Drugs Acting on the Upper Respiratory Tract

54

Learning Objectives

Upon completion of this chapter, you will be able to:

1. Outline the underlying physiological events that occur with upper respiratory disorders.
2. Describe the therapeutic actions, indications, pharmacokinetics, contraindications, most common adverse reactions, and important drug–drug interactions associated with drugs acting on the upper respiratory tract.
3. Discuss the use of drugs that act on the upper respiratory tract across the lifespan.
4. Compare and contrast the prototype drugs with other agents in their class and with other classes of drugs that act on the upper respiratory tract.
5. Outline the nursing considerations, including important teaching points, for patients receiving drugs acting on the upper respiratory tract.

Glossary of Key Terms

antihistamines: drugs that block the release or action of histamine, a chemical released during inflammation that increases secretions and narrows airways

antitussives: drugs that block the cough reflex

decongestants: drugs that decrease the blood flow to the upper respiratory tract and decrease the overproduction of secretions

expectorants: drugs that increase productive cough to clear the airways

mucolytics: drugs that increase or liquefy respiratory secretions to aid the clearing of the airways

rebound congestion: a process that occurs when the nasal passages become congested as the effect of a decongestant drug wears off; patients tend to use more drug to decrease the congestion, and a vicious circle of congestion, drug, and congestion develops, leading to abuse of the decongestant; also called rhinitis medicamentosa

rhinitis medicamentosa: reflex reaction to vasoconstriction caused by decongestants; a rebound vasodilation that often leads to prolonged overuse of decongestants; also called rebound congestion

ANTITUSSIVES
benzonatate
codeine
dextromethorphan (P)
hydrocodone

DECONGESTANTS

Topical Nasal Decongestants
ephedrine (P)
oxymetazoline
phenylephrine
tetrahydrozoline
xylometazoline

Oral Decongestants
pseudoephedrine (P)

Topical Nasal Steroid Decongestants
beclomethasone
budesonide
dexamethasone
flunisolide (P)
fluticasone
triamcinolone

ANTIHISTAMINES

First-Generation
brompheniramine
buclizine
carbinoxamine
chlorpheniramine
clemastine
cyclizine
cyproheptadine
dexchlorpheniramine
dimenhydrinate
diphenhydramine
hydroxyzine (P)
meclizine
phenindamine
promethazine
triprolidine

Second-Generation (non-sedating)
azelastine
cetirizine
desloratadine
fexofenadine
levocetirizine
loratadine

EXPECTORANT
guaifenesin (P)

MUCOLYTICS
acetylcysteine
dornase alfa (P)

Drugs that affect the respiratory system work to keep the airways open and gases moving efficientl . The classes discussed in this chapter mainly act on the upper respiratory tract. Figure 54.1 sho ws structures of the upper respiratory tract. Figure 54.2 displays the sites of action of these drugs.

ANTITUSSIVES

Antitussives are drugs that suppress the cough refl x (Table 54.1). Many disorders of the respiratory tract, including the common cold, sinusitis, pharyngitis, and pneumonia, are accompanied by an uncomfortable, unproductive cough. Persistent coughing can be exhausting and can cause muscle strain and further irritation of the respiratory tract. A cough that occurs without the presence of any active disease process or persists after treatment may be a symptom of another disease process and should be investigated before any medication is given to alleviate it. Box 54.1 discusses the use of antitussives and other drugs acting on the upper respiratory tract in various age groups.

Therapeutic Actions and Indications

The traditional antitussi ves include codeine (generic only), hydrocodone (*Hycodan*), and de xtromethorphan (*Benylin* and many others), which act directly on the medullary cough center of the brain to depress the cough refl x. Because they are centrally acting, they are not the drugs of choice for anyone who has a head injury or who could be impaired by central nervous system (CNS) depression.

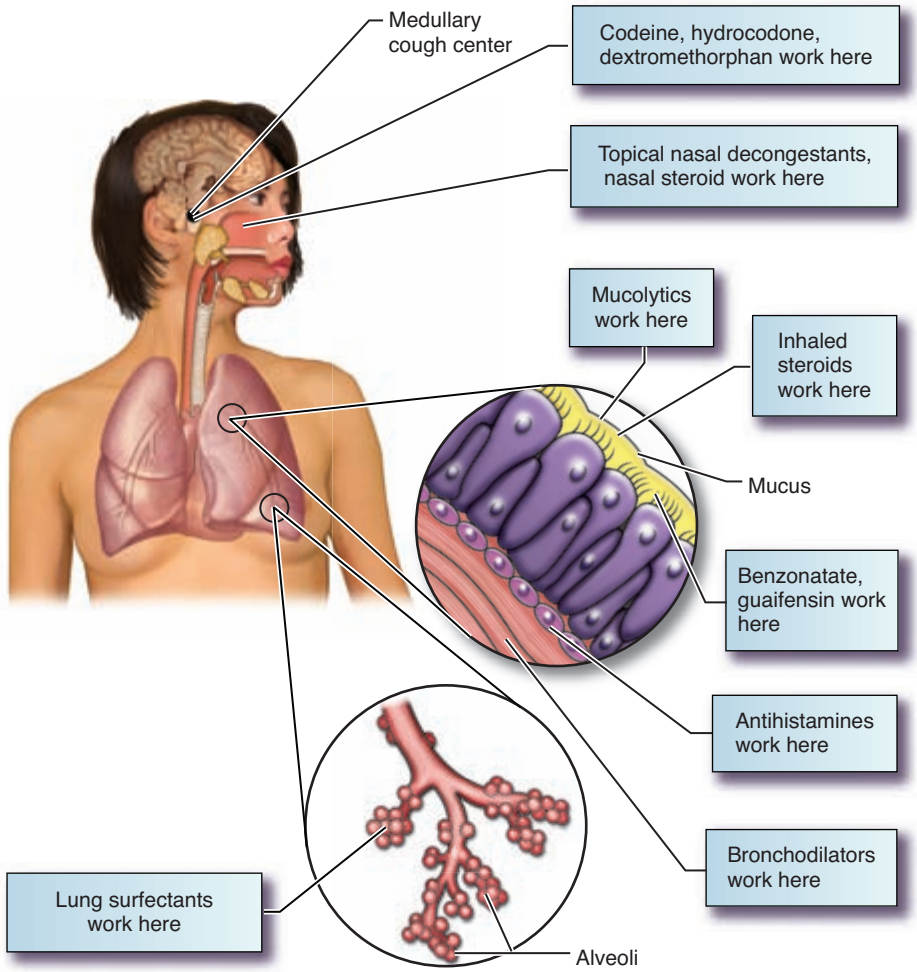
Other antitussives have a direct ef fect on the respiratory tract. Benzonatate (*Tessalon*) acts as a local anesthetic on the respiratory passages, lungs, and pleurae, blocking the effectiveness of the stretch receptors that stimulate a cough refl x. All of these drugs are indicated for the treatment of nonproductive cough.

Pharmacokinetics

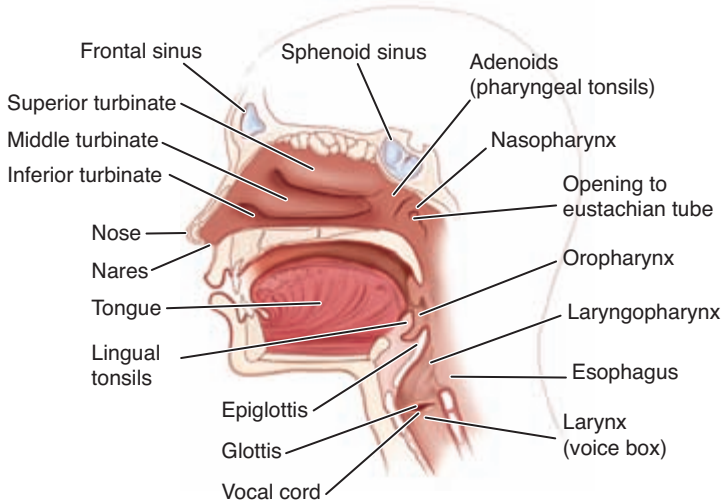
Codeine, hydrocodone, and de xtromethorphan are rapidly absorbed, metabolized in the liver, and excreted in urine. They cross the placenta and enter breast milk. Benzonatate is metabolized in the liver and excreted in urine. These drugs should not be used in pregnancy and lactation (see Contraindications and Cautions).

Contraindications and Cautions

Antitussives are contraindicated in patients who need to cough to maintain the airways (e.g., postoperative patients and those



● FIGURE 54.1 Sites of action of drugs acting on the upper respiratory tract.



● FIGURE 54.2 Structures of the upper respiratory tract.

who have undergone abdominal or thoracic surgery) *to avoid respiratory distress.* Careful use is recommended for patients with asthma and emphysema *because cough suppression in these patients could lead to an accumulation of secretions and a loss of respiratory reserve.* Caution should also be used in patients who are hypersensitive to or have a history of addiction to narcotics (codeine, hydrocodone). *Codeine is a narcotic and has addiction potential.* Patients who need to drive or to be alert should use codeine, hydrocodone, and dextromethorphan with extreme caution *because these drugs can cause sedation and drowsiness.* These drugs should not be used during pregnancy and lactation *because of the potential for adverse effects on the fetus or baby, including sedation and CNS depression.*

Adverse Effects

Traditional antitussives have a drying effect on the mucous membranes and can increase the viscosity of respiratory tract secretions. Because they affect centers in the brain, these antitussives are associated with CNS adverse effects, including drowsiness and sedation. Their drying effect can lead to nausea, constipation, and complaints of dry mouth. The locally acting antitussives are associated with gastrointestinal (GI) upset, headache, feelings of congestion, and sometimes dizziness.

Drug–Drug Interactions

Dextromethorphan should not be used with monoamine oxidase (MAO) inhibitors; hypotension, fever, nausea, myoclonic jerks, and coma could occur.

Prototype Summary: *Dextromethorphan*

Indications: Control of nonproductive cough.

Actions: Depresses the cough center in the medulla to control cough spasms.

Pharmacokinetics:

Route	Onset	Peak	Duration
Oral	25–30 min	2 h	3–6 h

$T_{1/2}$: 2 to 4 hours; metabolized in the liver and excreted in urine.

Adverse effects: Dizziness, respiratory depression, dry mouth.

TABLE 54.1 DRUGS IN FOCUS Antitussives

Drug Name	Usual Dosage	Usual Indications
benzonatate (*tessalon*)	Adult and pediatric (>10 yr): 100–200 mg PO t.i.d.	Treatment of nonproductive cough
codeine (generic)	Adult: 10–20 mg PO q4–6h Pediatric (6–12 yr): 5–10 mg PO q4–6h Pediatric (2–6 yr): 2.5–5 mg PO q4–6h	Treatment of nonproductive cough
dextromethorphan (*Benylin* and others)	Adult: 10–30 mg PO q4–8h; 60 mg PO b.i.d. for sustained action Pediatric (6–12 yr): 5–10 mg PO q4h; 30 mg PO b.i.d. for sustained action Pediatric (2–6 yr): 2.5–7.5 mg PO q4–8h; 15 mg PO b.i.d. for sustained action	Treatment of nonproductive cough
hydrocodone (*Hycodan*)	Adult: 5–10 mg PO q4–6h Pediatric (2–12 yr): 1.25–5 mg PO q4–6h	Treatment of nonproductive cough

FOCUS ON

BOX 54.1 *Drug Therapy Across the Lifespan*

Upper Respiratory Tract Agents

Children

These drugs are used frequently with children. Most of these agents have established pediatric guidelines. Care must be taken when these drugs are used with children because the risk of adverse effects—including sedation, confusion, and dizziness—are more common with children. Cough and cold medications should not be used in children under 2 years of age.

Because many of these agents are available in over-the-counter (OTC) cold, flu, and allergy remedies, it is very important to educate parents about reading labels and following dosing guidelines to avoid potentially serious accidental overdose. Parents should always be asked specifically whether they are giving the child an OTC or herbal remedy.

Parents should also be encouraged to implement nondrug measures to help the child cope with the upper respiratory problem—drink plenty of fluids, use a humidifier, avoid smoke-filled areas, avoid contact with known allergens or irritants, and wash hands frequently during the cold and flu season.

Adults

Adults may inadvertently overdose on these agents when taking multiple OTC preparations to help them get through the misery of a cold or flu. They need to be questioned specifically about the use of OTC or herbal remedies before any of these drugs are advised or administered. Adults can also be encouraged to use nondrug measures to help them cope with the signs and symptoms.

The safety for the use of these drugs during pregnancy and lactation has not been established. There is a potential for adverse effects on the fetus related to blood flow changes and direct drug effects when the drugs cross the placenta. The drugs may enter breast milk and also may alter fluid balance and milk production. It is advised that caution be used if one of these drugs is prescribed during lactation.

Older Adults

Older adults frequently are prescribed one of these drugs. Older adults are more likely to develop adverse effects associated with the use of these drugs, including sedation, confusion, and dizziness. Safety measures may be needed if these effects occur and interfere with the patient's mobility and balance.

Older adults are also more likely to have renal and/or hepatic impairment related to underlying medical conditions, which could interfere with the metabolism and excretion of these drugs. The dose for older adults should be started at a lower level than recommended for younger adults. The patient should be monitored very closely, and dose adjustment should be based on the patient's response.

These patients also need to be alerted to the potential for toxic effects when using OTC preparations and should be advised to check with their health care provider before beginning any OTC drug regimen.

Nursing Considerations for Patients Receiving Antitussives

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to any component of the drug or drug vehicle *to avoid allergic reactions*; cough that persists longer than 1 week or is accompanied by other signs and symptoms, *which could indicate a serious underlying medical condition that should be addressed before suppressing symptoms*; and pregnancy or lactation *because of the potential for adverse effects on the fetus or baby.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Monitor temperature *to evaluate for possible underlying infection.*
- Assess respirations and adventitious sounds *to assess drug effectiveness and to monitor for accumulation of secretions.*
- Evaluate orientation and affect *to monitor for CNS effects of the drug.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Ineffective Airway Clearance related to excessive drug effects
- Disturbed Sensory Perception related to CNS effects
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Ensure that the drug is not taken any longer than recommended *to prevent serious adverse effects and increased respiratory tract problems.*
- Arrange for further medical evaluation for coughs that persist or are accompanied by high fever, rash, or excessive secretions *to detect the underlying cause of the cough and to arrange for appropriate treatment of the underlying problem.*
- Provide other measures *to help relieve cough* (e.g., humidity, cool temperatures, fluids, use of topical lozenges) as appropriate.
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (control of nonproductive cough).
- Monitor for adverse effects (respiratory depression, dizziness, sedation).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of other measures to relieve cough.

KEY POINTS

- Antitussive drugs suppress the cough reflex by acting centrally to suppress the medullary cough center or locally as an anesthetic or to increase secretion and buffer irritation.
- Antitussive drugs can cause CNS depression, including drowsiness and sedation.
- Antitussive drugs should be used with caution in any situation in which coughing could be important for clearing the airways.

DECONGESTANTS

Decongestants decrease the overproduction of secretions by causing local vasoconstriction to the upper respiratory tract (Table 54.2). This vasoconstriction leads to a shrinking of swollen mucous membranes and tends to open clogged nasal passages, providing relief from the discomfort of a blocked nose and promoting drainage of secretions and improved airflow. An adverse effect that accompanies frequent or prolonged use of these drugs is a **rebound congestion,** technically called **rhinitis medicamentosa.** The reflex reaction to vasoconstriction is a rebound vasodilation, which often leads to prolonged overuse of decongestants.

Decongestants are usually adrenergics or sympathomimetics (see Chapter 30). Topical steroids are also used as decongestants, although they take several weeks to be really effective and are more often used in cases of chronic rhinitis.

Topical Nasal Decongestants

The topical nasal decongestants include ephedrine (*Pretz-D*), oxymetazoline (*Afrin, Allerest,* and others), phenylephrine (*Coricidin* and many others), tetrahydrozoline (*Tyzine*), and xylometazoline (*Otrivin*). Many of these are available as over-the-counter (OTC) preparations. The choice of a topical nasal decongestant varies with the individual. Some patients may have no response to one and respond very well to another.

Therapeutic Actions and Indications

Topical decongestants are sympathomimetics, meaning that they imitate the effects of the sympathetic nervous system to cause vasoconstriction, leading to decreased edema and inflammation of the nasal membranes. They are available as nasal sprays that are used to relieve the discomfort of nasal congestion that accompanies the common cold, sinusitis, and allergic rhinitis. These drugs can also be used when dilation of the nares is desired to facilitate medical examination or to relieve the pain and congestion of otitis media. Opening the nasal passage allows better drainage of the eustachian tube, relieving pressure in the middle ear. See Table 54.2 for usual indications for each of these agents.

Pharmacokinetics

Because these drugs are applied topically, the onset of action is almost immediate and there is less chance of systemic effects. Although they are not generally absorbed systemically, any portion of these topical decongestants that is absorbed is metabolized in the liver and excreted in urine. See Box 54.2 for tips on how to teach patient to use these medications.

BOX 54.2 FOCUS ON ***Patient and Family Teaching***

Administering Nasal Medications

Proper administration technique is very important for assuring that drugs given nasally have the desired therapeutic effect. It is important to periodically check the nares for any signs of erosion or lesions, which could allow systemic absorption of the drug. Most patients prefer to self-administer nasal drugs, so patient teaching is very important. Explain the technique, and then observe the patient using the technique.

Nasal Spray

Teach the patient to sit upright and press a finger over one nares to close it. Hold the spray bottle upright and place the tip of the bottle about ½ inch into the open nares. Firmly squeeze the bottle to deliver the drug. Caution the patient not to squeeze too forcefully, which could send the drug up into the sinuses, causing more problems. Repeat with the other nares.

Nasal Aerosol

Teach the patient to place the medication cartridge into the plastic nasal adapter and shake it well. Remove the plastic cap from the applicator and place the tip inside the nostril. Have the patient sit upright and tilt the head back. The patient should firmly press on the canister once to deliver the drug; inhale; hold his or her breath for a few seconds; and then exhale. The patient should be encouraged to keep the head titled back for a few minutes and reminded not to blow his or her nose for at least 2 minutes.

TABLE 54.2 DRUGS IN FOCUS Decongestants

Drug Name	Usual Dosage	Usual Indications
Topical Nasal Decongestants		
ephedrine (*Pretz-D*)	Instill solution in each nostril q4h, do not use for children <6 yr unless advised by physician	Relieves discomfort of nasal congestion associated with the common cold, sinusitis, allergic rhinitis; relieves pressure of otitis media
oxymetazoline (*Afrin*, *Allerest*)	Adult and pediatric (>6 yr): two to three sprays or drops in each nostril b.i.d. Pediatric (2–5 yr): two to three drops of 0.05% solution in each nostril b.i.d.	Relieves discomfort of nasal congestion associated with the common cold, sinusitis, allergic rhinitis
phenylephrine (*Coricidin*)	Adult and pediatric (>6 yr): one to two sprays in each nostril q3–4h Pediatric (2–6 yr): two to three drops of 0.125% solution in each nostril q4h as needed	Relieves discomfort of nasal congestion associated with the common cold, sinusitis, allergic rhinitis
tetrahydrozoline (*Tyzine*)	Adult and pediatric (>6 yr): two to four drops in each nostril t.i.d. to q.i.d. Pediatric (2–6 yr): two to three drops of 0.05% solution in each nostril q4–6h	Relieves discomfort of nasal congestion associated with the common cold, sinusitis, allergic rhinitis; relieves pressure of otitis media
xylometazoline (*Otrivin*)	Adult: two to three sprays or two to three drops in each nostril q8–10h (0.17% solution) Pediatric (2–12 yr): two to three drops of 0.05% solution q8–12h	Relieves discomfort of nasal congestion associated with the common cold, sinusitis, allergic rhinitis; relieves pressure of otitis media
Oral Decongestant		
pseudoephedrine (*Sudafed*, *Decofed*)	Adult: 60 mg PO q4–6h Pediatric: 6–12 yr: 30 mg PO q4–6h 2–5 yr: 15 mg PO q4–6h 1–2 yr: 0.02 mL/kg PO q4–6h 3–12 mo: three drops/kg PO q4–6h	Decreases nasal congestion associated with the common cold, allergic rhinitis; relief of pain and congestion of otitis media
Topical Steroid Nasal Decongestants		
beclomethasone (*Beclovent*)	Adult: one to two inhalations in each nostril b.i.d. Pediatric (6–11 yr): one inhalation in each nostril b.i.d.	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps
budesonide (*Pulmicort*)	Adult and pediatric (>6 yr): two sprays in each nostril morning and evening or four sprays in each nostril in the morning	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps
dexamethasone (*Decadron*)	Adult: two sprays in each nostril b.i.d. to t.i.d. Pediatric: one to two sprays in each nostril b.i.d.	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps
flunisolide (*AeroBid*)	Adult: two sprays in each nostril b.i.d. Pediatric (6–14 yr): one spray in each nostril t.i.d. to two sprays in each nostril b.i.d.	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps
fluticasone (*Flovent*)	Adult and pediatric (4–11 yr): two sprays in each nostril daily	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps
triamcinolone (*Azmacort*)	Adult: two sprays in each nostril every day	Treatment of seasonal allergic rhinitis in patients who are not obtaining a response with other decongestants or preparations; relieves inflammation following removal of nasal polyps

Contraindications and Cautions

Caution should be used when there is any lesion or erosion in the mucous membranes *that could lead to systemic absorption.* Caution should also be used in patients with any condition that might be exacerbated by sympathetic activity, such as glaucoma, hypertension, diabetes, thyroid disease, coronary disease, or prostate problems, *because these agents have adrenergic properties. Because there are no studies regarding the effects of these topical drugs in pregnancy or lactation,* if used during pregnancy or lactation, caution is advised.

Adverse Effects

Adverse effects associated with topical decongestants include local stinging and burning, which may occur the first few times the drug is used. If the sensation does not pass, the drug should be discontinued because it may indicate lesions or erosion of the mucous membranes. Use for longer than 3 to 5 days can lead to a rebound congestion. (Rebound congestion occurs when the nasal passages become congested as the drug effect wears off. As a result, patients tend to use more drug to decrease the congestion, thus initiating a vicious cycle of congestion–drug–congestion, which leads to abuse of the decongestant.) Sympathomimetic effects (e.g., increased pulse and blood pressure; urinary retention) should be monitored because some systemic absorption may occur, although these effects are less likely with topical administration than with other routes.

Clinically Important Drug–Drug Interactions

The use of topical nasal decongestants is contraindicated with concurrent use of cyclopropane or halothane anesthesia because serious cardiovascular effects could occur. Combined use with any other sympathomimetic drug or sympathetic-blocking drug could result in toxic or nonef fective responses. Monitor the use of these combinations carefully.

Prototype Summary: *Ephedrine*

Indications: Symptomatic relief of nasal and nasopharyngeal mucosal congestion due to the common cold, hay fever, or other respiratory allergies; adjunctive therapy of middle ear infections to decrease congestion around the eustachian ostia.

Actions: Sympathomimetic effects, partly due to release of norepinephrine from nerve terminals; vasoconstriction leads to decreased edema and inflammation of the nasal membranes.

Pharmacokinetics:

Route	Onset	Duration
Topical (nasal spray)	Immediate	4–6 h

$T_{1/2}$: 0.4 to 0.7 hours; metabolized in the liver and excreted in urine; little is usually absorbed for systemic metabolism.

Adverse effects: Disorientation, confusion, light-headedness, nausea, vomiting, fever, dyspnea, rebound congestion.

Nursing Considerations for Patients Receiving Topical Nasal Decongestants

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to the drug or a component of the drug vehicle; glaucoma, hypertension, diabetes, thyroid disease, coronary disease, and prostate problems, *all of which could be exacerbated by the sympathomimetic effects*; and pregnancy or lactation, *which require cautious use of the drug.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Assess skin color and temperature *to assess sympathetic response.*
- Evaluate orientation and reflexes *to evaluate CNS effects of the drug.*
- Monitor pulse, blood pressure, and cardiac auscultation *to assess cardiovascular and sympathomimetic effects.*
- Evaluate respirations and adventitious breath sounds *to assess the effectiveness of the drug and potential excess effect.*
- Perform bladder percussion *to monitor for urinary retention related to sympathomimetic effects.*
- Evaluate nasal mucous membrane *to monitor for lesions that could lead to systemic absorption and to evaluate decongestant effect.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to GI, CNS, or local effects of drug.
- Disturbed Sensory Perception (Kinesthetic) related to CNS effects (less likely with this route of administration).
- Deficient Knowledge regarding drug therapy.

Implementation With Rationale

- Teach patient the proper administration of the drug *to ensure therapeutic effect* (see Box 54.2). The patient should be instructed to clear the nasal passages before use, to tilt the head back when applying the drops or spray, and to keep it tilted back for a few seconds after administration. This technique *helps to ensure contact with the affected mucous membranes and decreases the chances of letting the drops trickle down the back of throat, which may lead to more systemic effects.*
- Caution the patient not to use the drug for longer than 5 days and to seek medical care if signs and symptoms persist after that time *to facilitate detection of underlying medical conditions that may require treatment.*
- Caution the patient that these drugs are found in many OTC preparations and that care should be taken not to inadvertently combine drugs with the same ingredients, *which could lead to overdose.*

- Provide safety measures if dizziness or sedation occurs as a result of drug therapy *to prevent patient injury.*
- Institute other measures *to help relieve the discomfort of congestion* (e.g., humidity, increased fluid intake, cool environment, avoidance of smoke-filled areas) as appropriate.
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (relief of nasal congestion).
- Monitor for adverse effects (local burning and stinging; adrenergic effects such as increased pulse, blood pressure, urinary retention, cool and clammy skin).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, measures to take to increase the effectiveness of the drug, proper administration technique).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

Oral Decongestants

The only oral decongestant currently available for use is pseudoephedrine (*Dorcol*, *Decofed*, and others) (Table 54.2).

Therapeutic Actions and Indications

Oral decongestants are drugs that are taken orally to decrease nasal congestion related to the common cold, sinusitis, and allergic rhinitis. They are also used to relieve the pain and congestion of otitis media. Opening of the nasal passage allows better drainage of the eustachian tube, relieving pressure in the middle ear.

Oral decongestants shrink the nasal mucous membrane by stimulating the alpha-adrenergic receptors in the nasal mucous membranes. This shrinkage results in a decrease in membrane size, promoting drainage of the sinuses and improving airflow.

Pharmacokinetics

Pseudoephedrine is generally well absorbed and reaches peak levels quickly—in 20 to 45 minutes. It is widely distributed in the body, metabolized in the liver, and primarily excreted in urine.

Contraindications and Cautions

Because pseudoephedrine has adrenergic properties, caution should be used in patients with any condition *that might be exacerbated by sympathetic activity,* such as glaucoma, hypertension, diabetes, thyroid disease, coronary disease, and prostate problems. *Because there are no adequate studies about its use during pregnancy and lactation,* such use should be reserved for situations in which the benefit to the mother outweighs any potential risk to the fetus or neonate.

Adverse Effects

Adverse effects associated with pseudoephedrine include rebound congestion. Because this drug is taken systemically, adverse effects related to the sympathomimetic effects are more likely to occur, including feelings of anxiety, tenseness, restlessness, tremors, hypertension, arrhythmias, sweating, and pallor. This drug is found in many OTC cold and flu preparations, and care must be taken to avoid inadvertent overdose when more than one such drug is used.

FOCUS ON

Safe Medication Administration

In late 2000, the U.S. Food and Drug Administration removed the oral decongestant phenylpropanolamine (PPA) from the market. This drug, which had been the center of controversy for many years, was found to be associated with an increased number of strokes in young women who took it. The drug had been an ingredient in many over-the-counter cold, allergy, and flu remedies. After a short absence, most of these products reappeared on the market with the drug pseudoephedrine taking the place of PPA. This drug, a sympathomimetic, is also known to cause sympathetic effects, including increased blood pressure and increased heart rate. Close follow-up of the effects of this drug will be done to monitor for any increased risk associated with its use.

Clinically Important Drug–Drug Interactions

Many OTC products, including cold remedies, allergy medications, and flu remedies may contain pseudoephedrine. Taking many of these products concurrently can cause serious adverse effects. Teach patients to read the OTC labels to avoid inadvertent overdose.

Prototype Summary: *Pseudoephedrine*

Indications: Temporary relief of nasal congestions caused by the common cold, hay fever, sinusitis; promotion of nasal and sinus drainage; relief of eustachian tube congestion.

Actions: Sympathomimetic effects, causes vasoconstriction in mucous membranes of nasal passages resulting in their shrinkage, which promotes drainage and improvement in ventilation.

Pharmacokinetics:

Route	Onset	Duration
Oral	30 min	4–6 h

$T_{1/2}$: 7 hours; metabolized in the liver and excreted in urine.

Adverse effects: Anxiety, restlessness, headache, dizziness, drowsiness, vision changes, seizures, hypertension, arrhythmias, pallor, nausea, vomiting, urinary retention, respiratory difficulty.

Nursing Considerations for Patients Receiving an Oral Decongestant

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to the drug and pregnancy or lactation, *which are contraindications to drug use*; hypertension or coronary artery disease, *which require cautious use*; and hyperthyroidism, diabetes mellitus, or prostate enlargement, *all of which could be exacerbated by these drugs.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Assess skin color and lesions *to monitor for adverse reactions.*
- Evaluate orientation, reflexes, and affect *to monitor CNS effects of the drug.*
- Monitor blood pressure, pulse, and auscultation *to assess cardiovascular stimulations.*
- Evaluate respiration and adventitious sounds *to monitor drug effectiveness.*
- Monitor urinary output *to evaluate for urinary retention.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to GI, CNS, or skin effects of the drug
- Increased Cardiac Output related to sympathomimetic actions of the drug
- Disturbed Sensory Perception (Kinesthetic) related to CNS effects
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Note that this drug is found in many OTC products, especially combination cold and allergy preparations; *care should be taken to prevent inadvertent overdose or excessive adverse effects.*
- Provide safety measures as needed if CNS effects occur *to prevent patient injury.*
- Monitor pulse, blood pressure, and cardiac response to the drug, especially in patients who are at risk for cardiac stimulation, *to detect adverse effects early and arrange to reduce dose or discontinue the drug.*
- Encourage the patient not to use this drug for longer than 1 week, and to seek medical evaluation if symptoms persist after that time, *to encourage the detection of underlying medical conditions that could be causing these symptoms and to arrange for appropriate treatment.*
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (improvement in nasal congestion).
- Monitor for adverse effects (sympathomimetic reactions, including increased pulse, blood pressure, pallor, sweating, arrhythmias, feelings of anxiety, tension, dry skin).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

Topical Nasal Steroid Decongestants

The topical nasal steroid decongestants (Table 54.2) include beclomethasone (*Beclovent* and others), budesonide (*Pulmicort*), dexamethasone (*Decadron* and others), flunisolide (*AeroBid* and others), fluticasone (*Flovent*), and triamcinolone (*Azmacort*).

Therapeutic Actions and Indications

Topical nasal steroid decongestants are very popular for the treatment of allergic rhinitis and to relieve inflammation after the removal of nasal polyps. They have been found to be effective in patients who are no longer getting a response with other decongestants. The exact mechanism of action of topical steroids is not known. Their anti-inflammatory action results from their ability to produce a direct local effect that blocks many of the complex reactions responsible for the inflammatory response.

Pharmacokinetics

The onset of action is not immediate, and these drugs may actually require up to 1 week to cause any changes. If no effects are seen after 3 weeks, the drug should be discontinued. Because these drugs are not generally absorbed systemically, their pharmacokinetics is not reported. If they were to be absorbed systemically, they would have the same pharmacokinetics as other steroids (see Chapter 36).

Contraindications and Cautions

Because nasal steroids block the inflammatory response, their use is contraindicated in the presence of acute infections. Increased incidence of *Candida albicans* infection has been reported with their use, related to the anti-inflammatory and anti-immune activities associated with steroids. Caution should be used in any patient who has an active infection, including tuberculosis, *because systemic absorption would interfere with the inflammatory and immune responses.* Patients using nasal

steroids should avoid exposure to any airborne infection, such as chickenpox or measles. As with all drugs, caution should always be used when taking these drugs during pregnancy or lactation. Because the systemic absorption of these drugs is minimal, they are often used during pregnancy and lactation.

Adverse Effects

Because they are applied topically, there is less of a chance of systemic absorption and associated adverse effects. The most common adverse effects are local burning, irritation, stinging, dryness of the mucosa, and headache. Because healing is suppressed by steroids, patients who have recently experienced nasal surgery or trauma should be monitored closely until healing has occurred.

Prototype Summary: *Flunisolide*

Indications: Treatment of seasonal allergic rhinitis for patients who are not getting any response from other decongestant preparations; relief of inflammation after the removal of nasal polyps.

Actions: Anti-inflammatory action which results from the ability to produce a direct local effect that blocks many of the complex reactions responsible for the inflammatory response

Pharmacokinetics:

Route	Onset	Peak	Duration
Topical (nasal spray)	Immediate	10–30 min	4–6 h

$T_{1/2}$: Not generally absorbed systemically.

Adverse effects: Local burning, irritation, stinging, dryness of the mucosa, headache, increased risk of infection.

Nursing Considerations for Patients Receiving Topical Steroid Nasal Decongestants

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to steroid drugs or any components of the drug vehicle, *which would be a contraindication*, and acute infection, *which would require cautious use.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Perform an intranasal examination *to determine the presence of any lesions that would increase the risk of systemic absorption of the drug.*
- Assess respiration and adventitious sounds *to evaluate drug effectiveness.*
- Monitor temperature *to monitor for the possibility of acute infection.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to local effects of the drug
- Risk for Injury related to suppression of inflammatory reaction
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Teach the patient how to administer these drugs properly, *which is very important to ensure effectiveness and prevent systemic effects.* A variety of preparations are available (e.g., sprays, aerosols, powder disks). Advise the patient about the proper administration technique for whichever preparation is recommended.
- Have the patient clear the nasal passages before using the drug *to improve its effectiveness.*
- Encourage the patient to continue using the drug regularly, even if results are not seen immediately, *because benefits may take 2 to 3 weeks to appear.*
- Monitor the patient for the development of acute infection that would require medical intervention. Encourage the patient to avoid areas where airborne infections could be a problem *because steroid use decreases the effectiveness of the immune and inflammatory responses.*
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (relief of nasal congestion).
- Monitor for adverse effects (local burning and stinging).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

KEY POINTS

- Decongestants cause local vasoconstriction, thereby reducing blood flow to the mucous membranes of the nasal passages and sinus cavities.
- Rebound vasodilation (rhinitis medicamentosa) is an adverse effect of excessive or long-term decongestant use.
- Topical nasal decongestants are preferred for patients who need to avoid systemic adrenergic effects associated with oral decongestants.

- Topical nasal steroid decongestants block the inflammatory response and are preferred for patients with allergic rhinitis for whom systemic steroid therapy is undesirable.

ANTIHISTAMINES

Antihistamines (Table 54.3) block the release or action of histamine, a chemical released during inflammation that increase secretions and narrows airways. Antihistamines are found in multiple OTC preparations that are designed to relieve respiratory symptoms and to treat allergies. When choosing an antihistamine, the individual patient's reaction to the drug is usually the governing factor. Because first-generation antihistamine have greater anticholinergic effects with resultant drowsiness, a person who needs to be alert should be given one of the second-generation, less-sedating antihistamines. Because of their OTC availability, these drugs are often misused to treat colds and influenza (see Box 54.3).

First-generation antihistamines include brompheniramine (*Bidhist*), buclizine (*Bucladin-S*), carbinoxamine (*Histex*, *Palgic*), chlorpheniramine (*Aller-Chlor* and others), clemastine (*Tavist*), cyclizine (*Marezine*), cyproheptadine (generic), dexchlorpheniramine (generic), dimenhydrinate (*Dimentabs* and others), diphenhydramine (*Benadryl* and others), hydroxyzine (*Vistaril* and others), meclizine (*Antivert*), phenindamine (*Nolahist*), promethazine (*Phenergan*), and triprolidine (*Zymine*).

Second-generation antihistamines include azelastine (*Astelin*), cetirizine (*Zyrtec*), desloratadine (*Clarinex*), fexofenadine (*Allegra*), levocetirizine (*Xyzal*), and loratadine (*Claritin*).

Therapeutic Actions and Indications

The antihistamines selectively block the effects of histamine at the histamine-1 receptor sites, decreasing the allergic response. They also have anticholinergic (atropine-like) and antipruritic effects. Antihistamines are used for the relief of symptoms associated with seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema. They are also used for the amelioration of allergic reactions to blood or blood products, for relief of discomfort associated with dermographism, and as adjunctive therapy in anaphylactic reactions. See Table 54.3 for usual indications for each of these agents. Other uses that are being explored include relief of exercise- and hyperventilation-induced asthma and histamine-induced bronchoconstriction in asthmatics. They are most effective if used before the onset of symptoms.

Pharmacokinetics

The antihistamines are well absorbed orally, with an onset of action ranging from 1 to 3 hours. They are generally metabolized in the liver, with excretion in feces and urine. These drugs cross the placenta and enter breast milk (see Contraindications and Cautions).

BOX 54.3 FOCUS ON Patient and Family Teaching

Following reports of serious and even fatal adverse effects when over-the-counter cough and cold medicines were used in children under the age of 2 years, the FDA held meetings to evaluate the safety and efficacy of the use of these products in young children. In early 2008, it completed its review and came out with recommendations that these products should not be used in children 2 years of age and younger. While continued research looks at the efficacy and safety of these products for children 2 to 11 years of age, the FDA suggests that parents be instructed in the safe use of OTC cough and cold products. Parents should be taught the following:

- Do not give over-the-counter (OTC) cough and cold products to children younger than 2 years of age unless specifically instructed to do so by a health care provider.
- Do not give your child OTC cough and cold medicines made for adults; look for the Children's, Infant's, or Pediatric use on the label.
- Always check the "Active Ingredients" on the drug label.
- Be very careful if you are giving your child more than one cough and cold medicine; many contain the same active ingredients, and overdose can occur.
- Carefully follow the directions in the "Drug Facts" section of the label and follow the directions for how often you can give the drug.
- Use the measuring spoons or cups that come with the medicine; do not use household spoons, which can vary widely in the amount of medicine they hold.
- Use OTC cough and cold medicines with child-proof caps and keep them out of the reach of children to avoid possible overdose.
- Consult with your health care provider; these drugs only treat signs and symptoms and do not cure any disease; contact your health care provider if the symptoms get worse.
- Do not use these products to make your child sleepy.
- Tell any health care provider taking care of your child the names of any OTC products that you are giving your child.

Contraindications and Cautions

Antihistamines are contraindicated during pregnancy or lactation *unless the benefit to the mother clearly outweighs the potential risk to the fetus or baby.* They should be used with caution in renal or hepatic impairment, *which could alter the metabolism and excretion of the drug.* Special care should be taken when these drugs are used by any patient with a history of arrhythmias or prolonged QT intervals *because fatal cardiac arrhythmias have been associated with the use of certain antihistamines and drugs that increase QT intervals, including erythromycin*. Box 54.3 presents topics for parent education in the use of these OTC products.

TABLE 54.3 DRUGS IN FOCUS Antihistamines

Drug Name	Usual Dosage	Usual Indications
First-generation		
brompheniramine (*Bidhist*)	Adult and pediatric (>12 yr): 6–12 mg PO q12h Pediatric (6–12 yr): 6 mg/d PO	Relief of symptoms of seasonal and perennial allergic rhinitis
buclizine *(Bucladin-S)*	50–150 mg/d PO; use caution with elderly patients	Relief of nausea and vomiting associated with motion sickness
carbinoxamine (*Histex*, *Palgic)*	Adults: 4–8 mg PO t.i.d. to q.i.d. Pediatric: 1–3 yr: 2 mg PO t.i.d. to q.i.d. 3–6 yr: 2–4 mg PO t.i.d. to q.i.d. ≥6 yr: 4–6 mg PO t.i.d. to q.i.d.	Relief of nasal and nonnasal symptoms of seasonal and perennial rhinitis
chlorpheniramine (*Aller-Chlor*, others)	Adult and pediatric (>12 yr): 4 mg PO q4–6h; 8–12 mg at bedtime for sustained release; use caution in elderly patients Pediatric: 6–12 yr: 2 mg PO q4–6h; 2–5 yr: 1 mg PO q4–6h Sustained release: 6–12 yr, 8 mg PO at bedtime; <6 yr, not recommended	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions
clemastine (*Tavist*)	Adult and pediatric (>12 yr): 1.34 mg PO b.i.d.; use caution with elderly patients Pediatric: 6–12 yr, 0.67 mg PO b.i.d.; <6 yr, not recommended	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions
cyclizine (*Marezine*)	Adult: 50 mg PO q4–6h; use caution with elderly patients Pediatric (6–12 yr): 25 mg PO t.i.d.	Relief of nausea and vomiting associated with motion sickness
cyproheptadine (generic)	Adult: 4–20 mg/d PO in divided doses Pediatric: 7–14 yr: 4 mg PO b.i.d. to t.i.d. 2–6 yr: 2 mg PO b.i.d. to t.i.d.	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions
dexchlorpheniramine (generic)	Adult and pediatric (>12 yr): 4–6 mg PO at bedtime or q8–10h during the day Pediatric (6–12 yr): 4 mg/d PO at bedtime	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions
dimenhydrinate (*Dimentabs*, others)	Adult and pediatric (>12 yr): 50–100 mg PO q4–6h or 50 mg IM as needed Pediatric: <2 yr: 1.25 mg/kg IM q.i.d. 2–6 yr: 25 mg PO q6–8h 6–12 yr: 25–50 mg PO q6–8h	Relief of nausea and vomiting associated with motion sickness
diphenhydramine (*Benadryl*, others)	Adult: 25–50 mg PO q4–6h or 10–50 mg IM or IV Pediatric: 12.5–25 mg PO t.i.d. to q.i.d. or 5 mg/kg per day IM or IV Use caution with geriatric patients	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; also used as adjunctive therapy in anaphylactic reactions, as a sleeping aid, and for parkinsonism
hydroxyzine (*Vistaril*, others)	Adult: 25–100 mg PO t.i.d. to q.i.d. or 25–100 mg IM q4–6h Pediatric (>6 yr): 50–100 mg/d PO in divided doses <6 yr: 50 mg/d PO in divided doses or 1.1 mg/kg per dose IM	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions; also used for sedation
meclizine (*Antivert*)	Adult and pediatric (>12 yr): 25–100 mg/d PO; use caution with elderly patients	Relief of nausea and vomiting associated with motion sickness

Drug Name	Usual Dosage	Usual Indications
First-generation (continued)		
phenindamine (*Nolahist*)	Adults and pediatric (≥12 yr): 25 mg PO q4–6h Pediatric: 6–12 yr: 12.5 mg PO q4–6h <6 yr: consult a physician	Relief of signs and symptoms of hay fever and allergic rhinitis
promethazine (*Phenergan*)	Adult: 25 mg PO, PR, IM, or IV Pediatric: 6.25–25 mg PO or PR	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; ameliorates allergic reactions; relief of discomfort associated with dermographism; used as adjunctive therapy in anaphylactic reactions; also used for sedation
triprolidine (*Zymine*)	Adults and pediatric (≥12 yr): 10 mL PO q4–6h Pediatric: 6–12 yr: 5 mL PO q4–6h 4–6 yr: 3.75 mL PO q4–6h 2–4 yr: 2.5 mL PO q4–6h 4 mo–2 yr: 1.25 mL PO q4–6h	Relief of signs and symptoms of seasonal and perennial allergic rhinitis
Second-generation (non-sedating)		
azelastine (*Astelin*)	Two sprays per nostril b.i.d.	Relief of symptoms of seasonal and perennial allergic rhinitis
cetirizine (*Zyrtec*)	Adult and pediatric (>12 yr): 5–10 mg/d PO; use 5 mg/d with hepatic or renal impairment Pediatric: 6–11 yr: 5 or 10 mg/d PO 6 mo–5 yr: 2.5 mg PO q12h or 5 mg/d PO	Relief of symptoms of seasonal and perennial allergic rhinitis; management of chronic urticaria
desloratadine (*Clarinex*)	Adult and pediatric (>12 yr): 5 mg/d PO Pediatric: 6–11 yr: 1 tsp, 2.5 mg/5 mL per day PO 12 mo–5 yr: 1/2 tsp, 1.25 mg/2.5 mLper day PO 6–11 mo: 1 mg/d PO Hepatic or renal impairment: 5 mg PO every other day	Relief of symptoms of seasonal allergic rhinitis, chronic idiopathic urticaria
fexofenadine (*Allegra*)	Adult and pediatric (>12 yr): 60 mg PO b.i.d. Pediatric (6–11 yr): 30 mg PO b.i.d. Geriatric or renal-impaired patient: 60 mg PO every day	Relief of symptoms of seasonal and perennial allergic rhinitis
levocetirizine (*Xyzal*)	Adults and pediatric (≥12 yr): 5 mg PO, once daily in the evening Pediatric (6–11 yr): 2.5 mg PO once daily in the evening	Relief of signs and symptoms of seasonal and perennial allergic rhinitis; chronic idiopathic urticaria
loratadine (*Claritin*)	Adult and pediatric (>6 yr): 10 mg/d PO Geriatric or hepatic-impaired patient: 10 mg PO every other day Pediatric (2–5 yr): 5 mg/d PO (syrup)	Relief of symptoms of seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema; amelioration of allergic reactions; relief of discomfort associated with dermographism; and as an adjunctive therapy in anaphylactic reactions

Adverse Effects

The adverse effects most often seen with antihistamine use are drowsiness and sedation (*see Critical Thinking Scenario for additional information*), although second-generation antihistamines are less sedating in many people. The anticholinergic effects that can be anticipated include drying of the respiratory and GI mucous membranes, GI upset and nausea, arrhythmias, dysuria, urinary hesitancy, and skin eruption and itching associated with dryness.

Drug–Drug Interactions

Drug–drug interactions vary among the antihistamines; for example, anticholinergic effects may be prolonged if

CRITICAL THINKING SCENARIO

Dangers of Self-Medicating for Seasonal Rhinitis

THE SITUATION

K.E. is a 46-year-old businessman who has been self-treating for seasonal rhinitis and a cold. His wife calls the physician's office; she is concerned that her husband is dizz , has lost his balance several times, and is very drowsy. He is unable to drive to work or to stay awake. She wants to take him to the emergency department of the local hospital.

CRITICAL THINKING

What is the best approach for this patient?
What crucial patient history questions should you ask before proceeding any further?
If you do not know this patient, given his presenting story, what medical conditions would need to be ruled out before proceeding further?
If K.E. is self-medicating for the signs and symptoms of seasonal rhinitis, what could be causing his drowsiness and dizziness?
What teaching points should be emphasized with this patient and his wife?

DISCUSSION

The first impression of K.E 's condition is that it is a neurological disorder. K.E. should be evaluated by a health care provider to rule out significant neurological problems However, after a careful patient history and physical examination, K.E.'s condition seemed to be related to high levels of over-the-counter (OTC) medications.

There are a multitude of OTC cold and allergy remedies, most of which contain the same ingredients in varying proportions. A patient may be taking one to stop his nasal drip, another to help his cough, another to relieve his congestion, and so on. By combining OTC medications like this, a patient is at great risk for inadvertently overdosing or at least allowing the medication to reach toxic levels.

In this situation, the first thing to determine is xactly what medication is being taken and how often. K.E. seems to have received toxic levels of antihistamines, decongestants, or other upper respiratory tract agents. The nurse should encourage K.E.—and all patients—to check the labels of any OTC medications being taken and to check with the health care provider if there are any questions. K.E. and his wife should receive written information about the drugs that K.E. is taking. They also should be shown how to read OTC bottles or boxes for information on the contents of various preparations. In addition, they should be encouraged to use alternative methods to relieve the discomfort of seasonal rhinitis (e.g., using a humidifie , drinking lots of liquids, avoiding smoky areas) to allay the belief that many OTC drugs are needed. Finally, K.E. and his wife should be advised to check with their health care provider if they have any questions about OTC or prescription drugs or if they have continued problems coping with seasonal allergic reactions. Other prescription medication may prove more effective.

NURSING CARE GUIDE FOR K.E.: ANTIHISTAMINES

Assessment: History and Examination

Assess K.E.'s health history for allergies and GI stenosis or obstruction, bladder obstruction, narrow-angle glaucoma, benign prostatic hypertrophy, and concurrent use of monoamine oxidase inhibitors and OTC allergy or cold products.
Focus the physical examination on the following areas:
Neurological: orientation, refl xes, affect, coordination
Skin: lesions
Cardiovascular: blood pressure, pulse, peripheral perfusion
GI: bowel sounds, abdominal exam
Hematological: CBC
Respiratory: respiratory rate and character, nares, adventitious sounds
GU: urinary output

Nursing Diagnoses

Acute Pain Related to GI effects or dry mouth
Decreased Cardiac Output
Impaired Sensory Perception (Kinesthetic)
Impaired Urinary Elimination related to thickening mucus
Deficient Kn wledge regarding drug therapy

Implementation

Provide comfort and safety measures, for example, give drug with meals; teach about mouth care; increase humidity; institute safety measures if dizziness occurs.
Provide support and reassurance to deal with drug effects and allergy.
Provide patient teaching regarding drug name, dosage, adverse effects, precautions, and warning signs to report.

Evaluation

Evaluate drug effects, that is, relief of respiratory symptoms.
Monitor for adverse effects: CNS effects, thickening of secretions, urinary retention, glaucoma.
Monitor for drug–drug interactions as indicated.
Evaluate the effectiveness of support and encouragement strategies, patient teaching program, and comfort and safety measures.

Dangers of Self-Medicating for Seasonal Rhinitis (continued)

PATIENT TEACHING FOR K.E.

- Antihistamines are commonly used to treat the signs and symptoms of various allergic reactions. Because these drugs work throughout the body, many systemic effects can occur with their use (e.g., dry mouth, dizziness, drowsiness).
- Take this drug only as prescribed. Do not increase the dose if symptoms are not relieved. Instead, consult your health care provider.
- Common effects of this drug include:
  - *Drowsiness, dizziness:* Do not drive or operate dangerous machinery if this occurs. Use caution to prevent injury.
  - *Gastrointestinal upset, nausea, vomiting, heartburn:* Taking the drug with food may help this problem.
  - *Dry mouth:* Frequent mouth care and sucking sugarless lozenges may help.
  - *Thickening of the mucus, difficulty coughin , tightening of the chest:* Use a humidifier o , if you do not have one, place pans of water throughout the house to increase the humidity of the room air; avoid smoke-filled areas; drin plenty of fluids
- Report any of the following to your health care provider: *difficulty b eathing, rash, hives, difficulty in voidin , abdominal pain, visual changes, disorientation or confusion.*
- Avoid the use of alcoholic beverages while you are taking this drug. Serious drowsiness or sedation can occur if these are combined.
- Avoid the use of any over-the-counter medication without first checking with your health care pr vider. Several of these medications contain drugs that can interfere with the effectiveness of this drug or they can contain very similar drugs and you could experience toxic effects.
- Tell any doctor, nurse, or other health care provider involved in your care that you are taking this drug.
- Take this drug only as prescribed. Do not give this drug to anyone else, and do not take similar preparations that have been prescribed for someone else. Keep this drug, and all medications, out of the reach of children.

diphenhydramine is tak en with a monoamine inhibitor , and the interaction of fe xofenadine with k etoconazole or erythromycin may raise fe xofenadine concentrations to toxic levels. F or more information, consult a nursing drug handbook or package insert for individual details.

Prototype Summary: *Diphenhydramine*

Indications: Symptomatic relief of perennial and seasonal rhinitis, vasomotor rhinitis, allergic conjunctivitis, urticaria, and angioedema; also used for treating motion sickness and parkinsonism and as a nighttime sleep aid and to suppress coughs.

Actions: Competitively blocks the effects of histamine at H1-receptor sites; has atropine-lik e antipruritic and sedati ve effects.

Pharmacokinetics:

Route	Onset	Peak	Duration
Oral	15–30 min	1–4 h	4–7 h
IM	20–30 min	1–4 h	4–8 h
IV	Rapid	30–60 min	4–8 h

$T_{1/2}$: 2.5 to 7 hours; metabolized in the li ver and excreted in urine.

Adverse effects: Drowsiness, sedation, dizziness, epigastric distress, thickening of bronchial secretions, urinary frequency, rash, bradycardia.

Nursing Considerations for Patients Receiving Antihistamines

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to antihistamines; pregnancy or lactation; and prolonged QT interval, *which are contraindications to the use of the drug*; and renal or hepatic impairment, *which requires cautious use of the drug.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Assess the skin color, texture, and lesions *to monitor for anticholinergic effects or allergy.*
- Evaluate orientation, affect, and reflexes *to monitor for changes due to CNS effects.*
- Assess respirations and adventitious sounds *to monitor drug effects.*
- Evaluate liver and renal function tests *to monitor for factors that could affect the metabolism or excretion of the drug.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to GI, CNS, or skin effects of the drug
- Disturbed Sensory Perception (Kinesthetic) related to CNS effects
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Administer drug on an empty stomach, 1 hour before or 2 hours after meals, *to increase the absorption of the drug*; the drug may be given with meals if GI upset is a problem.
- Note that patient may have poor response to one of these agents but a very effective response to another; the prescriber may need to try several different agents *to find the one that is most effective.*
- Because of the drying nature of antihistamines, patients often experience dry mouth, which may lead to nausea and anorexia; suggest sugarless candies or lozenges *to relieve some of this discomfort.*
- Provide safety measures as appropriate if CNS effects occur *to prevent patient injury.*
- Increase humidity and push fluids *to decrease the problem of thickened secretions and dry nasal mucosa.*
- Have patient void before each dose *to decrease urinary retention if this is a problem.*
- Provide skin care as needed if skin dryness and lesions become a problem *to prevent skin breakdown.*
- Caution the patient to avoid excessive dose and to check OTC drugs for the presence of antihistamines, *which are found in many OTC preparations and could cause toxicity.*
- Caution the patient to avoid alcohol while taking these drugs *because serious sedation can occur.*
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (relief of the symptoms of allergic rhinitis).
- Monitor for adverse effects (skin dryness, GI upset, sedation and drowsiness, urinary retention, thickened secretions, glaucoma).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

KEY POINTS

- The antihistamines selectively block the effects of histamine at the histamine-1 receptor sites, decreasing the allergic response. Antihistamines are used for the relief of symptoms associated with seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, and angioedema.
- Patients taking antihistamines may react to dryness of the skin and mucous membranes. The nurse should encourage them to drink plenty of fluids, use a humidifier if possible, avoid smoke-filled rooms, and use good skin care and moisturizers.
- Antihistamines should be avoided with any patient who has a prolonged QT interval because serious cardiac complications and even death have occurred.

EXPECTORANTS

Expectorants (Table 54.4) increase productive cough to clear the airways. They liquefy lower respiratory tract secretions, reducing the viscosity of these secretions and making it easier for the patient to cough them up. Expectorants are available in many OTC preparations, making them widely available to the patient without advice from a health care provider. The only available expectorant is guaifenesin (*Mucinex* and others).

Therapeutic Actions and Indications

Guaifenesin enhances the output of respiratory tract fluids by reducing the adhesiveness and surface tension of these fluids allowing easier movement of the less viscous secretions. The result of this thinning of secretions is a more productive cough and thus decreased frequency of coughing. See Table 54.4 for usual indications.

Pharmacokinetics

Guaifenesin is rapidly absorbed, with an onset of 30 minutes and a duration of 4 to 6 hours. Sites of metabolism and excretion have not been reported.

TABLE 54.4 DRUGS IN FOCUS Expectorant

Drug Name	Usual Dosage	Usual Indications
P guaifenesin (*Mucinex*, others)	Adult and pediatric (>12 yr): 200–400 mg PO q4h Pediatric: 6–12 yr: 100–200 mg PO q4h 2–6 yr: 50–100 mg PO q4h	Symptomatic relief of respiratory conditions characterized by a dry, nonproductive cough, including the common cold, acute bronchitis, and influenza

Contraindications

This drug should not be used in patients with a known allergy to the drug *to prevent hypersensitivity reactions*, and it should be used with caution in pre gnancy and lactation *because of the potential for adverse effects on the fetus or baby* and with persistent coughs, *which could be indicative of underlying medical problems.*

Adverse Effects

The most common adverse effects associated with expectorants are GI symptoms (e.g., nausea, vomiting, anorexia). Some patients experience headache, dizziness, or both; occasionally, a mild rash develops. The most important consideration in the use of these drugs is disco vering the cause of the underlying cough. Prolonged use of the O TC preparations could result in the masking of important symptoms of a serious underlying disorder. These drugs should not be used for more than 1 week; if the cough persists, encourage the patient to seek health care.

Prototype Summary: *Guaifenesin*

Indications: Symptomatic relief of respiratory conditions characterized by dry , nonproductive cough and in the presence of mucus in the respiratory tract.

Actions: Enhances the output of respiratory tract fluid b reducing the adhesi veness and surf ace tension of the fluid facilitating the removal of viscous mucus.

Pharmacokinetics:

Route	Onset	Peak	Duration
Oral	30 min	Unknown	4–6 h

$T_{1/2}$: Unknown; metabolism and excretion are also unknown.

Adverse effects: Nausea, vomiting, headache, dizziness, rash.

Nursing Considerations for Patients Receiving Expectorants

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to the drug; persistent cough due to smoking, asthma, or emphysema, *which would be cautions to the use of the drug*; and very productive cough, *which would indicate an underlying problem that should be evaluated.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Assess the skin *for the presence of lesions and color to monitor for any adverse reactions.*
- Monitor temperature *to assess for an underlying infection.*
- Assess respirations and adventitious sounds *to evaluate the respiratory response to the drug effects.*
- Monitor orientation and affect *to monitor CNS effects of the drug.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to GI, CNS, or skin effects of the drug
- Disturbed Sensory Perception (Kinesthetic) related to CNS effects
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Caution the patient not to use these drugs for longer than 1 week and to seek medical attention if the cough persists after that time *to evaluate for any underlying medical condition and to arrange for appropriate treatment.*
- Advise the patient to take small, frequent meals *to alleviate some of the GI discomfort associated with these drugs.*
- Advise the patient to avoid driving or performing dangerous tasks if dizziness and drowsiness occur *to prevent patient injury.*
- Alert the patient that these drugs may be found in OTC preparations and that care should be taken *to avoid excessive doses.*
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (improved effectiveness of cough).
- Monitor for adverse effects (skin rash, GI upset, CNS effects).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

KEY POINTS

- Expectorants are drugs that liquefy the lower respiratory tract secretions. They are used for the symptomatic relief of respiratory conditions characterized by a dry, nonproductive cough.
- Guaifenesin is the only expectorant currently available. Care should be taken to avoid inadvertent overdose when using OTC products that might contain this drug.

MUCOLYTICS

Mucolytics (Table 54.5) increase or liquefy respiratory secretions to aid the clearing of the airways in high-risk respiratory

TABLE 54.5 DRUGS IN FOCUS Mucolytics

Drug Name	Usual Dosage	Usual Indications
acetylcysteine (*Mucomyst*)	By nebulization, 2–20 mL of 10% solution q2–6h; by direct instillation, 1–2 mL of 10%–20% solution q1–4h; 140 mg/kg PO loading dose, then 17 doses of 70 mg/kg PO q4h as an antidote	Liquefaction of secretions in high-risk respiratory patients who have difficulty moving secretions, including postoperative patients (e.g., patients with tracheostomies to facilitate airway clearance and suctioning); clearing of secretions for diagnostic tests (e.g., diagnostic bronchoscopy); used orally to protect the liver from acetaminophen toxicity; treatment of atelectasis from thick mucus secretions
dornase alfa (*Pulmozyme*)	2.5 mg inhaled through nebulizer, may increase to 2.5 mg b.i.d. if needed	To relieve the buildup of secretions in high-risk respiratory patients who have difficulty moving secretions, including postoperative patients (e.g., patients with tracheostomies to facilitate airway clearance and suctioning); clearing of secretions for diagnostic tests (e.g., diagnostic bronchoscopy); treatment of atelectasis from thick mucus secretions as in cystic fibrosis

patients who are coughing up thick, tenacious secretions. Patients may be suffering from conditions such as chronic obstructive pulmonary disease (COPD), cystic fibrosis pneumonia, or tuberculosis. Mucolytics include acetylcysteine (*Mucomyst* and others) and dornase alfa (*Pulmozyme*).

Therapeutic Actions and Indications

Acetylcysteine is used orally to protect liver cells from being damaged during episodes of acetaminophen toxicity because it normalizes hepatic glutathione levels and binds with a reactive hepatotoxic metabolite of acetaminophen. Acetylcysteine affects the mucoproteins in the respiratory secretions by splitting apart disulfide bonds that are responsible for holding the mucus material together. The result is a decrease in the tenacity and viscosity of the secretions. See Table 54.5 for usual indications.

Dornase alfa is a mucolytic prepared by recombinant DNA techniques that selectively break down respiratory tract mucus by separating extracellular DNA from proteins. It is used in cystic fibrosis which is characterized by thick, tenacious mucous production. See Table 54.5 for usual indications.

Pharmacokinetics

The medication may be administered by nebulization or by direct instillation into the trachea via an endotracheal tube or tracheostomy.

Acetylcysteine is metabolized in the liver and excreted somewhat in urine. It is not known whether it crosses the placenta or enters breast milk. Dornase alfa has a long duration of action, and its fate in the body is not known.

Contraindications and Cautions

Caution should be used in cases of acute bronchospasm, peptic ulcer, and esophageal varices *because the increased secretions could aggravate the problem.* There are no data on the effects of the drugs in pregnancy or lactation.

Adverse Effects

Adverse effects most commonly associated with mucolytic drugs include GI upset, stomatitis, rhinorrhea, bronchospasm, and occasionally a rash.

Prototype Summary: *Acetylcysteine*

Indications: Mucolytic adjunctive therapy for abnormal, viscid, or inspissated mucous secretions in acute and chronic bronchopulmonary disorders; to lessen hepatic injury in cases of acetaminophen toxicity.

Actions: Splits links in the mucoproteins contained in the respiratory mucus secretions, decreasing the viscosity of the secretions; protects liver cells from acetaminophen effects.

Pharmacokinetics:

Route	Onset	Peak	Duration
Instillation inhalation	1 min	5–10 min	2–3 h
Oral	30–60 min	1–2 h	Unknown

$T_{1/2}$: 6.25 hours; metabolized in the liver and excreted in urine.

Adverse effects: Nausea, stomatitis, urticaria, bronchospasm, rhinorrhea.

Nursing Considerations for Patients Receiving Mucolytics

Assessment: History and Examination

- Assess for *possible contraindications or cautions*: any history of allergy to the drugs and the presence of acute bronchospasm, *which are contraindications to the use of*

these drugs; and peptic ulcer and esophageal varices, *which would require careful monitoring and cautious use.*
- Perform a physical examination *to establish baseline data for assessing the effectiveness of the drug and the occurrence of any adverse effects associated with drug therapy.*
- Assess skin color and lesions *to monitor for adverse reactions.*
- Monitor blood pressure and pulse *to evaluate cardiac response to drug treatment.*
- Evaluate respirations and adventitious sounds *to monitor drug effectiveness.*

Nursing Diagnoses

Nursing diagnoses related to drug therapy might include the following:

- Acute Pain related to GI, CNS, or skin effects of the drug
- Disturbed Sensory Perception (Kinesthetic) related to CNS effects
- Ineffective Airway Clearance related to bronchospasm
- Deficient Knowledge regarding drug therapy

Implementation With Rationale

- Avoid combining with other drugs in the nebulizer *to avoid the formation of precipitates and potential loss of effectiveness of either drug.*
- Dilute concentrate with sterile water for injection *if buildup becomes a problem that could impede drug delivery.*
- Note that patients receiving acetylcysteine by face mask should have the residue wiped off the facemask and off their face with plain water *to prevent skin breakdown.*
- Review use of the nebulizer with patients receiving dornase alfa at home *to ensure the most effective use of the drug.* Patients should be cautioned to store the drug in the refrigerator, protected from light.
- Caution cystic fibrosis patients receiving dornase alfa about the need to continue all therapies for their cystic fibrosis *because dornase alfa is only a palliative therapy that improves respiratory symptoms, and other therapies are still needed.*
- Provide thorough patient teaching, including the drug name and prescribed dosage, measures to help avoid adverse effects, warning signs that may indicate problems, and the need for periodic monitoring and evaluation, *to enhance patient knowledge about drug therapy and to promote compliance.*
- Offer support and encouragement *to help the patient cope with the disease and the drug regimen.*

Evaluation

- Monitor patient response to the drug (improvement of respiratory symptoms, loosening of secretions).
- Monitor for adverse effects (CNS effects, skin rash, bronchospasm, GI upset).
- Evaluate the effectiveness of the teaching plan (patient can name drug, dosage, adverse effects to watch for, specific measures to avoid them, and measures to take to increase the effectiveness of the drug).
- Monitor the effectiveness of comfort and safety measures and compliance with the regimen.

KEY POINTS

- Mucolytics work to break down mucus to aid high-risk respiratory patients in coughing up thick, tenacious secretions.
- Dornase alfa is specific for the treatment of patients with cystic fibrosis, which is characterized by a thick, tenacious mucus production that can block airways.

CHAPTER SUMMARY

- The classes of drugs that affect the upper respiratory system work to keep the airways open and gases moving efficientl .
- Antitussives are drugs that suppress the cough refl x. They can act centrally to suppress the medullary cough center or locally to increase secretion and buffer irritation or to act as local anesthetics. These drugs should not be used longer than 1 week; patients with persistent cough after that time should seek medical evaluation.
- Decongestants are drugs that cause local vasoconstriction and therefore decrease the blood fl w to the irritated and dilated capillaries of the mucous membranes lining the nasal passages and sinus cavities.
- An adverse effect that accompanies frequent or prolonged use of decongestants is rebound vasodilation, called rhinitis medicamentosa. The refl x reaction to vasoconstriction is a rebound vasodilation, which often leads to prolonged overuse of decongestants.
- Topical nasal decongestants are preferable in patients who need to avoid systemic adrenergic effects. Oral decongestants are associated with systemic adrenergic effects and require caution in patients with cardiovascular disease, hyperthyroidism, or diabetes mellitus.
- Topical nasal steroid decongestants block the inflamma tory response from occurring. These drugs, which take several days to weeks to reach complete effectiveness, are preferred for patients with allergic rhinitis who need to avoid the complications of systemic steroid therapy.
- The antihistamines selectively block the effects of histamine at the histamine-1 receptor sites, decreasing the allergic response. Antihistamines are used for the relief of symptoms associated with seasonal and perennial allergic rhinitis, allergic conjunctivitis, uncomplicated urticaria, or angioedema.

- Patients taking antihistamines may react to dryness of the skin and mucous membranes. The nurse should encourage them to drink plenty of fluids use a humidifier if possible avoid smoke-filled rooms and use good skin care and moisturizers.
- Antihistamines should be avoided with any patient who has a prolonged QT interval because serious cardiac complications and even death have occurred.
- Expectorants are drugs that liquefy the lower respiratory tract secretions. They are used for the symptomatic relief of respiratory conditions characterized by a dry, nonproductive cough.
- Mucolytics work to break down mucus to aid high-risk respiratory patients in coughing up thick, tenacious secretions.
- Many of the drugs that act on the upper respiratory tract are found in various OTC cough and allergy preparations. Patients need to be advised to always read the labels carefully to avoid inadvertent overdose and toxicity.

WEB LINKS

Health care providers and patients may want to consult the following Internet sources:

http://www.rhinitisinfo.com
Information on allergic rhinitis and seasonal rhinitis, including support groups, research, and treatment.

http://www.healthy.net
Information on education programs, research, and other information related to allergies and seasonal rhinitis.

http://www3.niaid.nih.gov/research/topics/allergies/Introduction.htm
Information about allergy research and treatment.

http://allergy.mcg.edu/media/rhinit.html
Information for patients, including special pediatric information on seasonal allergies and hay fever resources and references.

http://www.cff.org
Information on cystic fibrosis including research, treatments, and resources.

CHECK YOUR UNDERSTANDING

Answers to the questions in this chapter can be found in Answers to Check Your Understanding Questions on the CD-Rom in the front of the book.

Multiple Choice

Select the best answer to the following.

1. A patient with sinus pressure and pain related to a seasonal rhinitis would benefit from taking
   a. an antitussive.
   b. an expectorant.
   c. a mucolytic.
   d. a decongestant.

2. Antitussives are useful in blocking the cough reflex and preserving the energy associated with prolonged, nonproductive coughing. Antitussives are best used with
   a. postoperative patients.
   b. asthma patients.
   c. patients with a dry, irritating cough.
   d. COPD patients who tire easily.

3. Patients with seasonal rhinitis experience irritation and inflammation of the nasal passages and passages of the upper airways. Treatment for these patients might include
   a. systemic corticosteroids.
   b. mucolytic agents.
   c. an expectorant.
   d. topical nasal steroids.

4. A patient taking an OTC cold medication and an OTC allergy medicine is found to be taking double doses of pseudoephedrine. As a result, the patient might exhibit
   a. ear pain and eye redness.
   b. restlessness and palpitations.
   c. sinus pressure and ear pain.
   d. an irritating cough and nasal drainage.

5. Antihistamines should be used very cautiously in patients with
   a. a history of arrhythmias or prolonged QT intervals.
   b. COPD or bronchitis.
   c. asthma or seasonal rhinitis.
   d. angioedema or low blood pressure.

6. A patient is not getting a response to the antihistamine that was prescribed. Appropriate action might include
   a. switching to a decongestant.
   b. stopping the drug and increasing fluids.
   c. trying a different antihistamine.
   d. switching to a corticosteroid.

7. Dornase alfa (*Pulmozyme*), because of its mechanism of action, is reserved for use in
   a. clearing secretions before diagnostic tests.
   b. facilitating the removal of secretions postoperatively.
   c. protecting the liver from acetaminophen toxicity.
   d. relieving the buildup of secretions in cystic fibrosis.

Multiple Response

Select all that apply.

1. Common adverse effects associated with the use of topical nasal steroids would include which of the following?
a. Local burning and stinging
b. Dryness of the mucosa
c. Headache
d. Constipation and urinary retention
e. Fungal infections
f. Osteonecrosis

2. An antihistamine would be the drug of choice for treating which of the following?
a. Itchy eyes
b. Irritating cough
c. Nasal congestion
d. Drippy nose
e. Idiopathic urticaria
f. Thick, tenacious secretions

3. Additional nursing interventions for clients receiving antihistamines probably would include which of the following?
a. Using a humidifier
b. Advising client to suck sugarless lozenges to help to relieve the dry mouth
c. Limiting fluid intake to decrease swelling
d. Providing safety measures to prevent falls or injury
e. Encouraging pushing fluids, if allowed
f. Leaving bowls of water around the house to increase humidity

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