to recognize foreign agents (called antigens) in the body and to attack them. Vaccines against influenza currently employ inactivated (not live) viruses to produce an immune response that will then attack the active virus. Vaccines are now given by injection in the fall, usually between October and December.

A live but weakened intranasal vaccine (Flumist) known as a cold-adapted, live, attenuated, trivalent, intranasal influenza vaccine (CAIV-T) has been investigated for some time. Because it doesn't need to be injected, it may increase the number of children being vaccinated if it proves to be safe. It is engineered to grow only in the cooler temperatures of the nasal passages, not in the

warmer lungs and lower airways. The vaccine boosts the specific immune factors in the mucous membranes of the nose that fight off the actual viral infections. It is employed using a nasal spray and studies are showing it to be highly effective. A CAIV-T vaccine has been used for 10 years to immunize children in Russia, where it has reduced hospitalization and respiratory infection rates by 30% to 50%.

Annual Redesign. At this time, vaccines must be redesigned each year to match the current strain. The influenza virus contains two primary molecules (hemagglutinin and neuraminidase) that serve as antigens, targets of the vaccines that used to prevent influenza. Unfortunately, the antigens in these influenza viruses undergo genetic alterations (called *antigenic drift*) over time, so they are likely to become resistant to a vaccine that worked in the previous year. Vaccines are then redesigned annually to match the current strain. The two major influenza viruses are called A and B depending on their stability:

- Influenza A is a particular problem because it can infect other species, such as pigs or chickens, and undergo major genetic reassortments.

- Influenza B viruses tend to be more stable than influenza A viruses, but they too vary. Although influenza B has been far less common than A, a vaccine for type B is important because experts are concerned that small children will not have developed any immunity to the virus and will experience severe flu if they are exposed to type B.

The current flu vaccines may be slightly less effective in the elderly, the very young, and patients with certain chronic diseases than in healthy young adults. (Even vaccinated patients may still experience some flu symptoms, such as nasal congestion or sore throat.) Even in people with a weaker response, however, the vaccine is usually protective against serious flu complications, particularly pneumonia.

Influenza Vaccines in Older Children and Adults. The following in order of priority, are the population groups who should be vaccinated each year. The first two groups have the highest need for influenza vaccinations and are given top priority:

- All adults 65 years and older. According to a national survey, about two thirds of older people received the influenza vaccine in 1998. Older African American and Hispanic adults, however, are far less likely to be vaccinated that older Caucasian people. Vaccinated older adults have lower hospitalization rates and death from any cause than unvaccinated peers. One small, preliminary study found a lower risk for stroke in vaccinated adults over the age of 60. Of further note, studies in 2000 suggested that benefits of influenza vaccinations for older people may also extend to their hearts. One reported a lower risk for cardiac arrest in vaccinated subjects and the other a lower risk for recurrent heart attack in vaccinated patients with heart disease.

- People of any age at high risk for serious complications from influenza. Such people include those with heart disease, lung problems, immune deficiencies, diabetes, kidney disease, or chronic blood disease. (There have been concerns about the safety of the vaccinations in certain high-risk patients such as those with HIV or asthma. Studies now suggest that the vaccine is generally safe in these patient groups. Furthermore, their risk for serious complications from influenza outweighs any potential adverse effects from the vaccines.)

- Adults between the ages of 50 and 64 who have chronic medical conditions. (The US Advisory Committee on Immunization Practices (ACIP) suggests that all adults over age 50 should be vaccinated, although this is not recommendation of the CDC.)

- People (such as household members or healthcare workers) in contact with individuals who are at high-risk for complications from influenza.

Other adults who should consider influenza vaccinations include the following:

- People at risk for complications for influenza and who are traveling to the tropics at any time or to the Southern Hemisphere between April and September.

- Pregnant women who are at risk for complications of influenza and who will be in their second or third trimester during flu season. (Vaccinations should usually be given after the first trimester. Exceptions may be women who are in their first trimester during flu season and their risk from complications of the flu is higher than any theoretical risk to the baby from the vaccine.)

- People such as firemen or policemen who are critical for public safety.

- People at risk for complications of influenza and who are traveling to the tropics at any time or to the Southern Hemisphere between April and September.

The vaccines may be slightly less effective in the elderly, the very young, and patients with certain chronic diseases than in healthy young adults.

Influenza Vaccine in Children. The following children over six months should be vaccinated against influenza:

- Any child with a condition that requires regular medical care. In fact, in 2002 the American Academy of Pediatrics (AAP) and the CDC recommended the vaccination for all healthy children under two years of age. This recommendation may vary from year to year depending on the supply of the vaccine.

- Any child who has been hospitalized for a serious illness (particularly lung, kidney, diabetes, sickle-cell, or immune deficiencies). The effects of the influenza vaccine on children with asthma are not entirely clear. Some studies have reported more severe asthma symptoms in children with the lung condition. A 2000 study of asthmatic children, however, reported no increased risk. In fact, there was some indication that the vaccination helped *reduce* asthma attacks over time. More research is needed to confirm or refute these results.

- Children who are receiving long-term aspirin therapy should also be immunized against the flu because they are at higher risk for Reye's syndrome, a life-threatening disease, if they get the flu.

Although such high-risk children have considerable risk for hospitalization from influenza, most of these children are not being vaccinated. One interesting study in Japan found that vaccinating children actually helps protect the elderly.

Negative Effects. Possible negative responses include the following:

- Allergic Reaction. Newer vaccines contain very little egg protein, but an allergic reaction still may occur in people with strong allergies to eggs.

- Soreness at the Injection Site. Almost a third of people who receive the influenza vaccine develop redness or soreness at the injection site for one or two days afterward.

- Flu-like Symptoms. Other side effects include mild fatigue and muscle aches and pains. They tend to occur between six and 12 hours after the vaccination and last up to two days. It should be noted that these symptoms are not influenza itself but an immune response to the virus proteins in the vaccine. Anyone with a fever, however, should not be vaccinated until the ailment has subsided.

Pneumococcal Vaccines

The pneumococcal vaccine protects against *S. pneumoniae* (also called pneumococcal) bacteria, the most common cause of respiratory infections. It does not prevent influenza, but it may help prevent pneumonia in people who are susceptible to severe influenza. Experts are now recommending that more people, including healthy elderly people, be given the pneumococcal vaccine, particularly in light of the increase in antibiotic-resistant bacteria. This has created a great sense of urgency in the medical community to find effective measures for preventing infection.

Pneumococcal Vaccine in Young Children. The pneumococcal vaccine (Prevnar or PCV7) is very effective in children, and some experts believe that universal vaccinations for infants would prevent a million cases of ear infections as well as serious infections, such as pneumonia. In one study, a similar vaccine under investigation protected not only children in day care from serious respiratory infections, but their younger unvaccinated siblings had fewer infections as well.

- The pneumococcal vaccine is now recommended by many experts for the following groups:

- All children up to age two. The pneumococcal vaccine (Prevnar or PCV7) has now been added to the Recommended Childhood Immunization Schedule. The pneumococcal vaccine (Prevnar or PCV7) is very effective in children. Studies are suggesting that it prevents common ear infections as well as serious infections, such as pneumonia. In one study, a similar vaccine under investigation protected not only children in day care from serious respiratory infections, but their younger unvaccinated siblings had fewer infections as well.

- Children up to age five who are at risk for pneumonia or complications of influenza, such as children with sickle disease, those with immune deficiencies, or children with chronic medical conditions.

- Other children age two to five who are higher risk for serious pneumococcal infections should be considered for vaccinations. They include African or Native Americans, children in group child care, socially or economically disadvantaged children, or those who have had frequent or complicated acute middle ear infections within the past year. (In one study, the vaccine reduced the number of ear infections episodes by 6%.)

The recommended schedule of immunization for Prevnar (PCV7) is four doses, given at two, four, six, and 12 to 15 months of age. Infants starting immunization between seven and 11 months should have three doses. Children starting their vaccinations between 12 and 23 months only need two doses. And those who are over two years old need only one dose.

Pneumococcal Vaccine in Older Children and Adults. Because the vaccine is inactive, it is safe for pregnant women and people with immune deficiencies. Many experts now recommend the vaccine for the following older children or adults:

- All people over 65 years old. (Anyone vaccinated more than five years previously should be revaccinated.) According to a 2001 survey, over half of older people have now

received a pneumococcal vaccination. Older African American and Hispanic adults, however, are far less likely to be vaccinated that older Caucasian people. This is particularly disturbing, since the mortality rates from pneumonia in these minority populations, particularly African Americans, are higher than in Caucasians.

- Individuals with immune deficiencies (e.g., HIV) or are undergoing treatments to suppress the immune system.
- Patients with kidney disease or kidney transplants. Older people who have had transplant operations or those with kidney disease may require a revaccination after six years.
- Patients with problems in the spleen.
- Alcoholics (especially those with cirrhosis).
- Adults with any condition that increases the risk for pneumonia should be vaccinated. Protection lasts for over six years in most people, although the protective value may be lost at a faster rate in elderly people than in younger adults. (Anyone at risk for serious pneumonia should be revaccinated six years after the first dose.)

When the vaccine is administered to pregnant women, it may actually protect their infants against certain respiratory infections. Protection lasts for over six years in most people, although the protective value may be lost at a faster rate in elderly people than in younger adults.

Side Effects of the Pneumococcal Pneumonia Vaccine. Side effects include pain and redness at the injection site, fever, and joint aches. Children are more likely to have fever within 48 hours if they receive other vaccines at the same time and also after the second dose. Rarely, such local reactions can be severe. Even if a person is mistakenly re-vaccinated before the effects of the first vaccination have worn off, the risk for severe side effects is very low. Allergic reactions are very rare.

Warnings on Antibiotic Over-Use and Resistant Bacteria

Of great concern is the emergence of common bacteria strains that are now resistant to many standard antibiotics. One of the primary causes of the increase in resistant bacteria is the worldwide overuse of antibiotics. Each year in the United States alone 160 million prescriptions are written for antibiotics, equal to about 25,000 tons of these drugs. About half are used for patients and half animal, fish, and other agricultural uses. Although new powerful antibiotics continue to be designed, they are expensive and are also prone to resistance eventually.

When Antibiotics Are Needed for Upper Respiratory Infections.

Antibiotics do not affect viruses and, in healthy individuals, these agents are almost never necessary or helpful for influenza or colds, even with persistent cough and thick, green mucus. In one disturbing study, antibiotics were prescribed for nearly half of children who went to the doctor for a common cold.

Antibiotics may be required for upper respiratory tract infections only under certain situations, such as the following:

- Patients, particularly small children or the elderly, who have medical conditions that put them at high risk for complications from any respiratory tract infections should usually be given antibiotics.

- Patients with severe sinusitis that does not clear up within seven days (some experts say 10 days) and symptoms include one or more of the following: green and thick nasal discharge, facial pain, or tooth pain or tenderness.

- Some children with middle ear infections, although experts differ on which ones will benefit. Some experts recommend that only children under the age of two should be treated with antibiotics, and children over two should be treated on a case by case basis. [See *Ear Infections (Otitis Media) in Children*, and *Sinusitis*.]

- Patients with strep throat (which is caused by the *Streptococcal* bacteria) or severe sore throat that involves fever, swollen lymph nodes, and absence of cough. (Strep throat makes up only about 12% of all sore throat cases.)

- Patients who have an acute cough that is caused by pneumonia (but in few other cases, regardless of the duration of the cough). Experts estimate that, outside the hospital setting, less than 20% of prescriptions for persistent coughing are necessary.

High-Risk Areas. The prevalence of such antibiotic-resistant bacteria has dramatically increased worldwide, but regions vary widely. For example, according to reports in 2002 and 2001, the rates of penicillin-resistant *Streptococcus pneumoniae* are 15% in Canada, between 30% to 40% in the US, and between 70% and 80% in Hong Kong. And, furthermore, in the US about 23% of *S. pneumoniae* are currently resistant to at least three antibiotics. In general, regions and institutions with the highest rate of resistance are those in which antibiotics are heavily prescribed.

Patients at Highest Risk for Infection with Resistant-Bacteria Strains. As of yet, the average person is not endangered by this problem. Patients at greater risk for developing an infection resistant to common antibiotics are those with following conditions:

- Being very old or very young.

- Being exposed to patients with drug-resistant infection.

- Being hospitalized in intensive care.

- Having had an invasive procedure.

- Having had a hospital stay.

- Having had prior and prolonged antibiotic therapy, particularly

within the past four to six weeks.

- Having a serious wound.
- Having intravenous lines, catheters, or tubes down the throat.
- Being immunosuppressed.
- In children, those at higher risk are those who attend day care, who are exposed to cigarette smoke, who were bottle-fed, who had siblings with recurrent ear infections. On a positive note, small study in an Israeli suggested that antibiotic-resistant pneumococcal strains carried by children in a day care center were not passed on to the adults in their household.

What the Health Care Community Is Doing. There are some signs of hope.

- Countries that have reduced their dependence on penicillin are reporting a parallel decline in bacteria resistant to the antibiotic. And, in the US the Centers for Disease Control and Prevention (CDC) is reporting a decline in antibiotic prescriptions since the early 1990s. A coalition of health plans, insurers and industry groups has been formed in 2002 to join with the CDC to educate physicians and patients on the dangers of overprescribing antibiotics.
- Greater emphasis is being placed on development of vaccines and expanding immunization programs to prevent infections in the first place.
- Innovative therapies are being investigated. One involves creating antibiotics that have the capacity to either self-destruct or regenerate themselves. Another involves an enzyme call Pa1 that kills S. pnemoniae in the nasal passages.

What Patients and Parents Can Do. Patients and parents can also help with the following tips:

- Use home or over-the-counter remedies to relieve symptoms of mild upper respiratory tract infections.
- Realize that antibiotics will not shorten the course of a viral infection. It is important for patients and parents to understand that although antibiotics may bring a sense of security, they provide no significant benefit for a person with viral infection, and overuse can contribute to the growing problem of resistant bacteria.
- Don't pressure a physician into prescribing an antibiotic if it is clearly inappropriate. The physician very often will give in.
- If a child needs an antibiotic, ask the physician whether it is appropriate to use high-dose short-term antibiotics, which may

lower the risk for developing resistant strains.

- If an antibiotic is prescribed, take the full course. (In some cases of severe sore throat, a physician may prescribe an antibiotic before getting test results back. If tests do not indicate a bacterial infection, then the patient should stop taking the antibiotics and discard the medicine.)

WHERE ELSE CAN PEOPLE WITH UPPER RESPIRATORY INFECTIONS GET HELP?

National Jewish Center for Immunology and Respiratory Medicine, 1400 Jackson Street, Denver, CO 80206. Call (800-222-LUNG or 303-355-LUNG) or for the recorded service Lung Facts call (800-552-LUNG) or on the Internet (http://www.njc.org/).

The American Lung Association, 1740 Broadway, New York, New York 10019-4374. Call (800-LUNG-USA) or on the Internet (www.lungusa.org)

The association is very responsive and offers a wide range of information and services

Centers for Disease Control has a National Immunization Information Hotline. Call (800-232-2522)

American Academy of Otolaryngology, Head and Neck Surgery, One Prince Street, Alexandria, VA 22314-3357. Call (703-836-4444) or (http://www.entnet.org/)

American Rhinologic Society, 1501 Kings Highway, PO Box 33932, Shreveport, LA 71130. Call (318-675-6264)

The Centers for Disease Control (CDC), 1600 Clifton Rd NE, Atlanta, GA 30333. Call (800-311-3435) or (http://www.cdc.gov/)

Flu guidelines (http://www.cdc.gov/ncidod/diseases/flu/fluvirus.htm)

Most state health departments are listed at (www.cdc.gov/nip/flu-vac supply/FluStateList.htm)

The National Immunization Program (NIP) Centers for Disease Control and Prevention 1600 Clifton Road, Mailstop E-05 Atlanta, Georgia 30333. Call (1-800-232-2522 for English) or (1-800-232-0233) for Spanish or (http://www.cdc.gov/nip)

Federal Agency for Health Care Policy and Research, 2101 E. Jefferson St., Suite 501, Rockville, MD 20852. Call (301-594-1364) or (http://www.ahcpr.gov)

Immunization Action Coalition, 1573 Selby Avenue, St. Paul MN 55104. Call (651-647-9009) or (http://www.immunize.org/)

Good Internet Sites

The Immunization Gateway: Your Vaccine Fact-Finder is an excellent source of good information on vaccinations (http://www.immunofacts.com/)

The Vaccine Page (http://vaccines.org/)

The Website of the Alliance for the Prudent Use of Antibiotics (http://www.healthsci.tufts.edu/apua/apua.html)

Special Instructions: