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Cold and Cough treatment

Nothing common about the common cold

INTRODUCTION

The common cold, a self-limiting viral infection of the upper respiratory tract, is responsible for approximately 62 million cases per year in the United States.¹ These viral infections, characterized by rhinorrhea, sneezing, nasal congestion, throat irritation and cough, account for three-quarters of all illnesses in infants and nearly one-half of all illnesses in adults.² More than 75 percent of cases are in children,³ with preschool children having as many as 12 colds per year. Adults typically have two to three colds annually.

Not only are colds and cough bothersome to the patient, they are also a huge burden on the health care system, including direct and indirect costs. Although these infections are often viewed as nuisance illnesses, the common cold is a leading cause of morbidity due to acute infections. Viruses associated with the common cold, particularly rhinoviruses, predispose patients to a variety of secondary infections, such as lower respiratory tract infections,⁴ sinusitis⁵ and otitis media⁶. The common cold puts patients with chronic respiratory conditions, such as asthma, at risk of acute exacerbations. According to statistics provided by the American College of Chest Physicians, cough is the most common

Virus	Incubation period	Seasonal occurrence
Adenovirus	4-7 days	Summer
Coronavirus	2-5 days	Spring and winter
Influenza	1-4 days	Winter
Parainfluenza	3-6 days	Year-round
Respiratory syncytial virus	2-8 days	Late fall, early spring
Rhinovirus	1-5 days	Early fall, late spring

References: Hayden F., Common viral respiratory infections. *Sci Am Med* 1997;25:1-11. Dolin R., Common viral respiratory infections. In *Harrison's Principles of Internal Medicine*. Edited by Fauci AS, Braunwald B, Isselbacher KJ. New York: McGraw-Hill 1998:1100-5.

complaint for which patients seek medical care and the second most common reason for a general medical examination.⁷ In the U.S., the cost of treating cough, excluding the cost of prescription medications for the common cold or chronic cough, exceeds \$1 billion annually. The cost of prescription medications to treat complications from colds adds billions to the cost. Lost productivity due to cough and cold costs \$9 billion annually.⁸ According to the Center for Disease Control, 22 million school days are lost annually due to the common cold.⁹ Along with missing days at work due to their own cold symptoms, adults often miss work to care for sick school-aged children.

PATHOPHYSIOLOGY OF COUGH/COLD

Nearly 200 viruses are associated with the common cold. The majority of implicated viruses belong to one of six virus families: rhinovirus, coronavirus, adenovirus, influenza, parainfluenza and respiratory syncytial virus (RSV). Seasonality and transmission patterns vary among virus families (See Table 1).

Among these viruses, the most prevalent is the rhinovirus. The rhinovirus, a member of the picornavirus family, accounts for more than 50 percent of all cold infections.¹⁰ There are 100 different rhinovirus serotypes. Infections with rhinovirus occur year-round, but the incidence peaks in the fall and spring.

By: Lauren S. Schlesselman, Pharm.D., assistant clinical professor, University of Connecticut School of Pharmacy

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Target Audience
Advance practice clinicians, including nurse practitioners and physician assistants, practicing in retail environments.

Learning Objectives
Upon the completion of this lesson, the clinician should be able to:

1. Differentiate types of respiratory symptoms (viral versus bacterial)
2. Determine appropriate treatment based on symptoms and etiology.
3. Counsel patients regarding appropriate management of coughs and colds (particularly avoidance of inappropriate antibiotic use).
4. Identify adverse effects and contraindications of various cough and cold treatments.

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PATIENT SCENARIO 1

Two patients arrive at the clinic to be evaluated for their cold symptoms. While waiting, the patients chat about their symptoms and how long they have been “suffering.”

The first patient to be seen by the clinician is a 78-year-old woman with a history of congestive heart failure and chronic bronchitis. After examining the patient, the clinician suspects she has developed acute bronchitis. The clinician prescribes multiple medications and recommends that the woman follow-up with her primary care provider.

The second patient, having witnessed the first patient leave with multiple prescriptions, enters the exam room believing he will receive an equal number of prescription medications. After examining the 22-year-old male patient with no significant medical history, the clinician prescribes a cough syrup. The patient can not believe that he did not receive as many prescriptions as the first patient! He complains to the clinician that he and the first patient had the same symptoms and had been ill for the same amount of time.

Case discussion

Not all patients with viral infections are the same. Even with the same symptoms and duration of illness, some patients are more likely to develop complications. In particular, patients of extremes in age or with chronic medical conditions are at risk of increased morbidity. The clinic setting provides a unique setting to evaluate patients at high risk and to diagnose or prevent severe complications. Other patients may need simpler regimens with fewer medications.

Although all age groups are affected, the incidence of infection is higher in children.

The rhinovirus is transmitted via aerosolization and after direct contact with respiratory secretions. The nasal passages do not efficiently clear or inactivate the virus, allowing the virus to enter the cells of the nose, nasopharynx and sinuses. In this moist and cool environment, the virus begins to replicate, reaching peak titers within 48 hours.¹¹ Although a 2- to 3-day incubation period is common, cough and cold symptoms can develop within 12 hours of exposure.¹² The virus remains in the nasopharynx for more than two weeks following infection.

Once the virus enters the cells, the infection induces the production of inflammatory cytokines and mediators within the respiratory epithelium. Rhinovirus infections are shown to increase the production of cytokines interleukin-6, interleukin-8 and granulocyte-macrophage colony stimulating factor.¹³ Studies also have demonstrated increases in TNF-alpha and interleukin-1-

beta as high as 10-fold.¹⁴ Induction of interleukin-8 and other cytokines may exacerbate airway reactivity.¹⁵ Induction of other inflammatory mediators, such as histamine, bradykinin, and prostaglandins, are associated with mediation of many cold symptoms. Increased histamine levels can precipitate sneezing, nasal obstruction and sore throat, while prostaglandins are associated with cough, sore throat and nasal obstruction.¹⁶ Bradykinin stimulate nasal irritation, stuffiness, sore throat and rhinorrhea.¹⁷

In addition to inflammatory cytokine and mediator response, rhinovirus infections also activate neurogenic reflexes. Studies have demonstrated increased proteins from the serous cells of the nasal glands.¹⁸ These cell changes precipitate transudation of plasma, tissue edema, vascular engorgement and mucus hypersecretion. Consequences of these changes include sneezing, coughing, airway hyperreactivity and fluid accumulation.

Symptoms of infection begin 1 to 2 days

following infection, lasting for about seven days. The first symptom is typically sore throat due to post-nasal drip. The sore throat resolves within a few days. This is soon followed by rhinorrhea, nasal congestion and sneezing within two to three days while cough develops around the fourth or fifth day. Other common symptoms include headache, malaise, myalgia, chills and low-grade fever.

Although often considered bothersome, coughs provide an essential defense mechanism. Coughs clear inhaled substances, fumes, excessive mucus and fluid from the airway, thus preventing them from entering into and settling in the respiratory tract. Due to mechanical or chemical irritation of the trachea or bronchi, afferent nerve fibers send a signal to the brainstem, the cough center of the brain. Efferent motor fibers from the pons and medulla oblongata respond to this signal by signaling the body to produce a cough to clear the irritant from the airway. The cough begins with a larger than normal in-

spiration of air, referred to as the inspiratory phase. During the compression phase, air is briefly trapped in the lungs due to closure of the glottis and larynx. While the glottis and larynx are closed, the expiratory muscles contract, creating increased pressure within the chest and airways. At this point, the bronchi are narrowed to appropriately 50 percent of the normal lumen diameter. As the glottis and larynx suddenly reopen, during the expulsive phase, air is forcefully expelled from the lungs. This air is pushed out through the glottis and larynx, creating the characteristic coughing sound. The high airflow and narrowing of the bronchi forces mucus in the airways upward, allowing the patient to expectorate or swallow the mucus.

Even after the initial infection has resolved, coughing may continue. This post-viral cough is due to inflammation of cells. When the virus enters the respiratory system, a cascade of chemical mediators is released, initiating an inflammatory response. This inflammatory response re-

TABLE 2
Manifestations of virus families

Usual manifestation	Occasional manifestation	Infrequent manifestation
Pharyngoconjunctivitis	Acute respiratory disease (military recruits)	Pneumonia (children) or lower respiratory tract infection (immunocompromised)
Common cold	Asthma or COPD exacerbation	Pneumonia or bronchiolitis
"Flu"-like illness	Pneumonia, rhinitis or pharyngitis	Pneumonia
Croup	Common cold or pharyngitis	Tracheobronchitis (adults) or lower respiratory tract infection (immunocompromised)
Pneumonia or bronchitis (children)	Common cold (adults)	Pneumonia (elderly, immunocompromised)
Common cold	Asthma or COPD exacerbation	—

Adapted from Dolin R., Common viral respiratory infections. In Harrison's Principles of Internal Medicine. Edited by Fauci AS, Braunwald B, Isselbacher KJ. New York: McGraw-Hill 1998:1100-5.

solves slowly. Until the inflammatory response resolves and chemical mediators clear, allowing cell disturbance to resolve, the irritated cells can be hyperresponsive and trigger a cough response.

MAKING THE DIAGNOSIS

During the patient interview, the clinician can gain valuable information pertaining to the probable cause and severity of the patient's symptoms. The clinician should assess the patient's recent exposure to an environment with a high risk of virus transmission, such as a school, day care or hospital. He or she also should determine if other members of the patient's family recently experienced similar symptoms.

The clinician should also evaluate the patient's medical history because this may influence the final treatment plan. In particular, the following should be noted:

- Is the patient frail?
- Is the patient an infant?
- Is the patient elderly?
- Does the patient have a chronic respiratory condition?
 - Does the patient have a chronic cardiac condition?
 - Does the patient have diabetes?
 - Does the patient require dialysis?

- Does the patient smoke?
- Is the patient immunosuppressed or immunodeficient?
 - Does the patient take any chronic medications?
 - What medications has the patient already tried for these symptoms? Did they help?
 - Is the patient pregnant or lactating?
 - Does the patient have any medication allergies?

During the examination, the clinician should consider the general symptoms of the common cold, along with typical manifestations of the various virus families (See Table 2). Although identifying the viral cause may not alter the planned treatment, the clinician may be able to more accurately define the expected course of the infection to the patient. This also will assist the clinician in determining if serious complications develop (See Table 3).

Differential diagnosis

Distinguishing between the common cold and other infections poses a significant challenge for the clinician (See Table 4). Numerous infectious and non-infectious conditions present with similar symptoms.

Viral and bacterial sore throats can be dif-

ferentiated by their presentation. Viral sore throats exhibit slower onset than bacterial infections. While bacterial sore throats are usually more severe, they are rarely accompanied by respiratory symptoms. Lymph nodes may be enlarged and tender with bacterial infections.

Influenza is a more serious infection than the common cold, including its symptoms and its possible complications. Influenza causes high fevers, chills, myalgias, arthralgias, vomiting, dehydration and headache. Upper respiratory symptoms are less common with influenza. For individuals of advanced age, small children or patients with underlying medical conditions, influenza is more likely to cause severe dehydration, fatigue, mental status changes or lead to exacerbations of concomitant disorders.

Bacterial sinusitis is typically a diagnosis of exclusion once patients fail to recover from their symptoms. Patients with bacterial sinusitis will typically present with a maxillary toothache and mucopurulent nasal drainage. Although the appearance of green-colored discharge is not a reliable indicator, bacterial sinusitis should be considered if drainage continues for longer than 10-14 days.

TABLE 3
Serious complications associated with upper respiratory infections

Disorder	Symptoms
Respiratory distress	Dyspnea, Tachypnea, shallow respirations, retraction, cyanosis, difficulty swallowing, dysphonia, sensation of throat closure
Altered responsiveness	Unresponsive, decreased level of consciousness, altered mental state, decreased activity, extreme lethargy, excessive sleep, refusal to eat
Dehydration	Vomiting, anuric for more than 12 hours, increased urination despite decreased intake of fluids
Meningeal signs	Stiff neck, severe headache, persistent vomiting

Adapted from Chow AW. Viral upper-respiratory infection (VURI) best practice report. Merck Medicus Web site. Available at http://merck.micromedex.com/index.asp?page=pbm_brief&article_id=BPM011D25.

TREATMENT

Nonpharmacologic treatment options

The only cure available for the common cold is time. All other treatments are aimed at symptom control. While waiting for this self-limiting infection to resolve, the patient can assist the recuperation process. Remaining well-rested, including taking naps, getting to bed early and refraining from strenuous activities, will allow the body to recuperate. A nutritious diet, as tolerated, also is recommended.

To ease coughing, patients should maintain adequate hydration or suck on hard candies. Not only do hard candies relieve the sensation of "tickle" in the throat, they increase saliva production and therefore help the flow of mucus down the pharynx. Hydrating with water will not thin already-formed mucus, but mucus formed in a well-hydrated patient will be less viscous and therefore more easily expelled.

Coughing spasms in children older than 4 months may often be controlled by having them drink warm liquids, such as apple juice, unsalted broth or decaffeinated tea. The warm liquid relaxes the airway and loosens mucus. Honey should not be added to the warmed liquid drink of children younger than 1 year old due to the risk of bacterial growth in the honey. Despite old wives' tales, alcohol should never be added to the child's drink.

Humidifiers can be utilized to increase the amount of moisture in inspired air. The increase in humidity can soothe airways and reduce cough. The pharmacist should recommend the use of cool-mist humidifiers, rather than warm-mist humidifiers. If the water in the humidifier should spill, the warm water represents a burn risk. Also, fewer bacteria grow in cool water. To reduce the risk of bacterial growth with either type of humidifier, the

clinician should educate the patient to clean the humidifier daily, disinfect it weekly and replace the filter routinely. The clinician also should warn the patient that increased humidity can increase the mold and dust mites in the house, thereby worsening allergies.

Saline nasal sprays or drops can be used to alleviate irritation of the mucosal membranes and to loosen encrusted mucus. Since saline has minimal side effects, it is safe for use in patients with underlying medical conditions. Saline works especially well in small children in conjunction with suctioning using a soft rubber bulb. To suction, the parent should squeeze the bulb before placing it in the child's nose, gently sticking the tip into the nostril, closing off the other nostril and slowly releasing the bulb.

For the reduction of fever, patients can take a sponge bath. The patient should be advised to use lukewarm water, not cold. The evaporation of the water will create a cooling sensation on the skin and draw the heat to the surface.

OTC treatment options

A variety of options are available for patients to self-treat with over-the-counter products. The clinician should tailor the recommended regimen to the patient's symptoms and medical history.

PATIENT SCENARIO 2

A patient presents to the clinic with general symptoms of the common cold. He says that, although he has only had the symptoms for 2 or 3 days, he has a lot on his agenda this week and does not have time to deal with this infection. He urges the clinician to provide a medication that will make this "go away right now."

When the clinician makes a recommendation for an over-the-counter medication, the patient explains that he has used that product before but did not feel it worked fast enough. He tells the clinician that he wants an antibiotic.

Case discussion

When seeking medical attention, some patients arrive with a preconceived notion of the appropriate medication for their infection. Often they believe that an antibiotic will cure their viral infection and rapidly resolve symptoms. Unfortunately, many patients do not realize that antibiotics do not have a role in the treatment of viral infections. Some clinicians feel pressured to abide by the patient's wishes.

Decongestant: Decongestants are specifically intended to treat sinus and nasal congestion. They are sympathomimetics that stimulate the alpha-adrenergic receptors. Alpha-adrenergic stimulation causes constriction of the blood vessels. When the blood vessels are constricted, engorgement of the vessels within the sinus is reduced.

Decongestants can be direct-acting or indirect-acting. Direct-acting decongestants, including oxymetazoline, phenylephrine and tetrahydrozoline, bind directly to the alpha-adrenergic receptors. The indirect-acting decongestants displace norepinephrine from vesicles within prejunctional nerve terminals. These decongestants have a slower onset of action and longer duration of activity. Ephedrine and pseudoephedrine have indirect or mixed activity.

Decongestants are available as oral and intranasal formulations. Topical products are often preferred by patients who desire to minimize systemic effects. Abnormalities of the nose, including septal deviation or nasal polyps, may reduce the efficacy of intranasal products. The agents administered topically, including phenylephrine, naphazoline, oxymetazoline and xylometazoline, differ primarily in their duration of action. The intranasal products are available in a variety of formulations, including drops, sprays and inhalers. Nasal drops are typically used for treating small children. The patient must lie down with his head tilted back in order to administer nasal drops. Nasal sprays are easier to administer since they do not require the patient to dangle his head backwards. Sprays also cover a larger surface area than drops. Topical formulations are prone to contamination due to contact with the nasal mucosa during administration.

Decongestants may exacerbate conditions that are sensitive to adrenergic stimulation. Patients with hypertension, hyperthyroidism, diabetes mellitus, coronary heart disease, elevated intraocular pressure and prostatic hypertrophy should be advised against using decongestants to avoid increased adrenergic stimulation. Although decongestant use is not recommended in patients with hypertension, studies have shown no significant increase in blood pres-

TABLE 4
Other respiratory conditions with symptoms similar to the common cold

Respiratory condition	Common symptoms
Allergic rhinitis	Congestion, clear nasal draining, itchy eyes/throat, watery eyes, history of allergies
Asthma	Nonproductive cough, dyspnea, wheezing, fatigue, chest tightness
Bacterial throat infection ("Strep throat")	Sore throat, fever
Bronchitis	Productive cough, persistent fever, dyspnea, discolored or foul-smelling sputum, chills, chest tightness
Croup	Initially presents with fever, rhinitis and pharyngitis, then progresses to "barking" cough, dyspnea; change of temperature or humidity can relieve cough
Epiglottitis	Severe throat pain, dysphagia, stridor, hoarseness, drooling
Infectious mononucleosis	Fatigue, severe throat pain, enlarged lymph nodes, persistent fever
Influenza	Nonproductive cough, arthralgia, myalgia, fever, sore throat
Otitis media	Ear pain, draining, fullness and popping; dizziness
Pertussis ("Whooping cough")	Prodromal typical URI symptoms followed by severe cough; whoop in children (not adults or adolescents); gagging; vomiting
Pneumonia	Productive cough (>7days), persistent fever, dyspnea, discolored or foul-smelling sputum, chills, pleuritic chest pain, chest tightness
Sinus infection	Fever, sinus tenderness, facial pain (particularly with postural changes), ear pressure, malaise, persistent upper respiratory symptoms (>7 days), upper respiratory symptoms that do not respond to decongestants
Streptococcal pharyngitis	Sore throat (rapid onset), exudative tonsillitis, tender anterior cervical adenopathy, lack of rhinorrhea or hoarseness, lack of cough, positive history of fever

sure with pseudoephedrine in patients with well-controlled hypertension.¹⁹

Adverse effects associated with decongestants, primarily when taken orally, are primarily cardiovascular or central nervous system related. Patients may experience elevated blood pressure, tachycardia, palpitation, or even arrhythmias. Insomnia, anxiety, restlessness, tremors or hallucinations are also possible side effects. Phenylpropranolamine was recently removed from the OTC

market due to case reports demonstrating an increased risk of stroke in women younger than 30 years old.²⁰ Patients using topical decongestants may experience adverse effects from the propellants or vehicles used in the product. Side effects with these formulations include burning, stinging and nasal dryness. Rebound congestion, also known as rhinitis medicamentosa, occurs when topical decongestants are used for more than three days.

Drug-drug interactions are possible with

oral decongestants. Patients taking monoamine oxidase inhibitors and tricyclic antidepressants may experience increases in blood pressure. Urinary acidifiers and alkalinizers may experience altered elimination.

Antihistamine: Antihistamines compete with histamine at central and peripheral receptors to prevent mediator release. They are classified as sedating or non-sedating, or first-generation and second-generation. Sedating antihistamines activate serotonin and alpha-adrenergic receptors, as well as block cholinergic receptors. The non-sedating antihistamines do not block cholinergic receptors, but they do inhibit the release of mast cell mediators.

A Cochrane abstract reviewed the use of antihistamines for the common cold.²¹ Although a large difference existed between the studies, participants, interventions, and outcomes, no clinically significant effects were demonstrated in adults or children. First generation antihistamines exhibited a

small effect on rhinorrhea and sneezing.

The side effect profile of each antihistamine depends on receptor activity and lipophilicity. The sedating antihistamines are highly lipophilic and, therefore, easily cross the blood-brain barrier. Central nervous system side effects are common with sedating antihistamines, including sedation, impaired performance, incoordination and reduced motor skills. Due to cholinergic blockade, sedating antihistamines also can cause dry eyes, mouth and nose, along with urinary retention and constipation. Nonsedating antihistamines have few sedating adverse effects due to poor lipophilicity. Children may experience paradoxical effects from antihistamines, including excitation and insomnia. Antihistamines should not be recommended to patients using central nervous system depressants, who have narrow-angle glaucoma or who have benign prostatic hyperplasia.

Mast cell stabilizer: Cromolyn prevents the release of histamine and other chemical

mediators through stabilization of the mast cells. Its original prescription indications were for the prevention of symptoms due to asthma and allergic rhinitis. Studies suggest cromolyn nasal spray also may prove beneficial in reducing the severity of symptoms associated with the common cold if initiated within 24 hours of symptom onset.²²

Cough suppressant: Coughing can induce more coughing due to airway irritation. Cough suppressants, or anti-tussives, aim to break this cycle. These agents, including dextromethorphan, codeine and diphenhydramine, depress the cough reflex center in the brain. They are indicated only for acute, non-productive coughs.

The effectiveness of dextromethorphan continues to be questioned.^{23,24} According to a Cochrane review,²⁵ two studies showed favorable results for dextromethorphan compared to placebo in the treatment of cough in adults, while a third did not. The review also found one study that showed no ben-

PATIENT SCENARIO 3

A woman visits the local pharmacy to pick up an over-the-counter medication for her cough and congestion. When she notices that the pharmacy now has a clinic, she decides to see the clinician because she would prefer if she were able to receive something stronger for her symptoms.

While meeting with the clinician, the patient denies any significant medical problems. She repeatedly announces to the clinician that “‘Cough-be-gone’ has always worked well for me in the past.” Finding that ‘Cough-be-gone’ would be appropriate for the patient’s symptoms, the clinician provides her with a prescription.

The woman brings the prescription to the pharmacist who begins entering the information into the computer. Suddenly the computer flags an interaction between ‘Cough-be-gone’ and the woman’s two anti-hypertensive medications. The pharmacist notices that ‘Cough-be-gone’ contains a decongestant that has the potential to elevate the woman’s blood pressure. After informing the patient, the pharmacist heads to the clinic to discuss an alternative with the clinician.

Case discussion

Even over-the-counter medications can have serious consequences if given to patients with certain medical conditions. When selecting a medication, the clinician should always assess if the product is the correct medication for that patient. Even if the patient comes to the clinic adamant that “‘Cough-be-gone’ has always worked well for me in the past,” the clinician should spend a few moments to determine if it is still appropriate this time.

Unfortunately, many patients do not remember what medications they are taking. Others may choose not to mention chronic health conditions, particularly if they are stable or not bothersome. In these situations, the clinician should consider making full use of the retail store clinic’s location. The clinician can work with the pharmacist to determine if any of the patient’s prescriptions filled at that store would interact with concomitant medications or are contraindicated with the patient’s medical conditions.

efit for dextromethorphan use in children. If used in combination with a monoamine oxidase inhibitor, dextromethorphan can cause hypotension, hyperpyrexia and coma.

Diphenhydramine and codeine are also cough suppressants. Diphenhydramine exhibits anticholinergic and central anti-tussive properties, while codeine acts centrally on the respiratory center of the medulla to suppress cough.

In some states, small amounts of codeine-based cough syrup are available without prescription as a Schedule C-V narcotic. Along with the potential for addiction, codeine also may cause nausea, vomiting, sedation, dizziness and constipation.

For patients who prefer a topic agent, menthol also is approved as an anti-tussive agent. Menthol, available as topical ointments, lozenges, vaporizing ointments, and patches, may alleviate cough through its local anesthetic effect or increased saliva production. The clinician should advise patients to only use vaporized products in a vaporizer, not in pots of boiling water. The use of lozenges may cause heartburn due to smooth muscle relaxation. Topical ointments and patches may cause skin irritation and dermatitis. Topical ointments should not be used in children younger than the age of two.

Expectorant: Removal of excessive mucus from the airways is essential during the common cold. If excessive mucus is permitted to settle in the lungs, pneumonia can develop. Guaifenesin, available as a liquid or tablet, may help patients with a productive cough if they are unable to clear mucus. Guaifenesin is generally well-tolerated with side effects including nausea, vomiting, headache, diarrhea and drowsiness. Adequate hydration also is important to clearing excess mucus.

Analgesics: For patients experiencing fever, myalgias or arthralgias, acetaminophen and non-steroidal anti-inflammatory agents, including ibuprofen and naproxen, are available over the counter. Although both

classes of medications are effective, the clinician may consider the non-steroidal agent the better option because it does not alter viral shedding. Acetaminophen may prolong viral shedding, while ibuprofen will not.²⁶ For children younger than the age of 6 months, acetaminophen is the agent of choice since ibuprofen is not approved in this population.

Aspirin should never be recommended for use in children or teenagers. The use of aspirin in this population may lead to development of Reye's syndrome.

community-acquired bacterial pneumonia, meningitis and sinusitis. The majority of antibiotics prescribed to adults in the ambulatory setting are for the treatment of acute respiratory tract infections and non-specific upper respiratory tract infections, such as the common cold.

In a position paper from the American College of Physician-American Society of Internal Medicine,²⁷ the panel recommends that antibiotics not be used for the treatment of nonspecific upper respira-

PATIENT SCENARIO 4

A patient presents to the clinic complaining of a sore throat, runny nose, headache, sneezing and coughing. He also specifies that he does not like to swallow "horse pills," preferring to take liquids whenever possible.

After obtaining a complete history and performing an examination, the clinician recommends two over-the-counter medications. Since the patient prefers liquids, the clinician recommends the syrup formulations.

When the clinician explains the recommended dose, side effects, and expected outcomes for each product, the patient does not appear pleased. He complains to the clinician that he does not want to take the cough syrup every 4 hours. When the patient looks at the bottles, he notices that the liquids are formulated in a "great-tasting cherry syrup." He wrinkles his nose and exclaims, "Cherry? Isn't there anything better?"

Case discussion

With hundreds of options available to treat the common cold and cough, the clinician can meet a patient's needs and desires in countless ways. The pharmacist should always consider these preferences when making a recommendation.

THE PUSH FOR ANTIBIOTICS

Health care providers understand that the common cold is caused by a virus and that antibiotics do not treat viral infections. Unfortunately, a vast number of patients do not understand one or both of these concepts. Many patients seek medical attention with a preconceived notion of the desired treatment. In many of these cases, the patient is seeking an antibiotic.

The inappropriate use of antibiotics has contributed to the emergence and spread of resistant bacteria. Of immediate concern is the resistance profile of *Streptococcus pneumoniae*, a leading cause of

tory tract infections in previously healthy adults. Purulent secretions do not predict bacterial infection nor do they benefit from antibacterial therapy. Such treatment does not enhance illness resolution or prevent complications.

The CDC and the American Academy of Pediatrics also has published guidelines promoting judicious use of antimicrobials.²⁸ Their guidelines recommend that antibiotics not be prescribed for the common cold. They also state that mucopurulent rhinitis with thick, opaque or discolored discharge is not an indication for treatment unless it persists for more than 10 days to 14 days.

Data from Finland in the early 1990s showed that a concerted effort to decrease ambulatory antibiotic prescribing could alter resistance patterns.²⁹ Due to increasing erythromycin resistance in group A streptococci, nationwide recommendations were issued to reduce the use of macrolides for the treatment of upper respiratory and skin infections. In one year, the consumption of erythromycin declined from 2.4 defined daily doses per 1,000 inhabitants per day to 1.38 daily doses. This reduction in usage was maintained for the remaining four years of the study. At the end of five years, the percentage of resistant streptococci samples fell from 16.5 percent to 8.6 percent.

For those practitioners who feel pressured by patients to prescribe antibiotics for viral infections, the CDC provides patient appropriate materials on its Web site at www.cdc.gov. The CDC provides posters aimed at various patient demographics, along with brochures in English or Spanish explaining viral versus bacterial infections and the role of antibiotics. A "prescription pad" also is available that discusses how viral infections do not require antibiotics, provides nonpharmacologic self-care recommendations and allows the clinician to fill in symptom-specific treatment regimens.

CONCERNS WITH CONCOMITANT MEDICAL CONDITIONS

Cardiac conditions. Patients with cardiac conditions, including hypertension, ischemic heart disease, and coronary artery disease, may experience significant adverse effects from OTC medications. Their condition also may become destabilized by fluid accumulation and other pathologic changes.

Diabetes mellitus. During an acute illness, patients with diabetes mellitus may experience poor control of blood sugars. This can be exacerbated by taking certain OTC products. When OTC cough products are necessary, sugar-free formulations are available.

Asthma. The use of cough suppressants in patients with asthma may mask worsening lung function.

Product recommendation

After making the diagnosis, the clinician must evaluate which medication is correct for the patients. The recommended medication only should treat the symptoms that the patient exhibits. With the vast variety of combination products available, the clinician should be cautious of medications containing numerous compounds unless the patient exhibits symptoms necessitating every ingredient. Unnecessary ingredients increase the patient's risk of adverse effects. All ingredients should be evaluated for contraindication with pre-existing medical conditions or with concurrent medications. Along with assessing the patient's medication allergies, the clinician should appropriately adjust the dose for the patient's age and weight, particularly if the patient is a child.

When recommending products, the clinician also should consider which products will be best accepted by the patient, thereby improving adherence. Some patients may prefer longer-acting products to avoid frequent dosing. Products which are more palatable also may prove more satisfactory.

Regardless of which product is selected, the clinician should advise the patient about possible side effects. Patients are prone to discontinuing therapy if unexpected or undesirable side effects develop. For prescription medications, this information should be reiterated by the pharmacist to reinforce the patient's comprehension. Repetition of the information is essential because the patient's fear, anxiety or frustration with the illness (or even with the health care system) may impede his ability to retain the information.

PATIENT EDUCATION

Self-care instructions

Not everyone exposed to the rhinovirus will develop cold symptoms. Various factors are associated with an increased risk of viral susceptibility. Individuals who smoke exhibit increased susceptibility.³⁰ Stressful life events are a positive predictor for developing colds following exposure.³¹ Perceived stress and negative emotional feelings are also risk factors for developing colds.³² Reducing these factors may influence the patient's risk of infection.

Stop the spread

The rhinovirus is transmitted via aerosolization or through direct contact. When an infected patient sneezes or coughs, aerosolized droplets containing the virus are expelled. These droplets land on surfaces that other individuals may touch, providing for continued spread of the virus.

To reduce the risk of spreading the virus, patients should be reminded to cover a sneeze or cough by using a tissue. Many schools now are teaching children to sneeze or cough into the bend of their elbow, rather than their hands if a tissue is unavailable. This technique prevents droplets from landing on hands which will then be placed on common surfaces.

Even patients who routinely utilize tissues should be reminded about the importance of frequent hand washing. Invariably, the virus will land on the hands of the patient or caregiver. To remove the virus, the clinician should recommend frequent hand washing with soap and hot water.

The clinician also should consider administering the influenza vaccine to high-risk individuals. In particular, influenza vaccination is recommended for patients who are:

- Younger than 2 years of age,
- 65 years or older,
- Children or adolescents receiving long-term aspirin therapy,
- Women who will be pregnant during the influenza season,
- Adults and children who have chronic respiratory or cardiovascular disorders, or
- Residents of nursing homes or other chronic-care facilities.

SUMMARY

No two patients with the common cold are the same. With so many types of viruses and viral infections, the clinician should carefully evaluate patients to determine the appropriate diagnosis. The patient's concurrent medical conditions also play a role in the decision-making. As a front-line for the care of ambulatory patients, the clinician can screen for patients at risk of severe complications, while working with the pharmacist to select an appropriate regimen.

Cough and Cold Treatment

Nothing common about the common cold

Learning Assessment

- The most prevalent cause of the common cold is:**
 - adenovirus
 - coronavirus
 - parainfluenza
 - rhinovirus
- The incidence of rhinovirus infection is more prevalent in:**
 - children
 - adults
- Symptoms of rhinovirus infection can develop within ___ of exposure.**
 - 12 hours
 - 2 days
 - 7 days
 - 10-14 days
- Rhinovirus infection can increase production of which cytokine(s)?**
 - IL-6
 - IL-8
 - granulocyte-macrophage colony stimulating factor
 - all of the above
- Which symptom(s) are due to stimulation of neurogenic reflexes?**
 - tissue edema
 - vascular engorgement
 - mucus hypersecretion
 - all of the above
- Typically the first symptom of the common cold is:**
 - cough
 - sore throat
 - sneezing
 - rhinorrhea
- Which of the following are areas associated with a high risk of viral transmission?**
 - schools
 - daycare centers
 - hospitals
 - all of the above
- Viral sore throats exhibit a faster onset than bacterial.**
 - True
 - False
- Which of the following is not a typical presentation of bacterial sinusitis?**
 - maxillary toothache
 - mucopurulent nasal drainage
 - dyspnea
 - facial pain
- Mucus developed in a well-hydrated patient will be more easily expelled.**
 - True
 - False
- A 6-month old with coughing spasm should not be offered:**
 - decaffeinated tea
 - warm water with honey
 - unsalted broth
 - apple juice
- Decongestants should be avoided or used with caution in patients with:**
 - HTN
 - DM
 - hyperthyroidism
 - all of the above
- The use of a tricyclic antidepressant in combination with _____ may cause increased blood pressure.**
 - decongestants
 - ibuprofen
 - guaifenesin
 - acetaminophen
- Which product should be used with caution in patients with BPH?**
 - acetaminophen
 - guaifenesin
 - diphenhydramine
 - ibuprofen
- The CDC recommends antibiotics for the treatment of mucopurulent discharge lasting more than 7 days.**
 - True
 - False
- Resistance patterns can decrease with judicious use of antibiotics in the community setting**
 - True
 - False
- Which virus most commonly causes croup?**
 - rhinovirus
 - adenovirus
 - parainfluenza
 - coronavirus
- Adenovirus' peak occurrence is during which season?**
 - spring
 - summer
 - fall
 - winter
- Which virus is associated with acute respiratory infection outbreaks in military recruits?**
 - adenovirus
 - rhinovirus
 - coronavirus
 - parainfluenza
- Which condition starts with sneezing, rhinorrhea, and mild cough then progresses to paroxysmal cough?**
 - allergic rhinitis
 - epiglottitis
 - pertussis
 - croup

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