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REVIEW

Overcoming barriers to intranasal corticosteroid use in patients with uncontrolled allergic rhinitis

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Abstract: Patients suffering from allergic rhinitis often attempt to self-manage their symptoms and may seek advice from pharmacists about nonprescription product choices. Several drug classes, both prescription and over-the-counter (OTC), are available, including intranasal corticosteroids (INCSs); oral, intranasal, and ocular antihistamines; leukotriene antagonists; and topical and systemic decongestants, as well as immunotherapies. Selection of the optimal treatment approach depends on the temporal pattern, frequency, and severity of symptoms as well as the patient's age. Nasal congestion is typically the most bothersome symptom, although rhinorrhea, postnasal drip, and ocular symptoms are also problematic. Together, these symptoms may adversely impact the quality of life, work productivity, sleep quality, and the ability to perform daily activities, particularly when uncontrolled. Practice guidelines recognize that INCSs are the most effective medications for controlling allergic rhinitis symptoms, including nasal congestion. Available INCS products have comparable safety and efficacy profiles, but they differ in formulation characteristics and sensory attributes. Several barriers can impede the use of INCSs, including concerns about safety, misperceptions regarding the loss of response from frequent use, and undesirable sensations associated with intranasal administration. Given the increasing number of INCSs available OTC, pharmacists can help allay these concerns by discussing treatment expectations, recommending INCS products with favorable formulation characteristics, and reviewing proper use and technique for the administration of the selected product. These steps can help to foster a collaborative relationship between the patient and the pharmacist in the treatment of allergic rhinitis.

Keywords: allergy, nasal sprays, over-the-counter medications, patient counseling, pharmacy practice

Introduction

Allergic rhinitis causes a variety of symptoms, including nasal congestion, sneezing, rhinorrhea, postnasal drip, nasal and ocular itching, and watery eyes.[1] Classification is based on the pattern (eg, seasonal, perennial, or episodic), frequency (intermittent or persistent), and severity (mild or moderate/severe) of symptoms.[1,2] Among individuals with self-reported nasal symptoms,[3] the 12-month prevalence of allergic rhinitis was estimated at 30%, corresponding to ~90 million Americans. Notably, only 22% of individuals in this survey reported a physician diagnosis of allergic rhinitis, suggesting that the disorder is being largely self-managed without physician oversight.[3]

National surveys evaluating the burden of allergic rhinitis on affected individuals have found that approximately three-quarters of respondents consider nasal congestion to be bothersome or extremely bothersome.[4,5] Other highly bothersome symptoms included runny nose (by 69% of respondents), red, itchy eyes (68%), and postnasal drip (65%).[4,5]

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As with the overall population of allergy sufferers, the majority of allergy symptoms experienced by children and adolescents are attributable to allergic rhinitis.[3] The symptom profile in children is comparable with that in adults, with both children and their parents reporting nasal congestion as the most common and the most bothersome symptom.[6] In the Pediatric Allergies in America survey,[6] parents of children with allergic rhinitis reported a 30% decrease in productivity at school and home when allergy symptoms were at their worst. Children with allergies were also significantly more likely to avoid school or social activities compared to children without allergies ($P<0.001$).

Nasal congestion and other allergy symptoms have a notable impact on the quality of life, work productivity, sleep quality, the ability to perform daily activities, and medical costs, particularly when uncontrolled.[7–12] For example, employed individuals reported that their work productivity was reduced by ~25% on days when their symptoms were at their worst.[4,5] Allergic rhinitis sufferers typically self-recognize their symptoms and then initiate management with over-the-counter (OTC) medications;[13] 82% of those managing their allergic rhinitis symptoms with OTC medications report that they required minimal or no guidance from their physicians. Since most individuals are self-managing their symptoms outside of direct physician's care, pharmacists are well positioned, when needed, to provide guidance and advice regarding the management and treatment of allergic rhinitis symptoms.

Pathophysiology of allergic rhinitis

Allergic rhinitis is caused by immunoglobulin E (IgE)-mediated responses to inhaled allergens, which trigger a series of immunological and biochemical events that produce the clinical symptoms characteristic of the disorder (Figure 1).[14] The process of allergic sensitization involves uptake of the allergens by antigen-presenting cells in nasal tissues, subsequent presentation to other immune response cells, and production of allergen-specific IgE. The IgE binds to high-affinity FcεRI

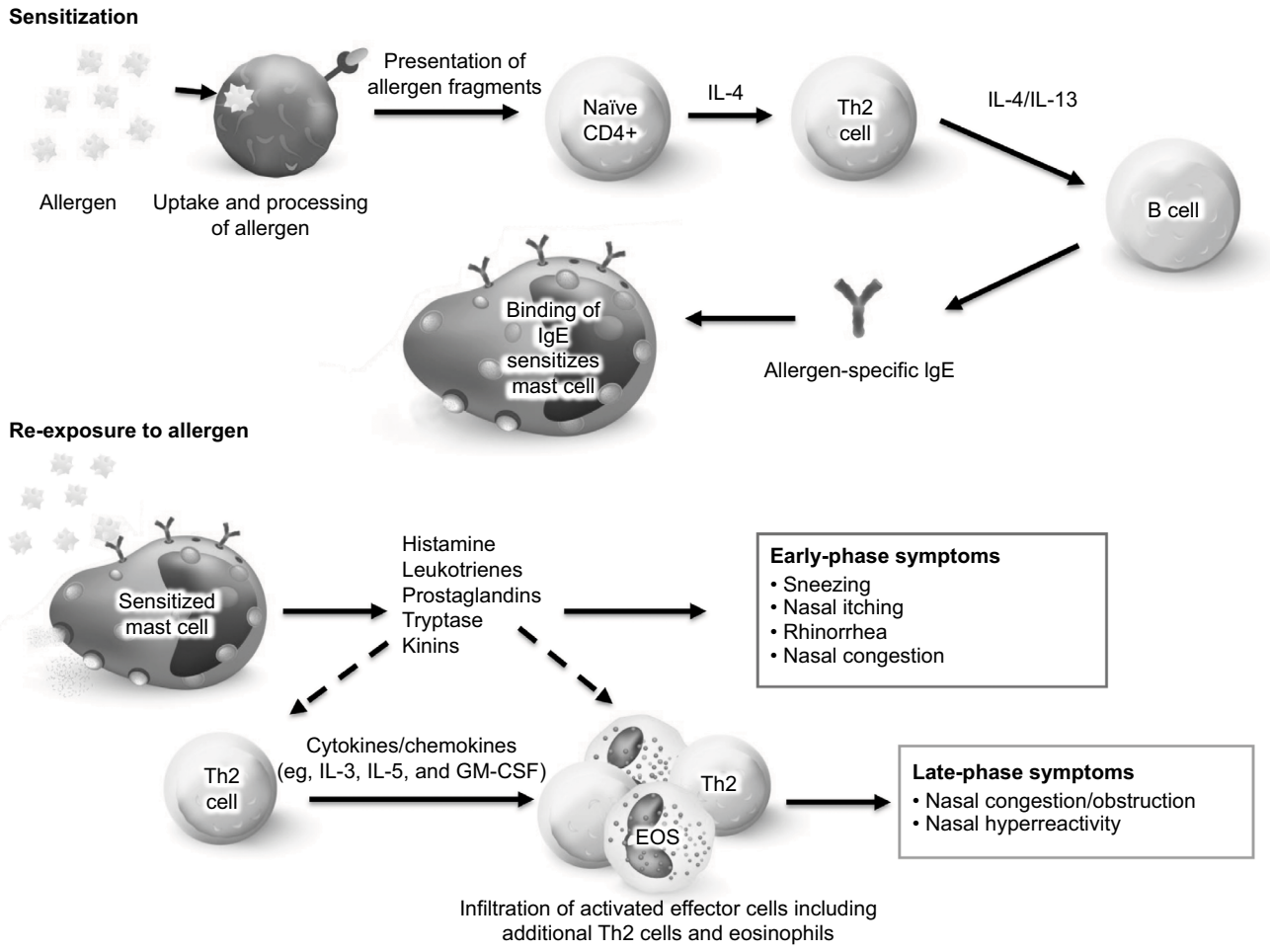

Figure 1 Pathophysiological steps leading to allergic rhinitis symptoms.
Note: Based on Figure 2 of Pathophysiology of allergic and nonallergic rhinitis. Sin B, Togias A. 2011. *Proc Am Thorac Soc*. 2011;8(1):106–114.[14]
Abbreviations: EOS, eosinophil; GM-CSF, granulocyte-macrophage colony-stimulating factor; IgE, immunoglobulin E; IL, interleukin; Th2, helper T-cell type 2.

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receptors on the surface of nasal mast cells and circulating basophils, thereby sensitizing them to the offending allergen but not yet causing any symptoms.[14–16] Upon re-exposure, the offending allergen is recognized by IgE on sensitized mast cells and basophils, which induce early- and late-phase responses that lead to the clinical symptomatology of allergic rhinitis. Within minutes, the allergen–IgE interaction causes degranulation of the sensitized cells, leading to the release/production of mediators, including histamine, tryptase, leukotrienes, and prostaglandins. Histamine activates H_1 receptors on sensory nerve endings to cause sneezing and nasal secretion, as well as both H_1 and H_2 receptors on mucosal blood vessels to cause nasal congestion. The leukotrienes act on receptors located on blood vessels and mucus glands to induce nasal congestion and mucus secretion. The symptoms produced by this immediate hypersensitivity reaction typically last for ~1 hour and then dissipate.[14,15] Approximately 50% of patients with allergic rhinitis then experience a late-phase response that may persist for hours after allergen exposure.[14] The late-phase response is characterized by the influx and activation of multiple inflammatory cells, including T cells, eosinophils, basophils, neutrophils, and monocytes, as well as by an increase in mast cell number in the nasal submucosa and epithelium, and is thought to be mediated by cytokines and chemokines released by the local activation of *Th2* cells. Nasal congestion is the most prominent symptom during the late-phase response.[14–16]

Allergic rhinitis can be classified as intermittent (≤4 days/week or ≤4 weeks/year) or persistent (>4 days/week and >4 weeks/year) and as mild (normal sleep, no impairment of daily activities, normal work and school, and no troublesome symptoms) or moderate to severe (abnormal sleep, impairment of daily activities, impairment of work and school activities, or troublesome symptoms).[2] Symptoms also may be classified according to their temporal pattern as seasonal, perennial/year-round, or episodic (eg, following exposure to a home with pets).[1] These classifications can help to identify the most appropriate treatment options on an individual basis.

Overview of current treatment guidelines

Multiple drug classes are available by prescription or OTC for the treatment of allergic rhinitis. To help guide the selection of appropriate medications, several professional organizations have issued practice guidelines, including the Allergic Rhinitis and its Impact on Asthma (ARIA) working group,[2,17] the American Academy of Allergy, Asthma & Immunology (AAAAI) and American College of Allergy, Asthma & Immunology (ACAAI) jointly,[18] and the American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF).[1]

Each set of practice guidelines recognizes that intranasal corticosteroids (INCSs) are the most effective medication class for controlling allergic rhinitis symptoms (Table 1).[1,2,18] The high efficacy of INCSs is attributed to their ability to modulate the pathophysiology of allergic rhinitis, including the release of multiple mediators and cytokines as well as the recruitment and infiltration of activated inflammatory cells to the nasal mucosa.[1] Accordingly, INCSs are effective at attenuating both early- and late-phase symptoms, including nasal congestion and hyperresponsiveness. The onset of action usually occurs within 12 hours of administration but may commence as early as 3–4 hours after use,[18] which is slower than the onset of antihistamines.[2,18] Continued daily use of INCSs may be needed in order to achieve maximum efficacy; although as-needed INCS dosing is less effective than continuous dosing, it may be an appropriate option for

Table 1 Relative efficacy of medication classes by allergic rhinitis symptom, symptom frequency, and symptom severity

Parameter	Intranasal corticosteroid	Oral antihistamine	Intranasal antihistamine	Leukotriene antagonist
Symptoms				
Congestion	+++	+	++	+
Rhinorrhea	+++	++	++	+
Sneezing	+++	++	++	+
Nasal itching	+++	++	++	+
Symptom frequency				
Intermittent	++	++	++	–
Persistent	++	+	+	±
Symptom severity				
Mild	++	+	++	±
Severe	++	–	+	–

Notes: Seidman MD, Gurgel RK, Lin SY, et al; Guideline Otolaryngology Development Group. AAO-HNSF. Clinical practice guideline: allergic rhinitis. *Otolaryngol Head Neck Surg*. 2015;152(1 Suppl):S1–S43. Copyright © 2015. Adapted with Permission from SAGE Publications, Inc.[1] For each medication class, the plus symbols indicate its relative effectiveness (+++, most effective) against the various symptoms and its relative role in treatment (++, highest recommendation) based on symptom frequency and severity.

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some patients with intermittent symptoms.[1] Local INCS side effects include nasal irritation/dryness, epistaxis, taste and smell disturbances, and, rarely, nasal septal perforation, which can be minimized with proper technique during administration.[1,18–24] Headache is a common systemic side effect with INCSs; cataracts and/or glaucoma may occur but are rare.[1,19–23] In general, the second-generation INCSs, including mometasone furoate, fluticasone propionate, ciclesonide, and fluticasone furoate, have very low (<1%) systemic bioavailability, which is postulated to limit the risk for clinically significant systemic side effects.[24] Evidence regarding potential effects on growth suppression with INCSs continues to evolve with the availability of data from more robust study designs, which has underscored the need for a thorough evaluation of safety and the balance of benefits and risks when used in children.[25] Additional long-term studies are needed to determine the effect of INCSs during childhood on final adult height.[25]

Oral antihistamines are effective against histamine-mediated allergic rhinitis symptoms, including rhinorrhea, sneezing, nasal itching, and ocular symptoms.[2] Agents in this class are less effective against nasal congestion (Table 1). Oral antihistamines can be categorized into first-generation and second-generation agents. Use of the former (eg, diphenhydramine and chlorpheniramine) may be limited by sedation and mucosal dryness reflecting their ability to cross the blood–brain barrier and their anticholinergic effects, whereas second-generation agents (eg, fexofenadine, cetirizine, levocetirizine, loratadine, and desloratadine) exhibit selectivity for the H_1 receptor and minimal penetration across the blood–brain barrier.[1] Although not as effective as the INCSs, an oral antihistamine may be sufficient for patients with mild-to-moderate symptoms of allergic rhinitis or intermittent symptoms, offering the advantages of lower cost and a more rapid onset of action.[1] When indicated, each set of guidelines recommends a second-generation oral antihistamine in order to minimize the risk of sedation, performance impairment, and anticholinergic side effects.[1,17,18]

Intranasal antihistamines are more effective than oral antihistamines for nasal congestion and at least as effective in controlling other allergic rhinitis symptoms[1,18] but, again, not as effective as INCSs[1,18] in providing relief of nasal symptoms.[18,26] Agents in this class may benefit patients who fail oral antihistamines or cannot otherwise tolerate them. Advantages include a rapid onset of action within 15–30 minutes and targeted delivery of higher antihistamine dosages to nasal tissues while minimizing systemic side effects. The most common side effects are bitter taste, epistaxis, headache, somnolence, and nasal burning.[1]

Allergic rhinitis sufferers may experience ocular symptoms in addition to nasal congestion, as previously described. Ocular antihistamines and mast cell stabilizers are also available and may be used to alleviate concomitant symptoms of allergic conjunctivitis.[27]

The orally administered leukotriene antagonist (LTRA), montelukast, is the only US Food and Drug Administration-approved LTRA for the treatment of allergic rhinitis in adults and children; other available LTRAs have not been adequately studied in allergic rhinitis.[1] Limitations compared with oral antihistamines include higher cost, prescription-only availability, and potential for side effects including headache and rare neuropsychiatric events.[1,11] Although LTRAs are not recommended as primary therapy for allergic rhinitis, they may be beneficial for patents with both allergic rhinitis and asthma.[1,18]

Combination therapy may be suggested when monotherapy does not adequately control allergic rhinitis symptoms.[1] For patients already on an INCS, an intranasal antihistamine can be added, or, alternatively, treatment can be switched to a combination product containing both medications, such as azelastine/fluticasone propionate. Similarly, temporary addition of an intranasal decongestant (eg, oxymetazoline), with use limited to 3–5 days in order to avoid rebound nasal congestion, represents another therapeutic approach.[1,17] An oral antihistamine or LTRA should not be added to an INCS, as clinical trials have shown no benefit from these combinations. Options for patients already using an oral antihistamine include switching to an INCS or an intranasal antihistamine, or adding an oral decongestant. The latter approach, however, is associated with an increased risk of side effects. Similarly, an INCS should not be added to an oral antihistamine because large clinical trials have not demonstrated a benefit of an INCS with an oral antihistamine compared to an INCS alone.[1] For patients inadequately controlled by an intranasal antihistamine, the addition of an INCS (a combination product currently available only via prescription) is the only recommended option based on current evidence.

Allergen-specific immunotherapy should be considered for patients who respond inadequately to available pharmacologic options.[1,18] This approach aims to increase immune tolerance through repetitive, controlled exposure to the offending allergen(s) and may be considered for patients with persistent symptoms despite pharmacological therapy.[1]

Barriers to the use of INCS

Although current practice guidelines recognize that INCSs are the most effective agents available for the treatment of allergic rhinitis, a large online survey found that only 30% of patients in the USA with severe nasal congestion were

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actually receiving INCS therapy.[7] However, it is important to note that the survey was conducted in 2004, prior to the OTC availability of INCSs in the USA (the first of which became available in 2014) and before the most recent treatment guidelines emphasizing their use. At present, multiple INCS products (including several OTC options) that are comparable in efficacy are available (Table 2).[19–23,28–33] Nevertheless, patient perceptions, beliefs, and preferences as well as formulation characteristics and cost may be barriers to the initiation of and adherence to INCS therapy. Fear of side effects has been reported more often for INCSs than for oral antihistamines (48 vs 33%) among patients with allergic rhinitis. The most common specific fears with INCSs were habituation (ie, loss of response due to frequent use), damage to mucous membranes, and side effects on other organs, whereas the most common fear with oral antihistamines was fatigue.[34] In another survey, few respondents thought that INCSs were unsafe but most did not use their INCSs because they feared a loss of effectiveness if used too much.[35]

Sensory attributes of an intranasal spray – including scent/odor, immediate taste, aftertaste, throat rundown, nose runout, burning, and feel of the spray in the nose and throat – may influence patient adherence. Among individuals with allergic rhinitis in US allergy/immunology clinics,[36] patient preference for an INCS decreased with increasing intensity of each of these sensory attributes, with the most important attributes identified as aftertaste, immediate taste, throat rundown, and nose runout. Notably, 77% of the respondents indicated that they would be able to adhere to a daily regimen for 3 months if the INCS had the lowest level of each sensory attribute, compared to only 4% of respondents if given an INCS with moderate levels of the sensory attributes ($P<0.01$).[36] Moreover, patients indicated a willingness to pay more to avoid sensory attributes of INCS sprays, particularly aftertaste, throat rundown, and nose runout.[37]

Numerous studies of sensory perceptions and patient preferences for INCS products (Table 3)[38–46] have illustrated that patients can detect significant differences in sensory attributes and specify preference for one product over another. High preference was shown across studies for several products, including fluticasone furoate, mometasone furoate, and triamcinolone acetonide aqueous spray. Fluticasone furoate was preferred over mometasone furoate after treatment for 2 weeks,[38] and triamcinolone acetonide was preferred over mometasone furoate in several single-dose studies.[42,45,46] Notably, fluticasone furoate was preferred over fluticasone propionate in terms of having less odor/scent, causing less nose runout/throat rundown, and having less aftertaste.[39] Thus, even though a patient may not have liked the sensory attributes of fluticasone propionate in the past, this should not preclude the use of fluticasone furoate given the differences in sensory perception. Finally, practice guidelines recognize that patient preference should be considered when recommending an INCS product.[1,2]

Role of the pharmacist in the self-management of allergic rhinitis symptoms

Many patients with allergic rhinitis attempt to self-manage their symptoms, and some will seek advice from pharmacists about choosing appropriate OTC products. Pharmacists should ask the patient to describe his/her symptoms in order to confirm that the patient is suffering from allergic rhinitis, including whether a medical diagnosis of hay fever, allergic rhinitis, or asthma has previously been identified. Establishing the history of symptoms (including the onset and temporal pattern, frequency, severity, and duration) and evaluating the exacerbating or mitigating factors and the therapies that have already been tried are critical factors in helping the patient select the proper treatment for their symptoms.[47] In addition, inquiring about other medical comorbidities or the use of other medications may help to identify which treatment approach is optimal for a particular patient.[2] The presence of two or more of the following symptoms lasting >1 hour on most days is suggestive of allergic rhinitis: watery anterior rhinorrhea, sneezing, nasal congestion, and nasal itching; conjunctivitis may also be present. The presence of symptoms in only one nostril, nasal congestion without other symptoms, mucopurulent rhinorrhea, postnasal drip with thick mucus and/or no anterior rhinorrhea, pain, recurrent epistaxis, and loss of the sense of smell are not usually associated with allergic rhinitis. Such patients should be referred to a physician for further evaluation and treatment.[1,2,18]

The American Pharmacists Association algorithm for the self-care of allergic rhinitis (Figure 2)[48] outlines a suggested approach to treatment recommendations for individuals with symptoms consistent with intermittent or persistent allergic rhinitis who are appropriate candidates for self-treatment. Exclusions for self-treatment include the presence of symptoms of nonallergic rhinitis; otitis media, sinusitis, bronchitis, or other infection; undiagnosed or uncontrolled asthma (eg, wheezing and shortness of breath); chronic obstructive pulmonary disease; or other lower respiratory disorder, and those who have experienced severe or unacceptable side effects of treatment. For children younger than 12 years and pregnant or lactating women, self-treatment is acceptable only if a

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Table 2 Intranasal corticosteroids approved for allergic rhinitis[a]

Drug	Brand name (maker)	Indications	Formulation	Dose per spray (μg)	Dosing/administration	OTC status
Beclomethasone dipropionate	Beconase AQ[19] (GSK)	Rx: seasonal and perennial allergic rhinitis and nonallergic rhinitis	Aqueous suspension in metered-dose manual-pump spray; pH 5.0–6.8; contains BC (0.02%) and phenylethyl alcohol (0.25%)	42	Age ≥12 years: 1–2 sprays per nostril BID Age ≥6–12 years: 1 spray per nostril BID (up to 2 sprays per nostril BID if not responding)	Rx only
	QNASL dry nasal aerosol[28] (TEVA)	Rx: seasonal and perennial allergic rhinitis	Pressurized nonaqueous solution in metered-dose aerosol device with HFA propellant; contains ethanol, no BC	80 and 40	Age ≥12 years: 2 × 80 μg sprays per nostril QD Age ≥4–11 years: 1 × 40 μg spray per nostril QD	Rx only
Budesonide	Rhinocort Aqua[21] (AstraZeneca); Rhinocort Allergy[29] (McNeil Consumer)	Rx: seasonal and perennial allergic rhinitis OTC: temporary relief of hay fever or other upper respiratory allergy symptoms: nasal congestion, runny nose, sneezing, and itchy nose	Aqueous suspension in metered-dose manual-pump spray; pH 4.5; contains no BC or alcohol	32	Age ≥12 years: up to 4 sprays per nostril QD Age 6–<12 years: up to 2 sprays per nostril QD	OTC
Ciclesonide	Omnaris nasal spray[30] (Sunovion)	Rx: nasal symptoms associated with seasonal allergic rhinitis in adults and children aged ≥6 years and perennial allergic rhinitis in adults and adolescents aged ≥12 years	Hypotonic aqueous suspension in metered-dose, manual pump spray; pH 4.5; contains no BC or alcohol	50	Age ≥6 years: 2 sprays per nostril QD	Rx only
	Zetonna nasal aerosol[31] (Sunovion)	Rx: Seasonal and perennial allergic rhinitis	Pressurized, metered-dose aerosol canister and actuator containing a solution of ciclesonide in HFA propellant and ethanol; no BC	37	Age ≥12 years: 1 spray per nostril QD	Rx only
Flunisolide	Various	Rx: nasal treatment of the symptoms of seasonal or perennial rhinitis	Solution in spray bottle; pH 5.3; contains BC; no alcohol	25	Age 6–14 years: 1 spray per nostril TID or 2 sprays per nostril BID Age >14 years: 2 sprays per nostril BID/TID	Rx only
Fluticasone furoate	Veramyst[32] (GSK) Flonase Sensimist Allergy Relief[52] (GSK Consumer Healthcare)	Rx: seasonal and perennial allergic rhinitis OTC: temporary relief of symptoms due to hay fever or other upper respiratory allergies in children aged ≥2 years and adults: nasal congestion; runny nose; sneezing; itchy nose; and itchy, watery eyes for ages ≥12 years	Aqueous suspension in metering, atomizing spray pump; pH 6; contains BC (0.015%); no alcohol	27.5	Age 2–11 years: 1 spray per nostril QD Age ≥12 years: 2 sprays per nostril QD	OTC[b]
Fluticasone propionate	Flixonase[22] (GSK) Flonase Allergy Relief[50] (GSK Consumer Healthcare)	Rx: seasonal and perennial allergic rhinitis, nasal polyps OTC: temporary relief of hay fever or other upper respiratory allergy symptoms: nasal congestion; runny nose; sneezing; itchy nose; itchy, watery eyes	Aqueous suspension in metering, atomizing spray pump; pH 5-7; contains BC (0.02%) and phenylethyl alcohol (0.25%)	50	Age 4–11 years: 1 spray per nostril QD Age ≥12 years: 2 sprays per nostril QD	OTC
Mometasone furoate	Nasonex[20] (Merck Sharp & Dohme)	Rx: seasonal and perennial allergic rhinitis, nasal polyps, prophylaxis of seasonal allergic rhinitis OTC: treatment of allergic rhinitis (scope of indication varies by country)	Aqueous suspension in metered-dose, manual pump spray; pH 4.3–4.9; contains BC; no alcohol	50	Age 2–11 years: 1 spray per nostril QD Age ≥12 years: 2 sprays per nostril QD	OTC (outside the USA)
Triamcinolone acetonide	Nasacort[23] (Sanofi) Nasacort Allergy 24HR[33] (Chattem, Inc., a Sanofi Company)	Rx: seasonal and perennial allergic rhinitis OTC: temporary relief of hay fever or other upper respiratory allergy symptoms: nasal congestion; runny nose; sneezing; itchy nose	Aqueous suspension in metered-dose pump spray; pH 4.5–6.0; contains BC; no alcohol	55	Age 2–5 years: 1 spray per nostril QD Age 6–11 years: 1 spray per nostril QD Age ≥12 years: 2 sprays per nostril QD/BID	OTC

Notes: [a]Indications, dosage, and prescription status may vary by country. [b]Approved by US Food and Drug Administration for OTC use as of August 2016; OTC product is anticipated to be available commercially in 2017.
Abbreviations: BC, benzalkonium chloride; BID, twice daily; HFA, hydrofluoroalkane; OTC, over-the-counter; QD, once daily; Rx, prescription; TID, three times daily.

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Table 3 Comparison of sensory attributes and patient preferences among INCS products

Study	Design	Patients	INCS products	Results
Yonezaki et al (2016)[38]	R, CO, MC	40 adults with SAR	FF vs MF, each for 2 weeks	FF preferred in terms of less bitter taste (P=0.01), throat rundown (P=0.033), nose runout (P=0.002); FF induced less nasal irritation (P=0.012), sneezing (P=0.017), rhinorrhea (P=0.007); overall preference: FF by 52.5%, MF by 22.5%, no difference by 25%
Meltzer et al (2010)[39]	R, DB, PC	360 adults with SAR	FF vs FP, each for 7 days	FF preferred by more patients in terms of scent/odor (58 vs 27%), less throat rundown/nose runout (59 vs 21%), gentleness of nasal mist (57 vs 26%), and less aftertaste (60 vs 18%) (all P<0.001)
Khanna and Shah (2005)[40]	R, CO	114 adults with AR	MF vs FP vs BDP vs BUD single dose on 1 day	FP had strongest odor (P<0.05); MF caused least irritation, had least aftertaste, and had highest sensation of moistness (all P<0.05); overall preference: MF > BUD > FP ≥ BDP
Meltzer et al (2005)[41]	R, DB, CO, MC	100 adults with symptomatic AR	MF vs FP single dose on 1 day	MF preferred in terms of less scent/odor, immediate taste, aftertaste (all P<0.002) and nose runout (P<0.05); overall preference: MF by 53% and FP by 34%
Stokes et al (2004)[42]	R, DB, CO (pooled from two studies)	215 adults with symptomatic AR	TAA vs MF vs FP single dose on 1 day	TAA preferred in terms of least odor (P<0.001), least moistness in nose/throat (P<0.05), least aftertaste (P<0.05), and greatest overall liking (P<0.05); overall preference: TAA by 50%, FP by 25%, and MF by 25%
Shah et al (2003)[43]	R, SB, CO, MC (two studies)	371 adults with AR experiencing mild-to-moderate symptoms	BUD vs FP single dose on 1 day	BUD preferred in terms of less scent, taste, aftertaste, nose runoff/throat rundown in study 1 and in terms of less scent and taste in study 2 (all P<0.001); overall preference: BUD by 59% and FP by 41% in study 1 (P=0.021); BUD by 53.6% and FP by 46.4% in study 2 (not significant)
Lumry et al (2003)[44]	R, SB, PG, MC	152 adults with SAR	TAA vs BDP for 3 weeks	TAA preferred in terms of better taste and odor overall and at weeks 2 and 3 (P≤0.05)
Bunnag et al (2003)[45]	R, DB, CO, MC	364 adults with AR	TAA vs FP vs MF single dose on 1 day	TAA preferred in terms of having lowest odor (P<0.0001), greatest comfort (P<0.05), and highest overall liking (P=0.0008); overall preference: TAA by 38.2%, FP by 36.8%, and MF by 24.9%
Bachert and El-Akkad (2002)[46]	R, DB, CO, MC	95 adults with AR	TAA vs FP vs MF single dose on 1 day	TAA preferred in terms of having lowest odor (P≤0.001), best taste (P≤0.01 TAA vs MF), and least aftertaste (P≤0.01), and causing least irritation (P≤0.05), but it caused the most nose runoff/throat rundown (P≤0.05); overall preference: TAA by 54.7%, MF by 24.2%, and FP by 21.1%

Abbreviations: AR, allergic rhinitis; BDP, beclomethasone dipropionate; BUD, budesonide; CO, crossover; DB, double-blind; FF, fluticasone furoate; FP, fluticasone propionate; INCS, intranasal corticosteroids; MC, multicenter, MF, mometasone furoate; PC, placebo-controlled; PG, parallel group; R, randomized; SAR, seasonal allergic rhinitis; SB, single-blind; TAA, triamcinolone acetonide.

physician has diagnosed allergic rhinitis and approved the use of OTC treatment.

When possible, pharmacists should advise the use of nonpharmacological measures for the avoidance of known allergens and environmental control.[1,18,47] Patients should be encouraged to avoid or minimize exposure to allergens that trigger allergic rhinitis symptoms. For severe seasonal symptoms caused by outdoor allergens, such as pollen, measures might include staying inside air-conditioned buildings with windows and doors closed, particularly on sunny, windy days with low humidity.[18] For indoor allergens (dust mites and mold), multifaceted environmental controls (eg, reduction of moisture, use of protective bed covers, washing of bedding and soft toys, use of acaricides, and removal of carpets) may be beneficial where practicable. For pet dander, measures include the avoidance or removal of animal allergens from the household.[18]

Pharmacists are often the primary source to provide medication counseling to patients with allergic rhinitis.[49] To guide treatment recommendations, it is important to discuss patient preferences and goals of treatment, which may include providing symptom relief, preventing symptom recurrence, and improving or restoring the quality of life and ability to function.[18] Based on this information along with the symptom profile, including frequency and severity, the pharmacist should provide counseling regarding available OTC treatment options.

Several OTC INCS products are available, differing in terms of formulation, number of sprays required per dose, age range approved for use, and, to some extent, dosing

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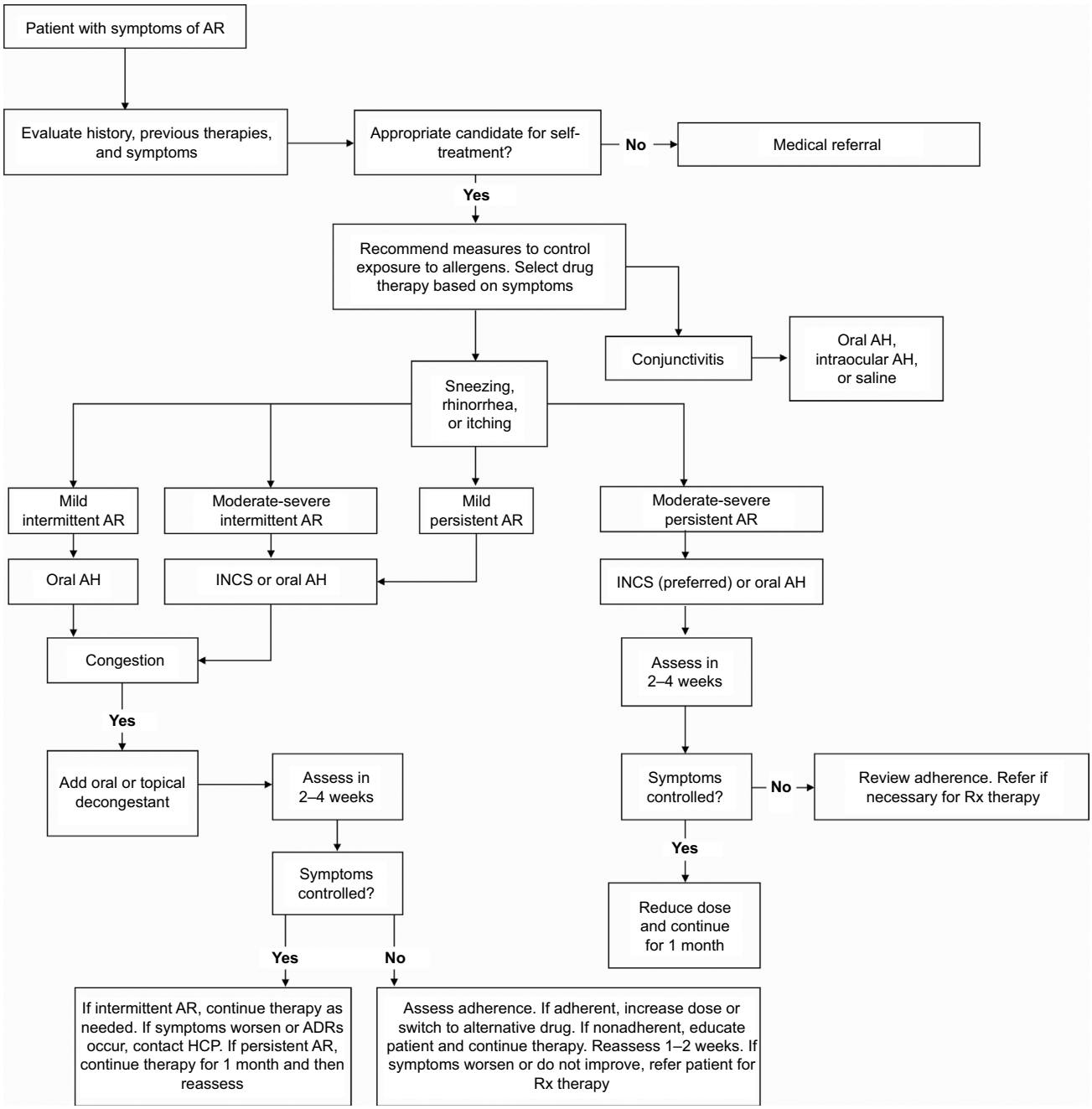

Figure 2 Treatment recommendations for the self-care of allergic rhinitis.
Note: Posted with permission of the American Pharmacists Association from Krinsky DL, Ferreri SP, Hemstreet BA, et al. *Handbook of Nonprescription Drugs*. 18th ed. Washington, DC: American Pharmacists Association; 2015:174.[48]
Abbreviations: ADR, adverse drug reactions; AH, antihistamine; AR, allergic rhinitis; HCP, healthcare provider; INCS, intranasal corticosteroid; Rx, prescription.

frequency (Table 2). The characteristics of nasal spray formulations may influence patient preferences. Additives and preservatives can irritate nasal mucosal membranes, thereby influencing comfort of use, and can confer an unpleasant odor or taste. Formulations containing phenylethyl alcohol may have a strong odor[43] and cause a feeling of dryness after administration.[46] Formulations containing benzalkonium chloride as a preservative may have a bitter taste.[43] Formulations delivering smaller volumes may have less nose runout and throat rundown.

The pharmacist should clarify any potential misperceptions about INCSs that could be a barrier to their appropriate use when indicated and, after recommending a product, provide counseling regarding its proper use, treatment expectations, and instructions on when to consult a physician. With INCSs, some benefit may be achieved within 3–4 hours,[18] but these medications provide optimal symptom control when used continually for several days. Moreover, patients should be instructed to continue using the INCS to maintain symptom control and not simply resort to a use-as-needed

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General patient instructions for use of intranasal corticosteroid sprays

- Wash your hands before and after use.
- Gently clear nasal passages before administering the product.
- Prime the pump and prepare the bottle per the product directions.
- Gently insert the nozzle tip into one nostril (see drawing). Aim tip of product away from nasal septum (toward the back or side of the nose) to avoid accidental damage to the septum.
- Depress the other side of the nose with finger to close off the nostril not receiving the medication.
- While breathing in or sniffing gently, activate the spray according to the product directions and breathe out through the mouth.
- Repeat steps for the other nostril.
- Once the recommended number of sprays has been delivered to each nostril, the spray nozzle should be wiped with a clean and dry tissue and the cap replaced.

Figure 3 General instructions for the use of intranasal corticosteroid sprays.
Note: Posted with permission of the American Pharmacists Association from Krinsky DL, Ferreri SP, Hemstreet BA, et al. *Handbook of Nonprescription Drugs*. 18th ed. Washington, DC: American Pharmacists Association; 2015;187.[48]

approach. For seasonal sufferers, treatment should be maintained during the allergy season.

Counseling regarding proper medication self-administration, including priming the device and using proper spray technique, in turn, may improve adherence and facilitate better symptom control.[29,33,50] Although the directions differ somewhat for each product, in general, the recommended technique involves several steps to ensure proper administration (Figure 3).[48,51] Each OTC product includes specific step-by-step directions for dosing and administration; these should be reviewed with the patient.[29,33,50]

A number of prescription-to-OTC switches have occurred in the INCS category over the past several years, providing the general public with greater access to these products. Additional prescription-to-OTC switches may occur in the future, which would expand access to options that allow easier or more preferable drug dosage delivery and self-administration. For example, fluticasone furoate, which was recently approved for OTC treatment of seasonal and perennial allergic rhinitis in the USA,[52] is a scent- and alcohol-free formulation with minimal throat/nose drip provided in a nasal device that contains a side-actuated mist-release button with a cap that prevents the button from being pressed accidentally.[32] The OTC product (FLONASE® Sensimist™ Allergy Relief; GlaxoSmithKline Consumer Healthcare, Research Triangle Park, NC, USA) is expected to become available in the USA in 2017.[52]

Conclusion

Given the prevalence of allergic rhinitis and symptom burden associated with the condition, many patients will opt for self-management and seek advice from pharmacists. Pharmacists, in turn, must keep abreast of the latest clinical evidence related to the prevention and treatment of symptoms, including product efficacy and nuances in product formulation.

In addition to suggesting strategies for avoiding exposure to allergens and irritants, pharmacists are often asked for recommendations regarding which OTC products to use. Current practice guidelines recognize that INCSs are the most effective medications for controlling allergic rhinitis symptoms including nasal congestion,[1,2,18] which is consistently identified in national surveys as the most bothersome symptom.[4,5] By asking a series of questions, pharmacists can establish if the patient has allergic rhinitis and identify the temporal pattern, frequency, and severity of symptoms.[2] This information is important for identifying when an INCS is the best choice; examples include patients with persistent and moderate-to-severe symptoms, patients suffering from predominantly nasal congestion, or patients whose symptoms disrupt their sleep or interfere with their work or school activities. To implement successful INCS use, pharmacists may have to address and help resolve several barriers, including concerns about safety or loss of response due to frequent use, and recognize that patient preferences and formulation characteristics are important considerations. All available INCS products have comparable efficacy and safety;[1] however, differences in sensory attributes, formulation characteristics, or spray bottle features may be important factors that influence patient adherence to therapy.

By educating and collaborating with patients to set appropriate treatment goals, pharmacists can play an important role in improving symptom control and quality of life in patients with allergic rhinitis.

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