Abstract

Objective: To review the signs and symptoms of allergic rhinitis and explore treatment options with a focus on strategies that pharmacists can use to support patients with allergic rhinitis.

Data sources: Authoritative guidelines and textbooks that describe the assessment, management, and treatment of allergic rhinitis. This information was supplemented with information from the U.S. Food and Drug Administration, product information, and PubMed where appropriate.

Study selection: At the author’s discretion based on clinical relevance of the information presented to the assessment, management, and treatment of allergic rhinitis.

Summary: Allergic rhinitis is a common and troublesome disease that occurs when the immune system responds to allergens through pathways that result in nasal symptoms, including rhinorrhea, nasal pruritus, sneezing, congestion, and conjunctivitis. Nonpharmacologic treatment interventions include allergen avoidance and nasal saline. Although allergen avoidance may eliminate symptoms of allergic rhinitis, often it is neither practical nor possible to fully implement. A number of pharmacologic treatments are available, including antihistamines, corticosteroids, anticholinergics, a leukotriene receptor agonist, a monoclonal antibody, and immunotherapy, which is available subcutaneously and sublingually. Pharmacists can play important roles in assisting patients with assessing their symptoms, selecting appropriate treatments, and using those treatments appropriately.

Conclusion: Allergic rhinitis is a common and troublesome condition, but effective treatments are available. Pharmacists can greatly improve the care of patients with allergic rhinitis through appropriate interventions that support successful symptom management.

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Development: This home-study continuing pharmacy education activity was prepared by Judy Crespi Loften, MS, on behalf of the American Pharmacists Association.

Learning objectives
■ Discuss signs and symptoms of allergic rhinitis.
■ Define trigger control strategies that may help prevent allergic rhinitis.
■ Identify clinical situations that may be managed with various nonpharmacologic or pharmacologic treatment options.
■ Identify clinical situations for which referral to a specialist is appropriate.
■ Discuss treatment options for allergic rhinitis with consideration to special populations, including product selection, correct dosing and administration, contraindications, and adverse effects.
CURRENT TREATMENT APPROACHES FOR ALLERGIC RHINITIS

Preassessment questions
Before participating in this activity, test your knowledge by answering the following questions. These questions will also be part of the CPE assessment.

1. Which of the following symptoms is more common in patients with the common cold than patients with allergic rhinitis?
   a. Itchy eyes
   b. Sneezing
   c. Cough
   d. Rhinorrhea

2. Which class of medications is considered the most effective treatment for allergic rhinitis?
   a. Oral antihistamines
   b. Intranasal corticosteroids
   c. Leukotriene receptor antagonists
   d. Intranasal anticholinergics

3. When administering intranasal medications, patients should
   a. Exhale while spraying the medication.
   b. Blow their noses immediately after administering the medication.
   c. Tilt their heads back.
   d. Aim the product away from the nasal septum.

Why do you think an understanding of the pathophysiology of allergic rhinitis is important to patient care? (choose all that apply)
   a. To have a deeper understanding of how various treatment options can work together to manage symptoms
   b. To be better prepared to educate patients about their condition
   c. To better assess risk factors for the development of allergies and advise patients accordingly
   d. Other (describe)

Development of allergic rhinitis
Allergic rhinitis is a very common condition that has increased in prevalence in recent decades. Approximately 20% of adults and 40% of children in the United States have this disorder. Although not life-threatening, allergic rhinitis causes substantial impairment in quality of life. Annual direct costs associated with allergic rhinitis in the United States have been estimated to range from $2 billion to $5 billion.

Allergic rhinitis is triggered by exposure to airborne indoor allergens (e.g., dust mites, cockroaches, pet dander) and/or outdoor allergens (e.g., pollen, mold) in susceptible individuals. Allergens are substances that trigger allergic rhinitis symptoms through an immunoglobulin E (IgE)–mediated reaction. Both genetic and environmental factors can contribute to the development of allergic rhinitis. Risk factors for developing allergic rhinitis include a family history of atopy, serum IgE greater than 11 IU/mL before 6 years of age, high socioeconomic status, and positive reaction to allergy skin tests.

The pathogenesis of allergic rhinitis symptoms following allergen exposure is complex and progresses through four phases: (1) sensitization, (2) early phase, (3) cellular recruitment, and (4) late phase. Sensitization occurs the first time a susceptible individual encounters an allergen to which he or she has a predisposition to develop an allergy. This encounter results in an immune system response involving stimulation of B cell–mediated IgE production (Figure 1). The first exposure to an allergen does not result in clinical symptoms.

Table 1. Signs and symptoms of allergic rhinitis

<table>
<thead>
<tr>
<th>Sign or symptom</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sneezing</td>
<td>Frequent, paroxysmal</td>
</tr>
<tr>
<td>Rhinorrhea</td>
<td>Anterior, watery</td>
</tr>
<tr>
<td>Pruritus of eyes, nose, and/or palate</td>
<td>Frequent</td>
</tr>
<tr>
<td>Nasal obstruction</td>
<td>Variable</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>Frequent</td>
</tr>
<tr>
<td>Pain</td>
<td>Sinus pain due to congestion and/or throat pain due to postnasal drip irritation may be present</td>
</tr>
<tr>
<td>Facial, nasal, and/or throat features</td>
<td>Allergic shiners (peri orbital darkening secondary to venous congestion)</td>
</tr>
<tr>
<td></td>
<td>Dennie’s lines (wrinkles beneath the lower eyelids)</td>
</tr>
<tr>
<td></td>
<td>Allergic salute (patient rubs the tip of the nose upward with the palm of the hand)</td>
</tr>
<tr>
<td></td>
<td>Allergic crease (horizontal crease above the bulbular portion of the nose secondary to the allergic salute)</td>
</tr>
<tr>
<td></td>
<td>Allergic gape (open-mouth breathing secondary to nasal obstruction)</td>
</tr>
</tbody>
</table>

Source: Reference 1.
CURRENT TREATMENT APPROACHES FOR ALLERGIC RHINITIS

Figure 1. Development of allergic responses

When an allergy-prone person is exposed to an allergen, immune cells in the lining of the nose or lungs engulf the pollen allergen and process it into small fragments. These cells, called antigen-presenting cells (APCs), display the allergen fragments on their surfaces. Allergen fragments on APCs activate type 2 T helper (Th2) cells, which then interact with B cells and cause them to develop into antibody-producing plasma cells. These plasma cells produce immunoglobulin E (IgE) molecules that are specific to the allergen. IgE produced after exposure to grass pollen, for example, is specific for grass and will not cause a reaction to ragweed pollen. IgE then binds to the surface mast cells that reside in the tissues, particularly in the skin and at mucous membranes. Upon subsequent exposure to the allergen, the allergen will bind to IgE on the mast cells, leading to the release of inflammatory mediators, including histamine and leukotrienes.

Source: Reference 4.

Why is it important to identify signs and symptoms of allergic rhinitis? (choose all that apply)

- a. To assess whether allergic rhinitis is the likely cause of symptoms
- b. To determine whether the patient requires referral for further evaluation and treatment
- c. To select therapies that are best matched to the patient’s symptoms
- d. Other

Signs and symptoms of allergic rhinitis

Nasal symptoms of allergic rhinitis are typically bilateral and include nasal congestion, rhinorrhea, sneezing, and itching (Table 1). Nonnasal symptoms may involve the eyes, ears, and throat. Symptoms generally are worst upon awakening, improve during the day, and worsen overnight. Epistaxis may occur and is associated with mucosal hyperemia and inflammation. Allergic rhinitis may be a presumptive diagnosis, meaning that testing is not required to confirm the diagnosis. Allergy testing is typically reserved for patients who do not respond to treatment, when there is diagnostic uncertainty, or to determine allergens to which a patient is sensitive.

Allergic rhinitis has traditionally been categorized as either seasonal allergic rhinitis (SAR) or perennial allergic rhinitis (PAR), depending on whether it occurs in response to seasonal allergens such as pollen or perennial allergens such as dust mites. As their names imply, SAR causes symptoms only when the allergen is in season, and PAR causes symptoms yearround. These classifications are used by FDA for drug approval. However, the Allergic Rhinitis and its Impact on Asthma (ARIA) classification system, available for several years, considers the frequency and severity of symptoms in classifying allergic rhinitis as either intermittent or persistent, with symptoms ranging from moderate to severe.

Untreated allergic rhinitis can have a significant impact on quality of life and cause disturbed sleep, chronic malaise, fatigue, and poor work or school performance. Allergic rhinitis has a clear association with asthma (which has a similar pathogenesis); however, it is unclear whether allergic rhinitis is an early manifestation in the development of asthma or whether it is causative for asthma. Patients with allergic rhinitis should be assessed for asthma as well as other associated conditions, including atopic dermatitis, sleep-disordered breathing, and conjunctivitis.

Allergic rhinitis also appears to be linked to sinusitis, nasal polyps, and otitis media. Recurrent sinusitis is a common
complication of allergic rhinitis that results from reduced clearance of secretions from sinus cavities, which can become infected with bacteria. Nasal polyps are not as common but may improve with effective management of allergic rhinitis. Allergic mediators that result in nasal allergic inflammation may contribute to eustachian tube edema and dysfunction, resulting in otitis media. However, a definitive causal relationship with otitis media has not been proven, and data indicating a benefit of allergic rhinitis therapy for treatment or prevention of otitis media are lacking. 1, 16 Although allergic rhinitis is sometimes considered a nuisance, its prevalence, propensity to aggravate other medical conditions, and potential for serious consequences contribute to the importance of its recognition and treatment.

**Approach to treatment of allergic rhinitis**

Overall goals of treatment for allergic rhinitis include preventing and minimizing symptoms to improve quality of life and preventing long-term complications. Ideally, these goals can be achieved with minimal adverse events and reasonable cost. Some patients are able to reduce their symptoms through environmental control measures that decrease exposure to allergens, but many others require pharmacologic interventions to achieve acceptable relief of symptoms.

Treatment of allergic rhinitis should be individualized according to a number of factors, including the following:

- Patient age
- Presenting symptoms
- Frequency and severity of symptoms
- Impact on quality of life
- Allergens to which the patient is sensitive
- History of response to therapy
- Comorbid conditions (e.g., asthma, sinusitis)

**Pause and reflect**

Do you know how each of these factors affects treatment selection?

Initial pharmacologic therapy for allergic rhinitis should target the most prominent symptoms. Multiple drug formulations may be added or used initially if the patient presents with moderate to severe symptoms or if the patient is at risk for exacerbation of underlying conditions such as asthma.

Patients with PAR require ongoing therapy, and considerations such as long-term safety and ease of use are relevant concerns. On the other hand, patients with SAR whose symptoms appear for only a few weeks during predictable times of the year may be able to begin prophylactic therapy before exposure or use medications on an as-needed basis to control symptoms. (However, regular use of medication is more effective, even for SAR.)

**Pause and reflect**

What are the four steps of the allergic response?

The four steps are sensitization, the early phase, cellular recruitment, and the late phase. As you explore treatment options for allergic rhinitis, consider how they affect the phases of the allergic response and the resulting symptom development.

**Pause and reflect**

Do you typically question patients about their allergic triggers?

Do you have standard recommendations for patients on avoiding allergens?

Have you had success in helping patients manage their symptoms through allergen avoidance?

**Treatment options**

**Nonpharmacologic approaches to managing allergic rhinitis**

The primary nonpharmacologic management strategy for allergic rhinitis is implementation of environmental control measures to reduce exposure to allergens. The most common allergens are pollens, fungi, dust mites, furry animal danders, and insect emanations. Complete avoidance of these allergens would be optimal but may not be possible. Allergen avoidance measures have been shown to reduce allergen levels; however, clinical benefits in terms of symptom reduction are limited. 2 Shared decision making is crucial to determine whether the patient is willing to implement environmental control measures. 2 For these measures to be effective, a multifaceted approach to environmental control is recommended.

Ideally, the patient and his or her health care team will be able to identify the patient’s allergens and triggers so that avoidance measures can be implemented. Initially, this can be attempted through careful history taking; however, if ineffective, more definitive testing is warranted. Skin-prick and blood testing can be performed to identify which allergens can evoke an allergic reaction in the patient. However, a positive skin-prick test to a particular allergen does not necessarily indicate that a person will have clinical manifestations of allergic rhinitis or asthma caused by that allergen. Approximately 50% of individuals in the United States have at least one positive skin test to a common allergen, but fewer than one-half of those people have symptoms of allergic rhinitis or asthma. Therefore, the health care provider should assess whether skin-prick test results align with the patient’s allergen exposures and subsequent symptoms. 3 Control measures for various allergens are listed in Table 2. 3

**Pause and reflect**

What are the most common symptoms of allergic rhinitis?

What are the most bothersome symptoms of allergic rhinitis?

**Nasal saline**

Topical saline delivered via nasal spray, bottle, pump, irrigation (e.g., neti pot), or nebulizer reduces symptoms of allergic rhinitis when used alone or in combination with other treatments. This therapy can have a soothing effect in addition to rinsing allergens from the local mucosa. Use of nasal saline has been shown to reduce the presence of eosinophils as well as symptoms, including sneezing and congestion. Although there are few studies comparing nasal saline with pharmacologic treatments, saline has been shown to be less effective than intranasal corticosteroids. 3 Adverse effects associated with nasal saline are minimal and include burning, irritation, and nausea. 3
### Table 2. Environmental control strategies for selected allergens

<table>
<thead>
<tr>
<th>Allergen</th>
<th>Allergen characteristic</th>
<th>Environmental control measure</th>
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</thead>
<tbody>
<tr>
<td>Pollens</td>
<td>Pollens are seasonally released from many plants (e.g., ragweed, grass, trees). Seasonal patterns differ among pollens, vary among geographic regions, and can fluctuate from year to year depending on weather patterns. Daily weather variations and time of day can affect pollen counts (e.g., ragweed pollen counts generally peak around noon or early afternoon).</td>
<td>■ Identify which pollens cause allergic responses and patterns of pollen release, including both the seasonal and daily patterns, to limit time outdoors when pollen counts are high. ■ Identify a source of information about local pollen counts and monitor this information to help determine when to limit outdoor exposure. (Data on pollen counts usually can be found on weather websites.) ■ Avoid extended time outdoors (e.g., camping trips) during peak pollen seasons. ■ Consider taking showers or baths after spending time outdoors to minimize exposure to allergens. ■ Washing pets after they spend time outdoors may be helpful. ■ Reduce indoor exposure to pollen by keeping windows closed.</td>
</tr>
<tr>
<td>Dust mites</td>
<td>Dust mite fecal residue is a common allergen. Dust mites are widespread in indoor environments. Dust mites are most abundant in areas where skin cells are shed and in areas with relative humidity ≥ 50%. Materials that harbor dust mites include upholstered furniture, carpeting, bedding, and stuffed toys. Regular vacuuming and dusting is ineffective, typically causing dust mite fecal pellets to become airborne and widely distributed throughout the room.</td>
<td>■ Maintain household humidity between 35% and 50%. ■ Ideally, replace carpeting with hardwood, vinyl, or tile floors. If this is not possible, use an acaricide (benzyl benzoate) to kill mites. Vacuum carpets with HEPA filtration vacuums. Use of face masks while cleaning may be of benefit. ■ Use household HEPA filtration to reduce dust mite exposure. ■ Enclose mattresses, box springs, and pillows in allergen-proof encasings. ■ Wash bedding in hot water (≥130° F) at least every 2 weeks to minimize dust mites. ■ Place stuffed toys that cannot be washed in plastic bags and place them in freezer to kill mites. ■ Use plastic, leather, or wood furniture because it is very difficult to eliminate mites in upholstered furniture. ■ Treating upholstery with a 3% tannic acid solution can denature allergens but does not kill the mites; therefore, repeated treatments are necessary.</td>
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<tr>
<td>Fungi</td>
<td>Fungi are ubiquitous in both indoor and outdoor environments. Outdoor fungi are present in the air yearround except during periods of snow cover. Fungi in the soil tend to release spores when the earth is disturbed (e.g., during digging, raking leaves, harvesting activities). Some fungi are more common during wet weather, while others are more prevalent during dry weather. Indoor fungi occur in moist environments, including areas with high humidity, basements with leaks, showers, sinks, etc.</td>
<td>Outdoors: ■ Avoid activities that disturb the soil. Indoors: ■ Reduce the source of moisture to reduce indoor fungi. Avoid keeping carpeting or upholstered furniture in areas with a lot of moisture. ■ Avoid using cool mist humidifiers because they are reservoirs for fungi. ■ Fungicides may inhibit fungal growth; use of a dilute bleach solution with a detergent may be effective on nonporous surfaces. Porous material (e.g., drywall) that is contaminated with fungi may need to be removed and replaced. ■ Spores may be present in carpeting, bedding, and upholstered furniture and can be controlled with the same methods used to control dust mites.</td>
</tr>
<tr>
<td>Animal allergens</td>
<td>Individuals may become allergic to any warm-blooded animal, including pets and farm animals. Sensitivity to animal allergens can be managed by avoidance. If patients and families decide not to remove a pet, recommend the following measures: ■ Keep the animal in an uncarpeted room (other than the bedroom) that has a HEPA or electrostatic air filter. ■ Bathe the animal frequently (twice weekly). ■ Regularly wash your hands after handling animals. ■ To reduce exposure to animal dander, try measures used to reduce exposure to dust mites.</td>
<td></td>
</tr>
<tr>
<td>Cockroaches and other insects</td>
<td>Debris from many insects can act as allergens and may be a common trigger in areas where insects are prevalent (e.g., cockroaches in inner cities, ladybugs in areas where they are endemic).</td>
<td>■ Careful food preparation and clean up are essential for eliminating cockroaches. ■ Promptly put away food, wash dishes, wipe up spills, and store garbage in tightly sealed containers. ■ Use of roach traps may be helpful. ■ If there is a heavy infestation, a professional exterminator or moving to a new setting may be required to eliminate exposure.</td>
</tr>
</tbody>
</table>

Abbreviation used: HEPA, high-efficiency particulate air.

Source: Reference 3.
Pharmacologic treatment options

Although allergen avoidance can be effective for minimizing allergic rhinitis symptoms, it is often not possible or practical; thus, pharmacologic treatments may be necessary to control symptoms. Several oral and intranasal agents are available for the treatment of allergic rhinitis (Table 3).2,3

Intranasal corticosteroids and second-generation antihistamines (alone or in combination with a decongestant for patients with prominent congestion) represent the most commonly used therapies for allergic rhinitis. Across the spectrum of severity of symptoms, oral antihistamines are the most common medications used by patients. In general, intranasal corticosteroids are the most effective class of medications; however, patient preference should be considered when selecting among available treatment options.4 Some patients may prefer oral therapies to intranasal therapies or vice versa. Patients with severe symptoms may initiate treatment with a combination of intranasal corticosteroids and an antihistamine. Intranasal antihistamines offer advantages for some patients but may cause adverse effects that limit tolerability.

Other agents, including leukotriene receptor antagonists, cromolyn, and omalizumab, may be appropriate in some patients. However, leukotriene receptor antagonists have limited efficacy, cromolyn must be dosed multiple times daily, and omalizumab is generally targeted for patients who also have severe allergic asthma that is uncontrolled despite maximal pharmacologic treatment and use of environmental control measures.6 Some patients may prefer oral therapies to intranasal therapies or vice versa. Patients with severe symptoms may initiate treatment with a combination of intranasal corticosteroids and an antihistamine. Intranasal antihistamines offer advantages for some patients but may cause adverse effects that limit tolerability.

While medications are commonly coadministered in practice, the evidence supporting the benefit of this approach is sparse. Medications are often combined on the basis of the symptom constellation present in the patient; however, an incremental improvement has often not been established. One exception is that the combination of inhaled corticosteroid and inhaled antihistamine has been shown to improve symptom control for patients with more severe and persistent symptoms.

Immunotherapy (also referred to as desensitization) is the only disease-modifying treatment available for allergic rhinitis. It may be an appropriate choice for patients who are willing and able to adhere to therapy and have adequate financial resources and/or health care insurance.6

Antihistamines. Antihistamines are effective for patients with mild to moderate disease and should be recommended for patients whose primary symptoms are rhinorrhea, sneezing, and itching.2 Antihistamines block the binding of histamine to the H1 receptor and prevent the release of histamine from mast cells, thereby preventing its actions. Therefore, antihistamines are most effective at preventing symptoms before allergen exposure. However, use on an as-needed basis may be effective for some patients, particularly those with intermittent symptoms.2

Oral antihistamines are classified as either first- or second-generation antihistamines. Second-generation antihistamines (Table 4) are generally preferred because the first-generation antihistamines (e.g., brompheniramine, diphenhydramine, chlorpheniramine, clemastine, hydroxyzine, triprolidine) are associated with significantly more sedation, performance impairment, and anticholinergic effects. Expert consensus is that second-generation therapies are preferred for treating allergic rhinitis. This guidance is based on equal effectiveness (with first-generation therapies), lower penetration of the blood-brain barrier, and improved selectivity for the histamine receptor.2

Adverse effects of first-generation antihistamines generally make these agents undesirable for the treatment of allergic rhinitis. Nevertheless, some patients are able to tolerate these medications and may prefer them because of their efficacy and low cost. Tolerance can develop to the sedation/drowsiness effect of first-generation agents, although cognitive impairment may persist.5 It is important to note that paradoxical hyperactivity may occur in some individuals, particularly children. An additional limitation of first-generation agents is that they are included on the Beers list as potentially inappropriate drugs in older adults.7 Older patients are more likely to have concomitant comorbid conditions, such as increased intraocular pressure, benign prostatic hypertrophy, or pre-existing cognitive impairment, and they are more likely to be negatively affected by anticholinergic effects and psychomotor impairment. Therefore, first-generation antihistamines should generally be avoided in this population.

Second-generation antihistamines are sometimes referred to as “nonsedating”; however, they are not completely devoid of sedative properties and may more appropriately be referred to as “less sedating.” Recommended doses of cetirizine and intranasal azelastine are associated with an increase in sedation compared with placebo, but the incidence of sedation is much lower than with the first-generation antihistamines. Loratadine and desloratadine may be associated with sedation when higher than recommended doses are used.

Intranasal antihistamines are considered an alternative to oral second-generation antihistamines for the symptoms of sneezing, pruritus, and rhinitis. In addition, unlike oral antihistamines, intranasal formulations produce clinically significant reductions in congestion. However, they are generally not as effective as intranasal corticosteroids. Intranasal antihistamines are systemically absorbed and may cause systemic effects (e.g., sedation) as well as local adverse effects (e.g., burning, epistaxis). They are appropriate choices as first-line therapy, especially in patients with mild to moderate symptoms who prefer a topical treatment.

Allergic conjunctivitis can be treated with ophthalmic antihistamines (e.g., levocabastine, bepotastine) or systemic antihistamines. Oral antihistamines are usually effective for ocular symptoms. Therefore, ophthalmic antihistamines are typically added to other therapies that primarily address nasal symptoms, such as intranasal products.6

Intranasal corticosteroids. Corticosteroids act to modify immune responses to allergens by reducing mediator re-
### Table 3. Pharmacologic treatment options for allergic rhinitis

<table>
<thead>
<tr>
<th>Class of agent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral agents</strong></td>
<td></td>
</tr>
<tr>
<td>Antihistamines</td>
<td>▪ Continuous use most effective for SAR and PAR, but appropriate for as-needed use for episodic AR because of relatively rapid onset of action.</td>
</tr>
<tr>
<td></td>
<td>▪ Less effective for nasal congestion than for other nasal symptoms.</td>
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<tr>
<td></td>
<td>▪ Other options, in general, are better choices for more severe AR.</td>
</tr>
<tr>
<td></td>
<td>▪ Less effective for AR than INS, with similar effectiveness to INS for associated ocular symptoms.</td>
</tr>
<tr>
<td></td>
<td>▪ Because generally ineffective for nonallergic rhinitis, other choices are typically better for mixed rhinitis.</td>
</tr>
<tr>
<td></td>
<td>▪ To avoid sedation (often subjectively unperceived), performance impairment, and anticholinergic effects of first-generation antihistamines, second-generation agents are generally preferred.</td>
</tr>
<tr>
<td></td>
<td>▪ Of second-generation agents, fexofenadine, loratadine, and desloratadine are classified as nonnarcotic at recommended doses.</td>
</tr>
<tr>
<td></td>
<td>▪ Expert opinion strongly recommends use of second-generation antihistamines instead of first-generation antihistamines.</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>▪ A short course (5–7 d) of oral corticosteroids may be appropriate for very severe nasal symptoms.</td>
</tr>
<tr>
<td></td>
<td>▪ Preferred to single or recurrent administration of intramuscular corticosteroids, which should be discouraged.</td>
</tr>
<tr>
<td>Decongestants</td>
<td>▪ Pseudoephedrine reduces nasal congestion.</td>
</tr>
<tr>
<td></td>
<td>▪ Adverse effects include insomnia, irritability, palpitations, and hypertension.</td>
</tr>
<tr>
<td>Leukotriene receptor antagonist</td>
<td>▪ Montelukast approved for SAR and PAR.</td>
</tr>
<tr>
<td></td>
<td>▪ No significant difference in efficacy between LTRAs and oral antihistamines.</td>
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<tr>
<td></td>
<td>▪ Approved for both rhinitis and asthma; may be considered in patients who have both conditions.</td>
</tr>
<tr>
<td></td>
<td>▪ Minimal adverse effects.</td>
</tr>
<tr>
<td></td>
<td>▪ Should not be offered as first-line therapy for patients with allergic rhinitis.</td>
</tr>
<tr>
<td><strong>Intranasal agents</strong></td>
<td></td>
</tr>
<tr>
<td>Antihistamines</td>
<td>▪ Effective for SAR and PAR.</td>
</tr>
<tr>
<td></td>
<td>▪ Have clinically significant rapid onset of action, making them appropriate for as-needed use in episodic AR.</td>
</tr>
<tr>
<td></td>
<td>▪ Effectiveness for AR equal or superior to oral second-generation antihistamines with clinically significant effect on nasal congestion.</td>
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<td></td>
<td>▪ Less effective than INS for nasal symptoms.</td>
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<tr>
<td>Anticholinergic</td>
<td>▪ Reduces rhinorrhea but not other symptoms of SAR and PAR.</td>
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<tr>
<td></td>
<td>▪ Appropriate for episodic rhinitis because of rapid onset of action.</td>
</tr>
<tr>
<td></td>
<td>▪ Adverse effects minimal, but dryness of nasal membranes may occur.</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>▪ Most effective monotherapy for SAR and PAR.</td>
</tr>
<tr>
<td></td>
<td>▪ Effective for all symptoms of SAR and PAR, including nasal congestion.</td>
</tr>
<tr>
<td></td>
<td>▪ As-needed use (e.g., &gt;50% days) effective for SAR.</td>
</tr>
<tr>
<td></td>
<td>▪ May consider for episodic AR.</td>
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<tr>
<td></td>
<td>▪ Usual onset of action is less rapid than oral or intranasal antihistamines, usually occurs within 12 hours, and may start as early as 3–4 hours in some patients.</td>
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<tr>
<td></td>
<td>▪ More effective than combination of oral antihistamine and LTRA for SAR and PAR.</td>
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<tr>
<td></td>
<td>▪ Similar effectiveness to oral antihistamines for associated ocular symptoms of AR.</td>
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<tr>
<td></td>
<td>▪ Without significant systemic adverse effects in adults.</td>
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<td></td>
<td>▪ Growth suppression in children with PAR has not been demonstrated when used at recommended doses.</td>
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<tr>
<td></td>
<td>▪ Local adverse effects minimal, but nasal irritation and bleeding occur; nasal septal perforation rarely reported.</td>
</tr>
<tr>
<td>Cromolynt</td>
<td>▪ For maintenance treatment of AR, onset of action within 4–7 days; full benefit may take weeks.</td>
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<tr>
<td></td>
<td>▪ For episodic rhinitis, administration just before allergen exposure protects for 4–8 hours against allergic response.</td>
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<tr>
<td></td>
<td>▪ Less effective than INS; inadequate data for comparison with LTRAs and antihistamines.</td>
</tr>
<tr>
<td></td>
<td>▪ Minimal adverse effects.</td>
</tr>
<tr>
<td>Decongestants</td>
<td>▪ For short-term and possibly for episodic therapy of nasal congestion, but inappropriate for daily use because of the risk of rhinitis medicamentosa.</td>
</tr>
<tr>
<td></td>
<td>▪ May assist in intranasal delivery of other agents when significant nasal mucosal edema is present.</td>
</tr>
</tbody>
</table>

Abbreviations used: AR, allergic rhinitis; INS, intranasal steroids; LTRA, leukotriene receptor antagonist; PAR, perennial allergic rhinitis; SAR, seasonal allergic rhinitis.
Sources: References 2 and 3.
Efficacy is similar among available products; therefore, for use in patients whose symptoms affect their quality of life. Intranasal corticosteroids are recommended for allergic rhinitis. Their efficacy is similar to antihistamines for the relief of ocular symptoms. Intranasal corticosteroids are preferred for allergic rhinitis.

Intranasal corticosteroids (Table 5) are the most effective agents for controlling symptoms of allergic rhinitis, including sneezing, itching, rhinorrhea, and nasal congestion. Their efficacy is similar to antihistamines for the relief of ocular symptoms. Intranasal corticosteroids are recommended for use in patients whose symptoms affect their quality of life. Efficacy is similar among available products; therefore, sensory attributes such as smell and aftertaste may play an influential role in product selection. While regular daily use beginning before allergen exposure is most effective, they are also effective when used on an as-needed basis. Some patients may benefit from the use of intranasal corticosteroids in combination with other agents such as antihistamines.

Topical intranasal administration of corticosteroids greatly reduces bioavailability. Although systemic adverse events are unusual in patients using recommended doses, they are not completely eliminated. For example, in older adults, there are reports of a possible association between the use of intranasal corticosteroids and posterior subcapsular cataracts. Inhaled corticosteroids for asthma have been associated with reduced bone mineral density; however, this effect has not been demonstrated with intranasal corticosteroids, which have lower systemic bioavailability than inhaled formulations.

Local adverse effects associated with intranasal corticosteroid use include nasal irritation and epistaxis. There are rare reports of nasal septal perforation; patients should be educated on the correct device technique and instructed to direct the spray away from the septum to reduce the risk of this effect.

Decongestants. Congestion can be a particularly bothersome symptom for some patients with allergic rhinitis. Fortunately, most patients experience only intermittent congestion. Expert consensus is that chronic use of decongestants (topically or systemically) is not warranted. Intranasal corticosteroids and intranasal antihistamines are effective for patients with chronic symptoms of congestion.

Oral decongestants include the alpha-adrenergic agonists pseudoephedrine and phenylephrine. These agents act as vasoconstrictors and are effective for reducing congestion associated with allergic rhinitis as well as upper respiratory infections. However, oral decongestants are associated with adverse events, including insomnia, irritability, and palpitations. Maximum daily dosages of systemic pseudoephedrine and phenylephrine are shown in Table 6. Although pseudoephedrine is considered a safe and effective decongestant, the sale and availability of pseudoephedrine products vary among states because of the potential for misuse in synthesizing methamphetamine for abuse.

Topical decongestants include phenylephrine, oxytetrizoline, and xylometazoline. These agents are effective for reducing congestion but are recommended for only short-term use because of the risk of rebound nasal congestion and rhinitis medicamentosa, which may occur after only 3 or 4 days of treatment.

### Table 4. Second-generation antihistamines

<table>
<thead>
<tr>
<th>Generic name</th>
<th>Trade name(s)</th>
<th>Usual adult dosage (no. sprays)</th>
<th>Lower age limit (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrivastine</td>
<td>Semprex-D a</td>
<td>8 mg four times daily</td>
<td>12 y</td>
</tr>
<tr>
<td>Cetirizine</td>
<td>Zyrtec</td>
<td>5–10 mg once daily</td>
<td>6 mo</td>
</tr>
<tr>
<td>Desloratadine</td>
<td>Clarinex</td>
<td>5 mg once daily</td>
<td>6 mo</td>
</tr>
<tr>
<td>Fexofenadine</td>
<td>Allegra</td>
<td>180 mg once daily or 60 mg twice daily</td>
<td>2 y</td>
</tr>
<tr>
<td>Levocetirizine</td>
<td>Xyzal</td>
<td>5 mg once daily</td>
<td>2 y</td>
</tr>
<tr>
<td>Loratadine</td>
<td>Claritin</td>
<td>10 mg once daily</td>
<td>2 y</td>
</tr>
<tr>
<td>Intranasal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azelastine</td>
<td>Astelin, Astepro</td>
<td>2 sprays (137 mcg/spray)/nostril twice daily</td>
<td>5 y</td>
</tr>
<tr>
<td>Olopatadine</td>
<td>Patanase</td>
<td>2 sprays (665 mcg/spray)/nostril twice daily</td>
<td>6 y</td>
</tr>
</tbody>
</table>

aAcrivastine is currently available only in combination with pseudoephedrine.
Source: Reference 3.

### Table 5. Intranasal corticosteroids

<table>
<thead>
<tr>
<th>Generic name</th>
<th>Trade name</th>
<th>Usual adult dosage (no. sprays)</th>
<th>Lower age limit (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>Beconase AQ</td>
<td>1–2 (42 mcg/spray)/nostril twice daily</td>
<td>6</td>
</tr>
<tr>
<td>Budesonide</td>
<td>Rhinocort Aqua</td>
<td>1–4 (32 mcg/spray)/nostril once daily</td>
<td>6</td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>Omnaris</td>
<td>1–2 (50 mcg/spray)/nostril once daily</td>
<td>6</td>
</tr>
<tr>
<td>Flunisolide</td>
<td>Nasarel</td>
<td>2 (25 mcg/spray)/nostril twice or three times daily</td>
<td>6</td>
</tr>
<tr>
<td>Fluticasone furoate</td>
<td>Veramyst</td>
<td>1–2 (50 mcg/spray)/nostril once daily</td>
<td>2</td>
</tr>
<tr>
<td>Fluticasone propionate</td>
<td>Flonase</td>
<td>2 (50 mcg/spray)/nostril once daily</td>
<td>4</td>
</tr>
<tr>
<td>Mometasone</td>
<td>Nasonex</td>
<td>1–2 (50 mcg/spray)/nostril once daily</td>
<td>2</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>Nasacort Allergy 24 Hour</td>
<td>1–2 (55 mcg/spray)/nostril once daily</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Reference 3.
Both oral and topical decongestants should be used with caution in older adults and patients with a history of cardiac arrhythmia, angina pectoris, cerebrovascular disease, hypertension, bladder neck obstruction, glaucoma, or hyperthyroidism. Oral decongestants are associated with increased blood pressure in patients with hypertension, but this effect is generally not an issue for normotensive patients. In addition, oral decongestants should be avoided in children younger than 4 years.

**Intranasal cromolyn.** Intranasal cromolyn is an effective option for some patients and has minimal adverse effects. Cromolyn is a mast cell stabilizer that acts by preventing the release of inflammatory mediators rather than treating symptoms.

Cromolyn is approved for patients older than 5 years. The recommended dosage is one spray in each nostril three to six times daily at regular intervals. The onset of action for relief of symptoms is 4 to 7 days, but 2 to 4 weeks may be required for maximal benefits. In addition, it must be taken multiple times a day, which can be a barrier to adherence. Adverse effects, which are generally mild and local, may include sneezing and nasal stinging or burning.

Cromolyn is most useful for treatment before expected allergen exposure. If symptoms are already present, a second agent may be required during the first few days of treatment. Patients with prominent congestion should be treated with a decongestant first because a patent airway is required for administration.

**Intranasal anticholinergic.** The intranasal anticholinergic ipratropium bromide is effective for managing the symptoms of rhinorrhea but has no effect on other nasal symptoms. Intranasal ipratropium bromide is indicated for the symptomatic relief of rhinorrhea associated with allergic and nonallergic perennial rhinitis in adults and children aged 6 years and older. The recommended dosage is two sprays (42 mcg) per nostril two or three times daily (total dose 168–252 mcg/d). Adverse effects are minimal and generally limited to dryness of the nasal membranes and epistaxis. Anticholinergics may be combined with other agents such as antihistamines or intranasal corticosteroids to produce synergistic efficacy.

**Antileukotriene agent.** The leukotriene receptor antagonist montelukast blocks the action of leukotrienes, chemical messengers involved in allergic reactions. Montelukast is indicated for the relief of symptoms of SAR in patients aged 2 years and older and symptoms of PAR in patients aged 6 months and older. It also is approved for the treatment of asthma. Therefore, patients who have both mild asthma and allergic rhinitis may use a leukotriene receptor antagonist to treat both conditions.

Leukotriene receptor antagonists may be similar in efficacy to second-generation antihistamines, and they are less effective than intranasal corticosteroids. When added to an antihistamine, they provide greater efficacy than the antihistamine alone. However, leukotriene receptor antagonists are not recommended as first-line therapy unless the patient has concurrent asthma, and these agents are considered ineffective for PAR according to the ARIA guidelines.

**Monoclonal antibody.** Omalizumab is a monoclonal antibody that works by reducing levels of circulating free IgE. Omalizumab links with IgE, blocking interactions with cells involved in the allergic response, including mast cells. This agent has been approved by FDA to treat allergic asthma. Omalizumab can prevent severe episodes of asthma in people whose asthma is not adequately controlled by other medications. Omalizumab also has been shown to improve nasal and ocular symptoms of allergic rhinitis; however, it has not been shown to be more effective than other therapies. This agent is administered by injection and is expensive. Because omalizumab is not approved for the treatment of allergic rhinitis, its use is limited to treatment of allergic rhinitis patients who also have severe allergic asthma.

**Immunotherapy.** Immunotherapy involves exposing the patient to sequentially increasing amounts of the allergen to which he or she is sensitive. Ultimately, the dose for immunotherapy may exceed what the patient would be exposed to in the natural environment. Immunotherapy in the form of subcutaneous injections (SCIT) has been used for more than 100 years. SCIT can provide long-lasting symptom relief for a variety of allergic conditions, including allergic rhinitis, allergic conjunctivitis, allergic asthma, and stinging insect hypersensitivity. Immunotherapy has been used successfully for a variety of allergens, including pollens, fungi, animal allergens, dust mites, and cockroaches. The use of immunotherapy in patients with allergic rhinitis may reduce their risk of developing asthma and allergic sensitivity to additional allergens. Moreover, immunotherapy for allergic rhinitis has benefits that persist after discontinuation of therapy. Immunotherapy is the only available disease-modifying treatment for allergic rhinitis. However, it has important limitations, including risks, cost of therapy, and time commitment.

### Table 6. Systemic decongestant dosages

<table>
<thead>
<tr>
<th>Medication</th>
<th>Adults and children ≥12 y</th>
<th>Children 6 to &lt;12 y</th>
<th>Children 2 to &lt;6 y*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenylephrine HCl</td>
<td>10 mg every 4 h</td>
<td>5 mg every 4 h</td>
<td>2.5 mg every 4 h</td>
</tr>
<tr>
<td>Phenylephrine bitartrate</td>
<td>15.6 mg every 4 h</td>
<td>7.8 mg every 4 h</td>
<td>Not recommended for children &lt;6 y</td>
</tr>
<tr>
<td>Pseudoephedrine</td>
<td>60 mg every 4–6 h</td>
<td>30 mg every 4–6 h</td>
<td>15 mg every 4–6 h</td>
</tr>
</tbody>
</table>

*FDA has advised that cough and cold medications not be used in children younger than 2 years. Manufacturers have voluntarily updated cough and cold product labels to state “do not use” in children younger than 4 years. However, these actions have not changed the official monographs for these products.

Source: Reference 1.
Patients are considered candidates for immunotherapy if their symptoms are not adequately controlled with medications (with or without environmental control measures), if they experience unacceptable adverse events from medications, and/or if they want an option that can reduce long-term use of medications. Allergen testing should demonstrate specific IgE antibodies or a positive wheal and flare reaction to the relevant allergen or allergens before a course of immunotherapy is initiated.

An estimated 5% of the population with environmental allergies receive SCIT for allergic rhinitis and asthma, and fewer than 20% of those who begin SCIT finish the entire treatment course. These low rates of treatment use and persistence are likely due to the cost and time commitment required for a course of therapy. However, immunotherapy is a cost-effective treatment in the long term because of the reduced need for ongoing pharmacotherapy.

There are two phases of immunotherapy: (1) the initial build-up phase and (2) the maintenance phase. During the build-up phase, the dose and concentration of the allergen extract are increased; during the maintenance phase, a therapeutically effective dose is administered repeatedly. Patients generally receive one to three injections per week during the build-up phase; the target maintenance dose is usually achieved after 3 to 6 months of this regimen. (A more accelerated schedule may be used but appears to increase the risk of systemic reactions.)

Once the maintenance dose is reached, patients receive injections at 2- to 4-week intervals for a period that generally lasts 3 to 5 years, depending on response to therapy. Some patients begin experiencing a decrease in symptoms during the build-up phase, but others may not notice an improvement until the maintenance phase. Many patients continue to experience symptom reduction for several years after a course of SCIT.

Local adverse effects from SCIT are usually minor and may include swelling or redness at the injection site. Local reactions are fairly common and are not predictive of systemic reactions. Serious systemic allergic reactions such as anaphylaxis, which can be life-threatening or fatal, are rare but do occur. For SCIT, systemic reactions occur in approximately 0.2% of injections, and the fatality rate has been estimated to be 1 per 2.5 million injections. The majority of systemic reactions following SCIT, including almost all severe systemic reactions, occur within 30 minutes of an injection. Therefore, SCIT should be administered in settings where anaphylaxis can be promptly recognized and treated; health care providers should observe patients for 30 minutes after an injection. It is imperative that patients receiving immunotherapy have access to an emergency treatment for anaphylaxis (e.g., subcutaneous epinephrine) in case a severe reaction is delayed.

Patients with comorbid asthma should not have immunotherapy initiated unless their asthma is stable on pharmacotherapy because patients with uncontrolled asthma are at increased risk of systemic reactions. In addition, patients must be willing to adhere to treatment regimens and have the ability to communicate the signs and symptoms of allergic reactions.

More serious systemic reactions and treatment-resistant anaphylaxis have been noted in patients receiving beta-blockers. Beta-blockade may both enhance inflammatory mediator release and make epinephrine less effective. In general, immunotherapy should be withheld from patients who are taking beta-blockers.

The sublingual route of immunotherapy (SLIT) allows patients to administer immunotherapy for some allergens at home, thereby reducing the logistical burden of this therapy. In 2014, FDA approved three SLIT products for allergies to grass and ragweed (Table 7). The results of several meta-analyses show that SLIT is effective for both allergic rhinitis and allergic asthma. However, the relative efficacy of SLIT compared with SCIT has not been established, and research is ongoing to compare the two approaches.

Adverse effects of SLIT are usually minor and may include pruritus and edema of the mouth, lips, or throat. However, systemic reactions, including anaphylaxis, can occur. Severe systemic reactions are less frequent with SLIT than with SCIT. Of note, systemic reactions have occurred in patients receiving SLIT who had previously had anaphylactic reactions to SCIT.

The first dose of SLIT should be administered under the supervision of a physician with experience in the diagnosis and treatment of severe allergic reactions, and the patient should be observed for at least 30 minutes after administration. Following the initial administration, patients may self-administer SLIT at home. Patients should be educated on the signs and symptoms of a severe systemic allergic reaction as well as a severe local allergic reaction. These include syncope, dizziness, hypotension, tachycardia, dyspnea, wheezing, bronchospasm, chest discomfort, cough, abdominal pain, vomiting, diarrhea, rash, pruritus, flushing, and urticaria. Patients must have injectable epinephrine available and be trained to use it if a severe allergic reaction occurs. Patients who experience a severe allergic reaction should seek immediate medical care, discontinue therapy, and resume treatment only if instructed to by their physician. Patients should be advised to discontinue SLIT if they experience severe or persistent symptoms of esophagitis or if they have asthma that becomes difficult to control or breathing becomes difficult. Children should receive SLIT only under an adult’s supervision.

Administration of SLIT must begin 3 to 4 months before the onset of the pollen season and continue throughout the season. Patients should be advised that immunotherapy will not provide immediate relief of allergy symptoms.

**Treatment considerations for special populations**

Treatment selection can be influenced by many additional factors, including the presence of comorbid conditions, pregnancy, and patient age.

**Patients with comorbid asthma.** There are many important interrelationships between allergic rhinitis and asthma.
Patients who have allergic rhinitis are at increased risk of developing asthma, and they often have bronchial hyperresponsiveness even when a diagnosis of asthma has not been made. The majority of patients with asthma also have allergic rhinitis, and the prevalence is higher among children. In patients with comorbid asthma, treatment of allergic rhinitis with intranasal corticosteroids, immunotherapy, and some second-generation antihistamines has been shown to improve symptoms of asthma. Therefore, aggressive treatment of allergic rhinitis is warranted in patients with asthma. In addition, some treatments for asthma (e.g., montelukast, omalizumab) may be effective for managing symptoms of allergic rhinitis. Many years ago, there was a concern that antihistamines used for allergic rhinitis would exacerbate asthma. This concern was unwarranted, however, and antihistamines are considered safe for use in patients with asthma.

Pregnant and lactating women. Treatment of allergic rhinitis during pregnancy should emphasize nonpharmacologic therapies, including intranasal saline. If these measures are insufficient to control symptoms, a discussion of the risks and benefits of medications is warranted.

To which special populations are you comfortable providing allergic rhinitis treatment recommendations? Which patient populations do you typically refer? (Choose all that apply)

a. Patients with comorbid asthma
b. Pregnant and lactating women
c. Young children
d. Older patients

A final rule issued by FDA in December 2014 made changes to medication labeling regarding pregnancy and breastfeeding. The new system replaces letter labeling categories—A, B, C, D, and X—with more detailed information on clinical considerations and risks to pregnant women and mothers who breastfeed. The first section of the new labeling structure contains information pertaining to pregnancy, including dosing that could be different if a woman were not pregnant; risks to the developing fetus; and whether there is a registry that collects data on how pregnant women are affected when using the medication. The section on lactation provides information such as the amount of drug in breast milk (if it can be determined) and the potential effects on the child. The third section pertains to prescribing for female and male patients of reproductive potential.

The new requirements went into effect in June 2015. Manufacturers of new approved drugs will be required to use new labeling immediately. For previously approved products, new labeling will be phased in gradually. As of publication, medications used in the treatment of allergic rhinitis continue to use preexisting pregnancy labeling. Pharmacists should monitor product labeling for new information about the safety of medications for pregnant and lactating women.

Most medications used in the treatment of allergic rhinitis have been classified into pregnancy risk categories B and C. Category B indicates that animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women. Category C indicates that animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans; however, potential benefits may warrant use of the drug in pregnant women despite potential risks.

First- and second-generation antihistamines have a sufficient amount of observational data to demonstrate safety. However, one case control study has found an increased risk of cleft palate in the children of women receiving diphenhydramine. In addition, animal data suggest that hydroxyzine should be used cautiously during the first trimester of pregnancy. Oral decongestants should be avoided during the first trimester of pregnancy. Short-term use of topical decongestants has not been studied but may be acceptable. Nasal cromolyn, montelukast, and intranasal corticosteroids are considered safer choices. Immunotherapy that is initiated before pregnancy may be continued, but dosages should not be increased. Immunotherapy should generally not be started during pregnancy.

Young children. Allergic rhinitis is very common in children. Sensitization to allergens most frequently occurs among children aged 4 to 6 years but may occur in children younger than 2 years. Manufacturers of some products have conducted clinical development programs in young children. Some antihistamines are indicated for children as young as 6 months (Table 4), and some intranasal corticosteroids are indicated for children as young as 2 years (Table 5). However, not all medications used in the treatment of allergic rhinitis have been studied in young children, a factor that can complicate treatment decisions.

Of note, systemic decongestants should be avoided in young children. In January 2008, manufacturers voluntarily removed OTC infant products containing decongestants from the market because of safety concerns. These safety concerns included reports of harm or death that occurred from overdose resulting from accidental ingestion, unintentional overdose, or dosing error. Most reports of death occurred in children younger than 2 years. Later during 2008, manufacturers voluntarily relabeled affected products for children to state: “Do not use in children under 4 years of age.”

Older patients. Physiologic changes associated with aging include atrophy of collagen fibers and mucosal glands, loss of dermal elastic fibers, fragmentation and weakening of sepal cartilage, and reduced blood flow to nasal tissues. These changes increase the risk of drying of nasal tissues and can magnify or complicate rhinitis.

Of note, older patients are more likely than younger patients to have profuse watery rhinorrhea associated with cholinergic hyperactivity. This may be treated with intranasal ipratropium bromide. However, ipratropium bromide should be used cautiously in patients with preexisting glau-
corticosteroids may be safely used in the older population.\(^3\) Nasal corticosteroids, such as intranasal beclomethasone, fluticasone, and budesonide, are considered first-line agents for rhinitis in this population. However, it is essential to assess for concomitant conditions, such as asthma or obstructive sleep apnea, which would indicate the use of oral corticosteroids.

### Managing allergic rhinitis in the pharmacy

Whether or not patients have a formal diagnosis of allergic rhinitis or are receiving prescription or OTC therapy, pharmacists have key roles in helping patients to manage their condition, including patient assessment, education, and follow-up. Pharmacists can provide information about environmental control measures; the appropriate use of medications, including correct device technique; common adverse events; and how to manage them, and when to seek further medical assistance.

#### Patient assessment

Because many medications used in the treatment of allergic rhinitis are available OTC (e.g., many antihistamines, some intranasal corticosteroids), patients who suspect that they have allergies often self-manage their symptoms without seeking a formal diagnosis. Pharmacists can help by collecting a careful patient history to identify possible allergic exposures, assessing self-treating patients to determine whether their symptoms are likely due to allergies, and assisting with product selection. If patients’ symptoms fail to respond to OTC treatments, patients should be referred for further evaluation, diagnostic tests, and possible prescription therapy.

Several of the symptoms of allergic rhinitis overlap with symptoms of the common cold, which can complicate symptom assessment and treatment selection, especially for self-treating patients (Table 8). Key distinctions include that colds are self-limiting viral infections characterized by initial sore throat followed by nasal symptoms and nonproductive cough. Pharmacists should question patients to assess whether symptom patterns are most likely due to allergic rhinitis, an upper respiratory infection, or another condition. The presence of a fever indicates that the patient has an infection, and more severe symptoms may be associated with an upper respiratory infection, such as influenza. A purulent nasal discharge is more common in infectious rhinitis, although the cause is usually viral rather than bacterial. Symptoms lasting more than 2 weeks suggest allergies rather than a cold.

Questioning patients about their symptoms is also useful to better guide product selection. For example, patients with congestion as a prominent symptom may respond better to an intranasal corticosteroid or an antihistamine/decongestant combination product than to an oral antihistamine alone. On the other hand, oral antihistamines may be more appropriate for patients with prominent ocular symptoms. It is important to note that some products used in the treatment of allergic rhinitis, such as decongestants, also may provide benefit in the treatment of the common cold. Therefore, response to treatment does not necessarily indicate the presence of allergic rhinitis.

#### Patient education

Patient education should include a discussion of allergic rhinitis as a chronic condition and the strategies available for its management, including nonpharmacologic and pharmacologic approaches. Instructions for appropriate use of the patient’s medications are also an essential part of managing allergic rhinitis in the pharmacy.

The patient’s environmental control strategies should be reviewed. If the patient has not yet undergone allergen testing and continues to experience symptoms despite treatment, it may be helpful to identify specific sensitivities so that avoidance measures can be targeted. However, the patient’s lifestyle and preferences should be considered when determining how much emphasis to place on environmental control measures. Some patients may be willing to make lifestyle changes to reduce allergen exposure (e.g., limiting time outdoors, removing pets from the household, replacing...
Table 8. Differentiating symptoms of the common cold from allergic rhinitis

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cold</th>
<th>Allergic rhinitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>General aches and pains</td>
<td>Slight</td>
<td>Never</td>
</tr>
<tr>
<td>Fatigue and weakness</td>
<td>Sometimes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Itchy eyes</td>
<td>Rare or never</td>
<td>Common</td>
</tr>
<tr>
<td>Sneezing</td>
<td>Usual</td>
<td>Usual</td>
</tr>
<tr>
<td>Sore throat</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Rhinorrhea</td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td>Congestion</td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td>Fever</td>
<td>Rare</td>
<td>Never</td>
</tr>
<tr>
<td>Duration</td>
<td>3–14 days</td>
<td>Weeks or longer, depending on length of exposure to allergen</td>
</tr>
</tbody>
</table>

Source: Reference 9.

Table 9. Patient education for intranasal medications

**General instructions**

Shake intranasal products before administration.

Intranasal sprays must be primed before first use and reprimed if the product has not been used for a while (3 d to 2 wk, depending on the product). To prime, the patient should remove the cap and then spray the bottle in the air several times until a fine mist appears.

To administer the product, the patient should tilt his or her head forward slightly and insert the tip of the bottle upright into the nostril. To ensure that the spray is directed away from the septum (center) of the nose, use the contralateral hand for administration (left hand to right nostril, right hand to left nostril). With the patient’s thumb supporting the bottom of the bottle, he or she should press down on the applicator with two fingers and gently breathe in through the nose and out through the mouth. The patient’s head should not be tilted back (doing so will cause some of the spray to run down the throat).

This administration technique should be repeated in each nostril for the number of sprays prescribed by the health care provider or indicated on package labeling.

After administering the medication, the patient should clean the tip of the applicator with a tissue, replace the cap, and store at room temperature away from light.

**Intranasal corticosteroids**

Be careful not to spray the medication on the nasal septum; the spray should be aimed toward the back of the patient’s nose.

**Intranasal decongestants**

Do not use for more than 3 consecutive days to prevent rhinitis medicamentosa.

Sources: References 17–19.

carpets and upholstery), while other patients may find these measures to be overly burdensome or insufficient to control symptoms.

For patients receiving pharmacologic therapy, pharmacists should provide education about proper medication administration, potential adverse events and their management, anticipated response to therapy, and when to seek further evaluation and treatment. Pharmacists should also emphasize the benefit of timing medication use appropriately. Many medications used in the treatment of allergic rhinitis are most effective when administered before exposure to allergens. For example, corticosteroids are most effective when administration begins 1 to 2 weeks before allergen exposure. However, some benefit is obtained when administered on an as-needed basis. On the other hand, antihistamines have a much shorter onset of action and can be used when needed but also have benefits when administered prophylactically. Cromolyn sodium is effective only when administered prophylactically. Immunotherapy must be administered for a few months before benefits are seen. When SLIT is administered for SAR, administration should begin 3 to 4 months before onset of the pollen season.

Patients who use non-oral formulations of medications for the treatment of allergic rhinitis should be provided with education about proper medication administration (i.e., device technique). Key educational points for the administration of intranasal products are shown in Table 9.17–19 Patients who receive SLIT should administer the tablets by placing them under their tongues and keeping them there for at least 1 minute before swallowing. Patients should wash their hands after handling the tablet. After the administration of SLIT, patients should wait at least 5 minutes before consuming any food or beverage.

**Patient follow-up**

Pharmacists should follow up with patients to assess response to therapy and recommend treatment modifications or referral to other health care providers when necessary. A 2- to 4-week trial of a therapeutic regimen is usually sufficient to determine whether it will be effective for a patient. If treatment is ineffective or the response is inadequate, combination therapy may be considered.2 Substituting another class
of medication is another treatment option. However, some patients will not respond well to initial therapy whether it is a prescription or OTC medication, and referral to a specialist may be appropriate.

Situations warranting consideration of referral for further evaluation and treatment are listed in Table 10.1,3 After a patient consults with other health care providers, pharmacists should continue to follow up with the patient to evaluate responses to therapy and support the patient’s ongoing management of allergic rhinitis symptoms.

**Summary**

Medications often play a crucial role in the management of patients’ allergic rhinitis symptoms; thus, pharmacists can have a positive impact on the care of patients with this condition. Many effective medications are available without a prescription. Pharmacists can help patients determine whether their symptoms are likely due to allergic rhinitis and help them select medications that meet their needs. Following up with patients to assess response to therapy and determine the need for referral for further evaluation and/or prescription therapy is an important role for pharmacists. Whether or not patients manage their symptoms with nonpharmacologic measures, OTC medications, prescription medications, or immunotherapy, pharmacists should educate patients to ensure they receive optimal benefits from their therapy.

### Table 10. Situations that may warrant referral

<table>
<thead>
<tr>
<th>Referral to an allergist/immunologist may be indicated in any of the following situations:</th>
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<tr>
<td>- The patient has had prolonged manifestations of rhinitis or symptoms do not improve after 2–4 weeks of treatment.</td>
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<tr>
<td>- The patient has complications of rhinitis (e.g., oitis media, sinusitis, nasal polyposis) or other infections.</td>
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<tr>
<td>- The patient has a comorbid condition (e.g., asthma).</td>
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<tr>
<td>- The patient requires systemic corticosteroids for the treatment of rhinitis.</td>
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<td>- The patient’s symptoms or medication adverse effects interfere with his or her ability to function (e.g., causes sleep disturbance, impairs school/work performance).</td>
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<tr>
<td>- The patient’s symptoms significantly decrease quality of life (e.g., a decrease in comfort and well-being, sleep disturbance, anosmia, ageusia).</td>
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<tr>
<td>- Treatment with medications for rhinitis is ineffective or produces adverse events.</td>
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<tr>
<td>- The patient has symptoms of rhinitis medicamentosa.</td>
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<tr>
<td>- Allergic/environmental triggers causing the patient’s rhinitis symptoms need further identification and clarification.</td>
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<tr>
<td>- Allergy immunotherapy is a treatment consideration.</td>
</tr>
</tbody>
</table>

Sources: References 1 and 3.

### References

CPE assessment

Instructions: This assessment must be taken online; please see the “CPE information” sidebar below for further instructions. The online system will present these questions in random order to help reinforce the learning opportunity. There is only one correct answer to each question.

1. Which of the following types of pain is most likely to be associated with allergic rhinitis?
   a. Sinus pain  
   b. General muscle aches  
   c. Toothache  
   d. Migraine headaches

2. Which of the following symptoms is more common in patients with the common cold than in patients with allergic rhinitis?
   a. Itchy eyes  
   b. Sneezing  
   c. Cough  
   d. Rhinorrhea

3. Which of the following symptoms indicates that the patient has a condition other than allergic rhinitis?
   a. Sore throat  
   b. Fatigue  
   c. Fever  
   d. Ocular irritation

4. During what time of day does ragweed pollen usually peak?
   a. Early morning  
   b. Early afternoon  
   c. Evening  
   d. Middle of the night

5. Which of the following statements is true about the use of environmental control strategies to reduce symptoms of allergic rhinitis?
   a. All patients should undergo a trial of 4 to 6 weeks of environmental control measures before initiating medication therapy.  
   b. The majority of patients with mild to moderate symptoms are able to control their allergic rhinitis solely with environmental control measures.  
   c. Adherence to these measures is predictive of adherence to medication therapy and should be considered before making treatment recommendations.  
   d. Environmental control measures are generally insufficient for symptom control of allergic rhinitis.

6. Which of the following activities is effective for reducing exposure to dust mite allergens?
   a. Dusting  
   b. Maintaining humidity above 50%  
   c. Washing bedding in warm water  
   d. HEPA filtration vacuuming

7. Outdoor fungi are least likely to be present in the air when
   a. The temperature is below freezing.  
   b. The weather is sunny.  
   c. There is snow cover.  
   d. It is raining.

8. Which of the following patients is most likely to be able to manage his or her allergic rhinitis with non-pharmacologic treatment approaches?
   a. A patient who is allergic to animal dander and does not live with any pets.  
   b. A patient allergic to fungi who likes to garden.  
   c. A patient allergic to dust mites who lives in a house with wall-to-wall carpeting.  
   d. A patient allergic to pollen who likes to play softball.

9. The anticholinergic effects of first-generation antihistamines are considered an important concern for which group of patients?
   a. Patients who use intranasal corticosteroids concomitantly  
   b. Older adults  
   c. Patients with comorbid sinusitis  
   d. Patients using intranasal corticosteroids concomitantly

CPE information

To obtain 2.0 contact hours (0.2 CEUs) of CPE credit for this activity, you must complete the online assessment and evaluation. A statement of credit will be awarded for a passing grade of 70% or better on the assessment. You will have two opportunities to successfully complete the assessment. Pharmacists who successfully complete this activity before October 1, 2018, can receive CPE credit. Your statement of credit will be available upon successful completion of the assessment and evaluation and will be stored in your ‘My Training Page’ and on CPE Monitor for future viewing/printing.

CPE instructions

1. Log in or create an account at pharmacist.com, and select LEARN from the top of the page; select Continuing Education, then Home Study CPE to access the Library.
2. Enter the title of this article or the ACPE number to search for the article, and click on the title of the article to start the home study.
3. To receive CPE credit, select Enroll Now or Add to Cart from the left navigation, and successfully complete the assessment (with randomized questions) and evaluation.
4. To get your statement of credit, click “Claim” on the right side of the page. You will need to provide your NABP e-profile ID number to obtain and print your statement of credit.

Live step-by-step assistance is available Monday through Friday from 8:30 am to 5:00 pm ET at APhA Member Services at 800-237-APhA (2742) or by e-mailing education@aphanet.com.
10. Which class of medications would be appropriate for long-term treatment of a patient with moderate allergic rhinitis symptoms, including congestion but without asthma?
   a. Intranasal decongestant
   b. Oral corticosteroid
   c. Leukotriene receptor antagonist
   d. Intranasal antihistamine

11. Which class of medications is considered the most effective treatment for allergic rhinitis?
   a. Oral antihistamines
   b. Intranasal corticosteroids
   c. Leukotriene receptor antagonists
   d. Intranasal anticholinergics

12. Which of the following medications reduces rhinorrhea but does not address other nasal symptoms?
   a. Ipratropium bromide
   b. Montelukast
   c. Omalizumab
   d. Cromolyn

13. Low cost is a benefit of which of the following medications?
   a. First-generation antihistamines
   b. Leukotriene receptor antagonists
   c. Omalizumab
   d. Immunotherapy

14. Which medication must be administered three to six times daily?
   a. Intranasal cromolyn
   b. Intranasal decongestants
   c. First-generation antihistamines
   d. Intranasal anticholinergics

15. Which class of medications increases the risk of anaphylaxis in patients receiving immunotherapy?
   a. Beta-blockers
   b. Antibiotics
   c. Antiepileptic drugs
   d. Tricyclic antidepressants

16. Sublingual immunotherapy should be initiated approximately how long before the start of the pollen season?
   a. 1 month
   b. 2 months
   c. 3 to 4 months
   d. 6 to 9 months

17. Which of the following agents should be avoided during the first trimester of pregnancy?
   a. Oral decongestants
   b. Cromolyn
   c. Montelukast
   d. Intranasal corticosteroids

18. Which one of the following patients should be referred for further evaluation?
   a. A patient purchasing nonprescription intranasal corticosteroids
   b. A patient with mild symptoms
   c. A patient whose symptoms have not improved after 1 month of treatment
   d. A patient who is unwilling to implement environmental control measures

19. Which of the following antihistamines is approved for children as young as 6 months of age?
   a. Loratadine
   b. Fexofenadine
   c. Cetirizine
   d. Acrivastine

20. When administering intranasal medications, patients should
   a. Exhale while spraying the medication.
   b. Blow their noses immediately after administering the medication.
   c. Tilt their heads back.
   d. Aim the product away from the nasal septum.