Treating the Common Cold

An Expert Panel Consensus Recommendation for Primary Care Clinicians

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Learning Objectives

1. Review evidence-based research regarding nonprescription cough and cold preparations.
2. Evaluate the usefulness of zinc, vitamin C, and echinacea in managing the symptoms of the common cold.
3. Differentiate the relative value of nonprescription products used to manage the symptoms of cold and cough.

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Accreditation

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The common cold, or acute upper respiratory tract infection (ARTI), is one of the most common reasons for patients to see a primary care clinician, and accounts for more than 25 million office visits in the United States each year.[1] The economic impact of ARTI is enormous in terms of both medical costs and lost productivity. The cost of treating the common cold in the ambulatory care setting exceeds $1 billion annually.[2] The huge cost of prescription and nonprescription medications must also be factored in: On a yearly basis, an estimated $227 million is spent on antibiotics in the treatment of ARTI, and approximately $2 billion is spent on nonprescription cough and cold products.[1,3] Furthermore, working adults with ARTI take a total of 20 million sick days each year and children with ARTI miss a total of 22 million school days each year.[4]

Although the common cold is an acute, usually afebrile, self-limited illness, its symptoms cause substantial discomfort, and its management poses a substantial burden on the medical community.[5] Primary care health professionals are faced daily with questions of whether, when, and how best to treat ARTI. Many clinicians are challenged by patients' beliefs and expectations regarding management of the common cold; such expectations may conflict with the delivery of appropriate medical care.[6] In addition, clinicians must continually keep abreast of safety and efficacy information regarding the plethora of alternative medications and over-the-counter (OTC) products available to their patients.

FnP Associates and the Illinois Academy of Family Physicians recently convened a multidisciplinary expert panel to develop recommendations for the management of ARTI—the common cold—in the primary care setting. These recommendations were based on a thorough review of the evidence-based literature regarding the diagnosis and treatment of ARTI. The panel reviewed the efficacy and safety of both prescription and nonprescription medications, with specific focus on alternative cold remedies such as zinc, vitamin C, and echinacea.

Epidemiology

ARTI presents seasonally, with the incidence increasing through the Fall, peaking in the winter months, and declining in the Spring.[7] Young children commonly experience 5 to 7 colds a year, but some have as many as 12.[8] Adults typically have 2 to 3 colds a year, although those who have frequent contact with young children may have more than that. Factors that increase the risk of contracting the common cold include smoking, poor nutrition, population crowding, sedentary lifestyle, and less diverse social networks.[9] Day-care attendance is a major risk factor for ARTI in young children, and the frequency of colds increases with the number of children in attendance.[10,11] In adults, stress contributes to an increased susceptibility to the common cold.[12] Heavy exercise may lead to an increased risk for ARTI, although moderate exercise is associated with favorable immune system changes that may protect against ARTI.[13]

Etiology and Pathogenesis

Rhinoviruses represent the culprit pathogen in approximately 80% of ARTIs.[5] Other viral pathogens implicated in ARTI include coronaviruses, parainfluenza viruses, respiratory syncytial virus, and adenoviruses. The primary route of rhinoviral infection in ARTI is through self-inoculation of the nose or eyes following contact with other persons' infected secretions. Rhinoviruses can survive on the hands or on environmental surfaces for several hours, and have been detected on the hands of 40% to 90% of cold sufferers.[14] Other modes of infection include transmission of small-particle aerosols via sneezing, which linger in the air for an extended period of time, and transmission of large-particle aerosols, most likely via coughing from an infected individual.[7]

ARTIs develop as cold viruses are transported to the adenoid area in the back of the throat, where they bind to intercellular adhesion receptor molecule-1, replicate within respiratory epithelial cells, and spread through the nasopharynx region.[15,16] The infectious dose of rhinovirus is very small, and replication occurs within 8 to 12 hours.[17,18] Despite the efficiency of the rhinovirus, symptomatic illness develops in only 75% of infected individuals.[17,19]

Symptoms

As the viral infection quickly spreads, the inflammatory cascade is activated. Infected cells signal production of cytokines and chemokines (eg, platelet-activating factor, leukotrienes, prostaglandins, bradykinins) that activate inflammatory and immunocompetent cells.[9] Clinical symptoms occur within 10 to 12 hours after infection, and typically include a sore, scratchy throat followed by profuse and watery rhinorrhea, watery eyes, nasal congestion, sneezing, and coughing (Table 1).[7] As symptoms peak in severity by day 2 or 3, nasal discharge worsens and may become thicker and discolored. This mucopurulent discharge is common with a viral ARTI and does not necessarily indicate the presence of bacteria.[20]

Other cold symptoms include malaise, fatigue, headache, hoarseness, arthralgia, sinus congestion and pain, ear pressure, fever, and myalgia (Table 1).[7] A dry, hacking, nonproductive cough may develop and persist into the second week of symptoms. Fever is common in children with ARTI but is an infrequent finding in adults. Myalgia, occasionally reported by patients with ARTI, is more typical of influenza. Cold symptoms generally last 7 to 10 days but can persist for up to 3 weeks.

Differential Diagnosis

Some of the symptoms of the common cold are the same as those of other upper respiratory tract infections such as acute bacterial rhinosinusitis (ABRS), allergic rhinitis, and streptococcal pharyngitis. A complete patient history can differentiate symptoms and facilitate an accurate diagnosis. The primary consideration in diagnosing ARTI is to rule out a more serious illness that would necessitate more aggressive treatment. Although a complete review of the complications of the common cold is beyond the scope of this guideline, special patient populations, such as the very young, the elderly, and persons with comorbid conditions, are at greatest risk for complications, including bacterial superinfection.[7] An atypical illness course should alert clinicians to investigate further.

Acute Bacterial Rhinosinusitis—Rhinosinusitis is the inflammation of one or more

of the paranasal sinuses and adjoining nasal mucosa.[21] Like the common cold, rhinosinusitis is a frequent reason for seeking medical attention, with 35 million cases occurring annually and resulting in 25 million office visits.[22] ABRS is also the fifth most common diagnosis for which antibiotics are prescribed, with an associated cost approximating $310 million per year.[1,23] Despite this widespread use, the most recent treatment guidelines state that symptom management with antimicrobials should be reserved for patients in whom a bacterial pathogen has been identified or is very likely to exist.[23]

Like the common cold, ABRS presents seasonally. It is typically preceded by an ARTI, the vast majority of which will resolve within 2 weeks without treatment.[24] Bacterial superinfection may occur at any point during the viral illness, but the risk is greater if viral symptoms are unresolved after 10 days. Viral sinusitis is complicated by bacterial infection in roughly 2% of cases.[23] A diagnosis of ABRS may be made in adults or children with symptoms of viral upper respiratory infection that have worsened after 5 to 7 days or have not improved after 10 days.

The American Academy of Otolaryngology has identified major and minor factors associated with ABRS, and has defined combinations of these factors to help primary care clinicians make an accurate diagnosis (Table 2).[23] Major factors include facial pressure and pain, nasal congestion, nasal discharge, hyposmia/anosmia, cough (not due to asthma; in children only), and fever (in ABRS of <4 weeks' duration). Minor factors include headache, halitosis, fatigue, dental pain, cough (in adults), and ear pain or pressure. With worsening or unresolved illness, the presence of at least two major factors or one major factor and two minor factors defines the diagnosis of ABRS.

Allergic Rhinitis—A systemic disease triggered by environmental allergens, allergic rhinitis affects 8% to 16% of US residents.[25] Costs associated with medical care and lost productivity related to this condition exceed $1 billion each year. In addition, the duration and intensity of allergic rhinitis symptoms can greatly compromise patients' quality of life.

Allergic rhinitis typically presents in atopic children or adults.[9] Episodes occur seasonally, timed with pollination of the offending weed, grass, or tree; or perennially, in response to environmental allergens such as dust. The most common signs and symptoms are nasal congestion; postnasal drip; repetitive sneezing; profuse, watery rhinorrhea; lacrimation; and pruritus of the eyes, nose, and palate (Table 3). Systemic symptoms include fatigue, irritability, and malaise. Other clinical features that clinicians may observe or patients may report include headache, sore throat, frequent throat clearing, nose picking, grimacing or twitching, coughing, ear pain/pressure, mouth breathing, decreased appetite/hearing/smell, hoarseness, sniffling, and/or epistaxis.

TABLE 1.
Symptoms of Acute Upper Respiratory Tract Infection

Common/Early	Other
Sore throat	Headache
Rhinorrhea	Hoarseness
Watery eyes	Arthralgia
Nasal congestion	Sinus congestion/pain
Sneezing	Ear pressure
Coughing	Nonproductive cough
Malaise	Fever
Fatigue	Myalgia

TABLE 2.
Diagnosis of Acute Bacterial Rhinosinusitis

- **Symptoms worsening after 5-7 days or unresolved after 10 days**
- **Presence of at least 2 major factors or 1 major and 2 minor factors**

Major Factors	Minor Factors
Facial pressure/pain	Headache
Nasal congestion	Halitosis
Nasal discharge	Fatigue
Hyposmia/anosmia	Dental pain
Cough (in children)	Cough (in adults)
Fever (acute disease)	Ear pain/pressure

TABLE 3.
Symptoms of Allergic Rhinitis

Common	Systemic
Nasal congestion	Fatigue
Postnasal drip	Irritability
Repetitive sneezing	Malaise
Watery discharge from nose and eyes	
Itching of nose, eyes, and palate	

Streptococcal Pharyngitis—Group A beta-hemolytic streptococcus (GAS), the leading bacterial cause of acute pharyngitis, accounts for only a small fraction of sore throats.[26] Fewer than 10% of adults and 30% of children with acute pharyngitis have a streptococcal infection.[27] However, sore throat is a common reason for patients to see primary care clinicians or pediatric healthcare providers; many of these patients (or their parents) are concerned about streptococcal infection and prevention of rheumatic fever.

GAS pharyngitis ("strep throat") occurs primarily in children aged 5 to 15 years, and presents most frequently in the winter and early Spring.[28] The clinical presentation of

streptococcal pharyngitis is typically characterized by acute pharyngeal pain, dysphagia, and fever, and is commonly accompanied by malaise, headache, nausea, vomiting, and abdominal pain (Table 4). Symptoms of GAS pharyngitis overlap with those of viral pharyngitis and other upper respiratory tract infections. However, the presence of rhinorrhea, cough, hoarseness, conjunctivitis, and diarrhea is uncommon in GAS pharyngitis and suggests a viral etiology. Fever should abate within 3 to 5 days, and all symptoms should subside within a week. Because the clinical presentation of GAS pharyngitis does not clearly reveal the cause of infection, definitive diagnosis must be based upon a throat swab culture or antigen-detection test.[29]

Common Cold—Table 5 compares the characteristics and clinical features of the common cold with those of ABRS, allergic rhinitis, and streptococcal pharyngitis.

Prevention

The predictable arrival of the common cold each Winter makes its symptoms all the more annoying and intrusive. Contrary to common beliefs, ingesting large doses of vitamin C or avoiding exposure to cold temperatures or recirculated cabin air on airplanes does not prevent colds.[30-32] However, primary care clinicians can recommend certain strategies to help patients reduce their risk of infection (Table 6). Eating a balanced diet, getting enough sleep, managing stress, and exercising

TABLE 4.
Symptoms of Streptococcal Pharyngitis

Sore throat	Headache
Difficulty swallowing	Nausea/vomiting
Fever	Abdominal pain
Malaise	

TABLE 5.
Differential Diagnosis of the Common Cold and other Upper Respiratory Conditions

Characteristics/ Clinical Features	Common Cold	Acute Bacterial Rhinosinusitis	Allergic Rhinitis	Streptococcal Pharyngitis
Seasonality	Fall, winter, spring	Fall, Winter, Spring	Seasonal or perennial	Winter, Spring
Duration of signs and symptoms (mean)	7 days	>10 days	Variable	7 days
Sore throat	Yes	—	Sometimes	Yes
Nasal discharge	Yes	Yes	Yes	—
Discharge color	White	Yellow/green	Clear	N/A
Discharge consistency	Thin or thick	Thick	Thin, watery	N/A
Nasal congestion	Yes	Yes	Yes	—
Sneezing	Yes	—	Yes	—
Cough	Yes	Sometimes	Sometimes	—
Malaise	Yes	Yes	Sometimes	Yes
Fatigue	Yes	Sometimes	Sometimes	Sometimes
Headache	Sometimes	Sometimes	Sometimes	Sometimes
Myalgia	Sometimes	—	—	Yes*
Fever	Sometimes†	Yes‡	—	Yes
Ear pain, pressure	Sometimes	Sometimes	Sometimes	—
Facial pressure	Sometimes	Yes	—	—
Itching of nose, eyes	Sometimes	—	Yes	—
Dysphagia	Sometimes	—	—	Yes
Hyposmia/anosmia	—	Yes	Sometimes	—
Halitosis	—	Sometimes	—	—
Dental pain	—	Sometimes	—	—
Nausea/vomiting	—	—	—	Yes
Abdominal pain	—	—	—	Yes

*Associated with fever.
†Fever in ARTI is common in children but atypical in adults.
‡In acute disease of <2 weeks' duration.

moderately help the immune system to fend off viral invaders.[33,34] Smokers are at increased risk for respiratory infections, so patients should be encouraged to stop smoking, or at least to decrease smoking frequency or to avoid second-hand smoke whenever possible.

Limiting exposure to cold viruses is another important means of reducing the risk of contracting an ARTI, and is especially important for people with increased susceptibility such as allergy or asthma sufferers.[33] Patients should be advised to avoid individuals with cold symptoms if possible. Frequent hand washing and regularly disinfecting surfaces (eg, countertops, telephone receivers, doorknobs) will also help to limit cold viruses from spreading.

Nonpharmacologic Therapy

With no cure for the common cold available, goals of treatment are to alleviate symptoms and avoid complications while the body's immune system combats the infection. In theory—given the rapid rate at which ARTI occurs—early symptomatic treatment yields the best results.[35] Patients can use a number of nonpharmacologic measures to manage symptoms and help them feel better as the cold runs its course (Table 7).

Drinking a large amount of fluids (≥8 8-oz glasses/day) will maintain hydration, help to loosen mucus, and assist in alleviating congestion.[9] Alcoholic and caffeinated drinks tend to dehydrate and should be avoided. Water, juice, ginger ale, herbal teas, and broth are good options. Chicken soup, grandmother's proverbial cold remedy, has a mild anti-inflammatory effect that may improve mucociliary clearance.[36] It is not necessary to withhold milk or dairy products because they do not increase congestion.[9] Because smoking interferes with the body's ability to keep bacteria out of the respiratory tract, smokers with a cold should be advised to curtail smoking so as to avoid progression to bacterial superinfection.[33] Although heavy exercise during the course of cold is not recommended, moderate exercise (eg, walking) is not harmful, and preliminary data indicate that it may mitigate cold symptoms.[13,37]

Blowing the nose is the simplest method of clearing nasal congestion associated with the common cold; however, using proper technique is important in terms of limiting spread of the virus to the ears and sinuses, as well as to other individuals.[38] Paper facial tissues, used once and discarded, are preferable to cloth handkerchiefs, which provide the perfect breeding ground for viruses and bacteria. Patients should be instructed not to close off one nostril but to blow gently through the open nostril, and then repeat on the opposite side. In addition, patients should be advised to avoid blowing too hard, because excessive pressure will force mucus drainage into the ears and sinuses. To avoid spreading infection, they should wash their hands after touching their nose and handling tissues.

Increasing environmental humidity with cool-mist humidifiers or vaporizers will help to alleviate nasal congestion.[9] For adults, warm salt gargles (1-3 teaspoons of table salt per 8 oz of warm tap water) may be recommended to soothe sore throats, and external nasal dilator strips can provide temporary relief of nasal stuffiness. For infants and young children, gentle suctioning of the nasal passages with a bulb syringe and applying saline drops into the nostrils can reduce congestion.

Nonprescription Drug Therapy

Many nonprescription medications are available to treat the complex of symptoms associated with the common cold, including decongestants, antihistamines, antitussives, and expectorants. Their indications, contraindications, precautions, drug interactions, and adverse effects are outlined in Table 8.

Single-ingredient products are preferable because of the increased cost, increased drug interaction and side-effect potential, risk of duplicative therapy, and limited dosing options associated with combination products (Table 9). Furthermore, many fixed-dose combination cough and cold products contain one or more ingredients targeted to treat symptoms that a patient may not have. Treating the most bothersome cold symptom with a specific single-agent product targeted to relieve that symptom is more prudent than trying a "shotgun," fixed-dose approach to alleviate multiple symptoms with a single pill.

OTC cold products should not be used in children younger than 2 years because no data are available to suggest appropriate dosing or to support their safety in this population.[9] Primary care clinicians must educate parents regarding the risk of serious adverse reactions that may occur in children younger than 2 who are given nonprescription cold products. If very young children's cold symptoms warrant pharmacologic treatment, clinicians should prescribe only those medications that are FDA approved for use in this age group.

Some individuals should refrain from taking OTC cold medications without the oversight of a healthcare professional (Table

TABLE 6.
Preventing the Common Cold

Practice Healthy Habits	Limit Exposures
Eat a balanced diet	Avoid contact with infected individuals
Get sufficient sleep	Wash hands frequently
Manage stress	Disinfect surfaces
Exercise moderately	
Stop smoking or decrease frequency	
Avoid second-hand smoke	

TABLE 7.
Nonpharmacologic Therapies for the Common Cold

Behavioral	Other
Adequate hydration	Room air humidification
Smoking cessation or decreased frequency	Saline gargles or sprays
Proper nose blowing technique	Externals nasal dilator strips
	Bulb syringe and saline drops (young children)

TABLE 8.
Using Nonprescription Therapies for the Common Cold*

DECONGESTANTS
Indication
Temporary relief of nasal stuffiness
Contraindications
Oral formulations: Severe, poorly managed HTN; CAD; MAOI use; hypersensitivity
Ophthalmic formulations: Glaucoma
Cautious Use*
In patients with hyperthyroidism, diabetes mellitus, coronary heart disease, ischemic heart disease, hypertension, increased intraocular pressure, and prostatic hypertrophy
Drug Interactions
MAOIs, methyldopa, TCAs, and urinary acidifier/alkalinizers
Adverse Effects
Oral formulations: Restlessness, nervousness, irritability, insomnia, dizziness, tremor, headache, tachycardia, and elevated blood pressure
Intranasal formulations: Rebound congestion with application for >2-3 days, local irritation

ANTIHISTAMINES
Indication
Relief of rhinorrhea and sneezing; limited value in ARTI; use only in patients with concomitant allergic rhinitis
Contraindications
Hypersensitivity and lactation
Cautious Use*
In patients with glaucoma, prostatic hypertrophy, breathing problems, chronic bronchitis, and young or advanced age
Drug Interactions
CNS depressants, MAOIs, phenytoin, ketoconazole, erythromycin, and cimetidine
Adverse Effects
Drowsiness, dry mouth, nervousness, and dizziness

ANTITUSSIVE (DEXTROMETHORPHAN)
Indication
Suppression of a dry, nonproductive cough
Contraindications
MAOI use or within 2 weeks of discontinuing MAOIs
Cautious Use*
In patients with glaucoma, prostatic hypertrophy, breathing problems, chronic bronchitis, or a productive cough; and in the elderly
Drug Interactions
MAOIs, sibutramine, fluoxetine, paroxetine, quinidine, terbinafine, grapefruit/Seville orange juice
Adverse Effects
Drowsiness, dry mouth, nervousness, and dizziness

EXPECTORANT (GUAIFENESIN)
Indication
Facilitation of mucus removal from the upper respiratory tract
Contraindications
Hypersensitivity or persistent, nonproductive cough (eg, smokers, asthmatics)
Adverse Effects
Nausea, vomiting, dizziness, headache, and rash

*Do not exceed recommended dose or dosing frequency of any nonprescription medication.
HTN = hypertension; CAD = coronary artery disease; MAOI = monoamine oxidase inhibitor; TCA = tricyclic antidepressant; ARTI = acute upper respiratory tract infection; CNS = central nervous system.

TABLE 9.
Disadvantages of Nonprescription Combination Cold Therapies

↑ Cost

↑ Drug-drug interactions

↑ Side effects

Risk of duplicate therapies

Limited dosing options

Administration of unnecessary drugs (young children)

TABLE 10.
Use of Nonprescription Cold Therapies in Special Patient Populations

Excluded from Use
Children <2 years of age

Exclusions from Self-Treatment
Fever (oral temperature >101.5° F), chest pain, shortness of breath
Worsening or additional symptoms
Chronic cardiopulmonary disease, AIDS, immunosuppressant therapy
Frail, elderly patients

Cautious Use
Children >2 years through adolescence
Older adults
Pregnant women
Patients with comorbid conditions

10). Exclusions from self-treatment include patients with a fever (oral temperature >101.5° F), chest pain, or shortness of breath; whose symptoms are worsening; who have additional symptoms; with concurrent underlying chronic cardiopulmonary disease (eg, asthma) or AIDS; or who are using long-term immunosuppressant therapy; and who are frail and/or elderly. Healthcare professionals should carefully review product labeling before recommending any OTC cold medication for young children, the elderly, pregnant women, and persons with comorbid conditions.

Decongestants—Decongestants provide temporary relief from nasal stuffiness associated with a cold, and are available in intranasal, oral, and ophthalmic formulations.[9,39] As vasoconstrictors, decongestants restrict blood flow to the nasal passages, which, in turn, reduces mucosal edema and sinusoid vessel engorgement.

Oral formulations. Pseudoephedrine is the prototypic oral decongestant; onset of action is 30 to 60 minutes after the first dose.[39] The recommended dosage for adults is 60 mg every 4 to 6 hours as needed (not to exceed 240 mg in a 24-hour period). As an alternative, pseudoephedrine may be dosed by weight in adults at a dosage of 4 mg per kg per day, in divided doses, every 6 hours as needed. Adults using a sustained-release preparation should take 120 mg every 12 hours as needed (not to exceed 240 mg/day). Children aged 6 to 12 years should take one half of the adult dose every 6 hours as needed, and children aged 2 to 5 years should receive one fourth of the adult dose every 6 hours as needed. Oral decongestants in syrup, elixir, or suspension formulations are typically easiest to administer to young children.

Topical formulations. Nasal sprays, drops, and inhalers are relatively inexpensive and easy to use, and work rapidly (onset of action, 30 seconds to 10 minutes), but patients must be warned that routine use for more than 2 or 3 days causes rebound nasal congestion.[39] This warning applies to ophthalmic decongestant formulations as well. Nasal decongestant sprays provide better distribution than do nasal drops, and longer-acting sprays such as oxymetazoline and xylometazoline are most frequently used. Phenylephrine is the prototypic active ingredient in nose drops.

Oral versus topical formulations. Disadvantages to intranasal delivery of decongestants include imprecise dosing, contamination of the bottle tip, local irritation, and reduced efficacy in the presence of nasal polyps, enlarged turbinates, or anatomic abnormalities (eg, septal deviation).[9] In addition, the medication in nasal inhalers loses efficacy within 2 to 3 months because of dissipation of the active ingredient. Oral decongestants can be used without risk of rebound congestion or local irritation but are less effective despite a longer duration of action.

Contraindications. Systemic oral decongestants are contraindicated in patients with severe, poorly-managed hypertension (HTN) or coronary artery disease (CAD); patients taking monoamine oxidase inhibitors (MAOIs) or those who have taken MAOIs within 14 days of decongestant therapy; and patients with hypersensitivity to any of the product components.[9,39] Ophthalmic decongestants are contraindicated in patients with glaucoma. In addition to the contraindications identified, decongestants should be used cautiously in patients with hyperthyroidism, diabetes mellitus, coronary heart disease, ischemic heart disease, hypertension, increased intraocular pressure, and prostatic hypertrophy. Topical nasal decongestants have limited systemic effect but should be used with caution in patients with the caveats noted for oral decongestants.

Interactions and adverse effects. Drugs that interact with decongestants include MAOIs, methyldopa, tricyclic antidepressants, and urinary acidifier/alkalinizers.[9,39] Adverse events associated with oral decongestant use include restlessness, nervousness, irritability, jitteriness, insomnia, lightheadedness, dizziness, nausea, tremor, headache, tachycardia, irregular heart rate, and elevated blood pressure. Burning, stinging, and dryness of the nose can occur with topical decongestants.

Antihistamines—The common cold is not a histamine-mediated process but, rather, an inflammatory condition. Therefore antihistamines are of limited value in treating ARTI.[39] Antihistamines should not be used as primary therapy and should be considered only for use in cold sufferers with concomitant allergic rhinitis. Because of the sedating effect of some first-generation antihistamines, the alkylamines (eg, brompheniramine, chlorpheniramine, triprolidine) or the second-generation antihistamine loratadine, which has no anticholinergic activity, should be used in cold sufferers with a comorbid allergy.[9]

Antihistamine use is contraindicated in patients with hypersensitivity to the specific drug and in lactating mothers.[39] Practitioners should use antihistamines cautiously in patients who have glaucoma, prostatic hypertrophy, breathing problems, or chronic bronchitis.[5] Because of the anticholinergic effects of some antihistamines, the severity of dementia and the risk of falls and fractures can be increased in elderly users of these medications. Clinicians prescribing antihistamines for older patients should start with the lowest dosage and increase dosing gradually. In addition, clinicians should be aware of the paradoxical excitation that may occur with antihistamine use in some children and in the elderly. Antihistamines can interact adversely with central nervous system depressants, MAOIs, phenytoin, ketoconazole, erythromycin, and cimetidine. Adverse effects of

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Practice Recommendation: Use of oral and topical nasal decongestants in adults is moderately effective for short-term relief of congestion from the common cold. Repeated use of decongestants over several days provides no benefit and is not recommended. Use of decongestants in young children with colds is also not recommended.

Evidence-Based Medicine (EBM) Source: Taverner D, Latte J, Draper M. Nasal decongestants for the common cold (Cochrane Review). *The Cochrane Library,* Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.

Strength of Evidence: This systematic review was based on 5 randomized, placebo-controlled studies of single-ingredient oral and topical nasal decongestants involving 286 adults.

Practice Recommendation: Use of single-agent antihistamines in children or adults to treat symptoms of ARTI is not recommended. Single-agent antihistamines do not alleviate symptoms of nasal congestion, rhinorrhea, or sneezing associated with the common cold to a clinically significant extent. In addition, first-generation antihistamines cause increased sedation in cold sufferers.

EBM Source: De Sutter AIM, Lemiengre M, Campbell H, Mackinnon HF. Antihistamines for the common cold. (Cochrane Review). *The Cochrane Library,* Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.

Strength of Evidence: 22 randomized, placebo-controlled studies of single-ingredient antihistamines of varied design were included in this combined analysis.

antihistamines include drowsiness, dry mouth, nervousness, and dizziness.

Antitussives—A productive cough in ARTI is a physiologically beneficial host defense mechanism and should not be suppressed except for short periods to enable sleep. However, the dry, nonproductive cough of a cold can be treated when it interferes with the patient's lifestyle. Antitussives are indicated for cough suppression in ARTI; nevertheless, the data are equivocal in terms of the efficacy of codeine and dextromethorphan in this regard.[9,40,41] Although typically available by prescription only, codeine-containing cough suppressants are classified as schedule V drugs in some states and are available OTC with personal identification.[5] However, these products should be avoided because of the abuse potential associated with codeine.

Despite the equivocal data, dextromethorphan is considered the antitussive agent of choice. It is equipotent with codeine on a milligram-for-milligram basis, and it has less abuse potential. It also has limited drug interactions and adverse effects and is available in extended-dose and pediatric formulations.[39] Cautious use of dextromethorphan is recommended in patients with a high fever, rash, persistent headache, or nausea/vomiting. Drowsiness and gastrointestinal disturbances occur rarely with dextromethorphan use.

Dextromethorphan should not be used in conjunction with MAOIs or within 2 weeks of MAOI administration.[39] Concomitant use of dextromethorphan and sibutramine is also not recommended because of the potential for serotonin syndrome. In addition, the effects of dextromethorphan may be potentiated if it is given in conjunction with an CYP2D6 inhibitor such as fluoxetine, paroxetine, quinidine, or terbinafine, or with grapefruit juice or Seville orange juice.[42,43]

Guaifenesin—An expectorant can be used to help break up mucus in patients with a productive cough associated with a cold. At the same time, good hydration, achieved by drinking eight or more 8-ounce glasses of water daily, will yield the same benefit.[5] In theory, a patent upper airway should eliminate a productive cough; nevertheless, the efficacy of expectorants in clearing secretions and providing a clinical benefit remains to be proven.[39,44] Guaifenesin is the only FDA-approved expectorant available, and it is a component of many OTC products (of note, it is frequently underdosed).[5] It is contraindicated in patients with a hypersensitivity. Also, guaifenesin should not be used for a persistent, nonproductive cough—that is, cough associated with smoking, asthma, or emphysema.[39] Adverse effects, including nausea/vomiting, dizziness, headache, and rash, occur infrequently.

Antitussive/Expectorant Combinations—Concurrent use of an antitussive and an expectorant or use of an antitussive/ expectorant fixed-dose combination product is generally discouraged.[39] Expectorants thin respiratory mucus in order to facilitate the removal of secretions, whereas antitussives act to suppress the cough reflex, a homeostatic host defense mechanism. The pharmacologic actions of expectorants and antitussives essentially oppose each other; thus, their use in combination impedes the removal of accumulated respiratory debris and is illogical.

Other Nonprescription Products

Cold symptoms may also be treated with systemic analgesics, mouth and throat products, and topical rubs (Table 11). In addition, zinc, vitamin C, and echinacea have been evaluated for prophylaxis and treatment of ARTI (Table 12).

Systemic Analgesics—Systemic analgesics can relieve the head and body aches and feverish feeling associated with the common cold.[9] Salicylic acid and aspirin should be avoided in children because of the potential risk of developing Reye syndrome. Ibuprofen, naproxen, and acetaminophen are available without prescription, have good safety profiles, and are generally preferred when use is limited to a 7- to 10-day period. Patients should be advised to read the package labeling of OTC medications carefully because fixed-dose combination cold products designed for multi-symptom relief may contain duplicate ingredients.

Mouth and Throat Products—Demulcents, lozenges, gargles, and sprays provide temporary relief of a sore throat and the irritation of postnasal drip that are common with a cold.[39] Demulcents lubricate the oropharynx and are available in a sugar-free lozenge formulation for patients with diabetes. Medicated lozenges, gargles, and sprays may contain a local anesthetic, typically benzocaine or dyclonine, which have a short duration of action—about 30 minutes. Other ingredients may include antiseptics and counterirritants. These products should be used at 3- to 4-hour intervals and for no longer than 2 days. Lozenges promote saliva production and provide a beneficial lubricating effect. OTC gargles and spray products have no advantage over a homemade saline gargle of 1 to 3 teaspoons of table salt mixed with 8 ounces of warm tap water. Mouth and throat cold remedies should not be used if patients have a history of hypersensitivity; a sore throat of greater than 7 to 10 days' duration; or concurrent high fever, rash, severe headache, or nausea/vomiting.

Rubs—Camphor and menthol, the active counterirritant ingredients in topical rubs, act as modest local anesthetics on the respiratory tract and provide temporary symptomatic relief of nasal congestion and cough associated with ARTI.[5,39] Topical camphor or menthol can be rubbed on the neck and chest in a thick layer and loosely covered with a warm, dry cloth up to 3 times daily. Rubs are for external use only, and contact with the eyes should be avoided. Rubs should not be

TABLE 11.
Other Products for Symptomatic Relief of the Common Cold

Systemic Analgesics
- Used to relieve headache and body aches
- Ibuprofen, naproxen, and acetaminophen are preferred; avoid aspirin in children

Mouth and Throat Products
- Offer temporary relief of sore throat and irritation
- Should be used at 3- to 4-hour intervals for ≤2 days; saline gargles are sufficient
- Contraindicated in patients with hypersensitivity, sore throat of ≥7-10 days' duration, high fever, rash, severe headache, or nausea/vomiting

Rubs
- Offer temporary relief of nasal congestion and cough
- Should be applied in a thick layer on neck and chest, which are covered loosely, up to 3 times/day
- For external use only; discontinue use with skin irritation

TABLE 12.
Zinc, Vitamin C, and Echinacea for the Common Cold

Zinc
- Results of controlled studies of oral zinc supplement for cold treatment and prophylaxis are variable, but recent trials have shown benefits
- Oral zinc should be initiated within 24 hours of symptom onset
- Dosage: 13-24 mg every 2 hours while awake and with symptoms (maximum, 150 mg/day)
- Intranasal zinc not recommended
- Adverse effects: dysgeusia, stomach upset

Vitamin C
- High doses (1 g/day) may have a modest therapeutic effect on duration of cold symptoms
- Adverse effects: diarrhea, increased iron absorption, kidney stones, nausea, abdominal cramping, transient colic, and flatulence

Echinacea
- Current data do not support use of echinacea to reduce severity or duration of cold symptoms or to prevent colds, although further investigation is needed
- Contraindications: hypersensitivity to flowers in the daisy family, autoimmune disease, HIV infection, multiple sclerosis, tuberculosis, young age, pregnancy, and use of immunosuppressive agents
- Adverse effects: dyspepsia, headache, and dizziness

applied to irritated skin; if irritation occurs, the product should be discontinued.

Zinc—A naturally occurring element, zinc has demonstrated antiviral effects in vitro.[45] It is also a physiological mitogen that enhances immune system function.[46] The best food sources of zinc are shellfish (eg, oysters, clams), red meats, and organ meats (eg, liver). Diets comprised of mostly pasta, fruits, and vegetables are frequently zinc deficient, and high-fiber foods (eg, whole-grain cereals) inhibit zinc absorption.[47] Supplemental oral zinc therapy for symptomatic relief of ARTI has been evaluated in several studies.[45]

Early study of zinc supplementation to treat the common cold demonstrated a statistically significant reduction in the duration of cold symptoms in zinc recipients compared with placebo recipients, but subsequent studies yielded mixed results.[45,48] Variations in zinc formulations, dosing, and blinding problems were among the confounding factors.[5] In addition, studies that failed to show a clinical benefit may have used zinc lozenges that became inactivated secondary to possible chelating effects of additives such as citric acid, tartaric acid, mannitol, or sorbitol.[49]

A recent randomized, double-blind study demonstrated a reduction in the duration and severity of cold symptoms with the administration of zinc lozenges (one 12.8-mg lozenge every 2-3 hours while awake and with cold symptoms) as compared with placebo.[50] In addition, McElroy and Miller found a statistically significant reduction in cold symptom duration in adolescents treated with four 13.3-mg zinc gluconate glycine lozenges daily.[51] Prophylactic administration of zinc (one 13.3-mg zinc gluconate glycine lozenge daily) was also associated with a decreased incidence of colds in this population. It is important to note that this study was not blinded and that control patients were identified through retrospective chart review. Further study is needed to evaluate the effects of zinc in treating or preventing the common cold.[52]

Patients who choose to use zinc supplements should be advised to initiate therapy as soon as possible after the first symptoms of a cold appear, ideally within 24 hours of onset.[5,53] The usual dosage of zinc gluconate lozenges ranges from 13 to 24 mg every 2 hours while awake (not to exceed a total daily dose of 150 mg); treatment may be continued as long as symptoms persist. Oral zinc supplements can cause dysgeusia and stomach upset. Ingesting with food is recommended, but this will decrease absorption.[5,54] Intranasal zinc has been temporally associated with a complete or partial loss of smell, and its use is not recommended.[55]

Vitamin C—Contrary to popular myth, vitamin C supplementation does not reduce the incidence of the common cold in the general population.[30] However, a meta-analysis of both prophylactic and therapeutic vitamin C

intake at relatively high dosages (1 g/day) revealed a modest therapeutic effect on the duration of cold symptoms.[56] The effect was variable, with a mean reduction of a half-day of symptoms per cold episode. Use of high-dose vitamin C to treat colds shortly after symptoms occur does not necessarily reduce cold symptom severity, and further study of the appropriate dosage to achieve benefit is needed.[30,57] Primary care clinicians should warn their patients about the potential adverse effects associated with routine ingestion of high doses of vitamin C, including diarrhea, increased iron absorption, kidney stones, nausea, abdominal cramping, transient colic, and flatulence.[5]

Echinacea—A number of clinical studies have suggested that echinacea may be beneficial in treating the common cold; however, these trials used several different echinacea preparations and many had poor methodology.[58-60] An herbal remedy derived from a variety of flowering plants, echinacea appears to have a modest immunostimulating effect, although its exact mechanism of action is unknown.[5] A recent placebo-controlled study by Barrett and colleagues addressed the shortcomings of many earlier trials and found that echinacea did not reduce the severity or duration of cold symptoms.[61] In addition, evidence to support prolonged use of echinacea for prevention of ARTI is lacking.[58] Still, additional study of the clinical benefit of echinacea for the common cold is warranted.[62] Echinacea use is contraindicated in patients with a hypersensitivity to flowers in the daisy family, autoimmune disease, HIV infection, multiple sclerosis, or tuberculosis.[5] Children, pregnant women, and person using immunosuppressive agents should avoid echinacea as well. Because echinacea's immunostimulating properties may decline with continued use, it should not be taken for longer than 8 consecutive weeks.[59] Echinacea is well-tolerated; adverse effects include dyspepsia, headache, and dizziness.

Antibiotics and the Common Cold

Antibiotic agents are inappropriate therapy for ARTI because the underlying cause of the common cold is almost always a virus, not a bacterium.[63] Although antibiotics are not effective in treating the common cold, about half of patients seen for ARTI leave their clinician's office with an antibiotic prescription.[64] This overuse of antibiotics for treating the common cold is widespread, and has led to an epidemic rise in antibiotic-resistant bacteria (especially problematic with penicillin-resistant *Streptococcus pneumoniae*).[63,65]

TABLE 13.
Principles of Appropriate Antibiotic Treatment of the Common Cold

- Antibiotics are not recommended for the treatment of acute upper respiratory tract infection (ARTI) in children or adults.
- Mucopurulent secretions, commonly observed in patients with ARTI, do not predict bacterial infection and are not an indication for antimicrobial therapy.

To decrease inappropriate antibiotic use and control the spread of drug-resistant bacteria, principles for appropriate use of antibiotics in ARTI have been developed (Table 13).[66,67] Controlled clinical trials have consistently shown that antibiotic therapy does not alter the course or resolution of a cold; therefore, these agents should not be given to patients with a common cold.[66,67] Presence of mucopurulent nasal discharge or sputum is common in patients with virally caused ARTI, and it is not an indication for antibiotic treatment unless the discharge persists for 10 to 14 days without improvement or other signs of ABRS are present.

Patients' unrealistic expectations and demands for antibiotics are among the reasons that clinicians continue to prescribe these agents for ARTI.[6] However, adult patients and parents may be willing to forgo antibiotic therapy for ARTI and consider alternative treatments.[68] A study of adults with ARTI symptoms and of parents of children with ARTI symptoms assessed their expectations for antibiotic prescriptions for their colds or their children's colds.[68] Among adults surveyed, 85.5% understood that the cold was self-limited, 80% indicated that the primary reason for the office visit was to rule out more serious illness, and 57.4% knew that antibiotic therapy would not hasten the resolution of or cure the cold.

Clinicians must realize that patient satisfaction is not contingent upon antibiotic prescriptions, and should provide reassurance and education to improve their understanding of the nature of viral ARTI.[69] A simple educational message, in language that is easily understood by patients, will facilitate this process.[70] Key points of this message are outlined in Table 14. Readers may download and copy a "prescription" that can be given to patients diagnosed with ARTI or other upper respiratory conditions to further reinforce the message.[71] It is available at www.npcentral.net/ce/colds.

Conclusion

With a cure for the common cold still elusive, primary care clinicians are routinely faced with challenges surrounding the accurate diagnosis and appropriate clinical management of patients with ARTI. The nature of rhinoviral illness, simple preventive measures, nonpharmacologic symptom relief, proper symptom management with nonprescription drugs, and inappropriate antibiotic use are key educational messages for clinicians to share with their patients with colds. Nonprescription cough and cold products may help with symptom relief, but the use of

EB CME

Practice Recommendation: Routine use of antibiotics in the treatment of ARTI in children or adults is not recommended.

EBM Source: Arroll B, Kenealy T. Antibiotics for the common cold and acute purulent rhinitis (Cochrane Review). *The Cochrane Library,* Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.

Strength of Evidence: This systematic review by the Cochrane Group included 9 randomized trials comparing any antibiotic with placebo in ARTI with less than 7 days of symptoms. Overall quality of the trials was variable. A total of 2157 patients, including children and adults, participated.

TABLE 14.
Principles of Appropriate Antibiotic Treatment of the Common Cold

- Establish patients'/parents' baseline knowledge about acute upper respiratory tract infection (ARTI). Explain that antibiotics are not effective in viral ARTIs and that the illness will resolve over time (7-10 days).
- Address problems associated with inappropriate antibiotic use (eg, increased difficulty in managing bacterial infections that were easily treated in the past).
- Reassure patients/parents that the infection has not spread to the lungs or ears and is not a bacterial sinus infection.
- Do not prescribe antibiotics (or any other therapy) inappropriately.
- Support patients'/parents' efforts. Review signs and symptoms of more serious illness and encourage follow-up.

these products in special patient populations requires medical supervision. Decongestants, dextromethorphan, and guaifenesin can help to relieve nasal congestion and cough. Primary use of antihistamines in ARTI is appropriate only with concomitant allergic rhinitis. Systemic analgesics, mouth and throat products, and rubs can help to alleviate the aches and pains, throat irritation, and stuffiness associated with a cold. Data supporting the use of zinc and vitamin C for cold prophylaxis and treatment are limited, but some positive evidence supports their use, and further study is warranted. With the use of any nonprescription cold products, clinicians and patients must be aware of the contraindications, warnings, precautions, drug interactions, and adverse effects associated with their use.

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