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CLINICAL FOCUS: CLINICAL IMMUNOLOGY & INFECTIOUS DISEASES
REVIEW



Management of allergic rhinitis in the era of effective over-the-counter treatments

Warner W. Carr^a and Barbara P. Yawn^b

^aPhysician, Allergy & Asthma Associates of Southern California, A Medical Group, Southern California Research, Mission Viejo, CA, USA;

^bDepartment of Family and Community Health, University of Minnesota, Minneapolis, MN, USA

ABSTRACT

Allergic rhinitis (AR) may be regarded as a trivial issue unworthy of the doctor's time, and with the availability of many different over-the-counter (OTC) treatments, up to two thirds of patients self-manage AR before seeking medical care. Yet, AR can have a significant impact on health-related quality of life and is associated with a greater detriment to work productivity than other chronic diseases such as diabetes and hypertension. For many patients, the impact on quality of life is greater than suggested by reported symptoms and should also be a focus of treatment.

Although many patients can effectively manage AR symptoms independently, a significant percentage will need direction from a physician to obtain optimal results. The availability of several different classes of treatment – including decongestants, sedating and non-sedating antihistamines, and more recently intranasal corticosteroids (INS) – has increased the complexity of self-management, leaving patients confused about the best approach to treatment. Treatment guidelines universally classify INS as the most effective medical agents available for use in the OTC and primary care settings. Many patients are unaware that INS are available OTC and that they are more effective than other therapies. Patients may have negative perceptions about the safety of INS and may have experienced unpleasant taste, scent, and feel with nasal sprays. Unless a patient volunteers the information, healthcare professionals (HCPs) may be unaware that the patient has significant AR and is using one or more OTC AR therapies. To address this gap in communication, HCPs must be proactive in identifying, assessing, and advising patients with AR, including best strategies to assess allergen trigger symptoms, which treatments are appropriate, and when and how to use them. Proper use of delivery devices is especially important. This article reviews the primary care management of AR in the context of the availability of effective OTC medicines.

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decongestant;
immunotherapy; intranasal
corticosteroid; leukotriene
receptor antagonist

Case study

MC is a 32-year-old teacher who presented to her primary care physician in September 2015 complaining of seasonal allergy symptoms. She said that she had been experiencing persistent sneezing, runny nose, and nasal congestion. The patient also stated that she had been increasingly tired at work due to her symptoms keeping her awake at night. Examination revealed turbinate hypertrophy, clear nasal discharge, and allergic shiners (dark circles under the eye caused by blood pooling as a result of nasal and sinus congestion). The patient stated that she had never been diagnosed with asthma, and examination revealed no evidence of the condition. Further history indicated that she has no pets and that symptoms are worse in the spring and fall, consistent with seasonal allergic rhinitis (AR). Her prior medical history was unremarkable, and she had no other concurrent medical conditions. At the time of her visit, she was not currently using any over-the-counter (OTC) or prescription medications. She said that she had tried diphenhydramine to manage her allergies, but it made her drowsy at work. She had also tried loratadine and cetirizine,

but they had little effect on her congestion. She was now seeking more effective therapy for her allergies.

Given that her symptoms were clearly having a substantial impact on her daily activities and work performance, it was recommended that she try an OTC intranasal corticosteroid (INS). She was instructed to take two sprays of the INS into each nostril daily, with the spray aimed to the side of the nose, away from the middle of the nose (septum), and toward the outer portion of the eye or top of the ear on that side, as shown in Figure 1 [1]. At follow-up a month later, she stated that her symptoms had improved noticeably and she was sleeping and functioning much better. Based on her response to the OTC INS, it was determined that a prescription medication and further evaluation were not warranted at that time.

1. Introduction

Allergic rhinitis (AR), sometimes regarded as a trivial or nuisance medical condition, is increasingly recognized by healthcare professionals (HCPs) as clinically important due to its

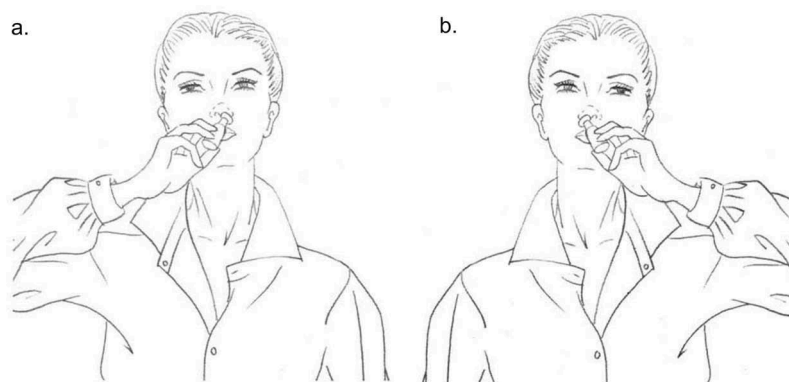


Figure 1. Technique for application of INS spray, using (a) the right hand to spray the left nostril and (b) the left hand to spray the right nostril [1]. With the head in a neutral upright position, after gently blowing the nose to remove any thick or excessive mucus, the spray nozzle should be inserted into the nostril. The spray should be directed laterally or to the side, away from the middle of the nose (septum), and toward the outer portion of the eye or the top of the ear on that side. While activating the device as recommended by the manufacturer, gently breathe in or sniff during spraying, then breathe out through the nose. Benninger MS, et al. *Otolaryngol Head Neck Surg.* 130(1) pp 5–24, copyright © 2004 by (SAGE Publications). Reprinted by Permission of SAGE Publications, Inc [1]. INS, intranasal corticosteroid.

established relationship with asthma, adverse impact on quality of life (QOL), and other comorbid conditions [2]. AR imposes a substantial burden of illness for some individuals, with AR symptoms exerting a negative toll on daily functioning and QOL [3]. In fact, AR is associated with a greater deterioration in work productivity than other common chronic conditions such as diabetes and hypertension [4]. Despite broad recognition of the clinical significance of AR, its management often begins outside of the healthcare setting, with patients initiating therapy with OTC medications [5,6].

Many patients with AR are able to accurately identify their symptoms as due to AR and are comfortable managing the disease with little or no guidance from HCPs. In fact, up to 85% of individuals try one or more of the very effective OTC products before consulting an HCP [5,6]. While the majority of patients are able to effectively self-medicate, many need guidance from a physician to ensure adequate control.

Prior to 2013 when INS first became available OTC in the USA, the most frequently used OTC medications for allergies were oral antihistamines and oral decongestants, which were used by 88% and 10% of patients with nasal and ocular allergies, respectively [6]. Given the widespread and long-standing use of antihistamines and decongestants, many AR sufferers may not be aware that INS are also now available as OTC drugs and that they are regarded as more effective than oral antihistamines for management of AR [7–10]. In addition, some patients may be concerned about potential side effects of intranasal products or have negative perceptions, such as the rebound effect, which some patients confuse with addiction; however, this effect is limited to topical decongestants [11,12].

Consultation with an HCP generally occurs only after OTC treatment fails, and is often secondary to an office visit for another reason. Other patients may delay seeking treatment from an HCP until their symptoms become intolerable [13]. Although some patients consult a pharmacist, primary care is typically the setting of the initial HCP contact for AR [5]. Primary care physicians and other clinicians play an important role in confirming the AR diagnosis and ensuring an

appropriate treatment plan. As such, it is important for HCPs to be aware of the range of OTC treatments available to patients, what additional allergy assessments and treatments can be recommended or prescribed, and what further therapies an allergy specialist may be able to prescribe for management of uncontrolled AR.

2. Epidemiology and impact of allergic rhinitis

AR, which may be either seasonal or perennial, affects 30–60 million people in the USA annually, including 10–30% of adults and up to 40% of children [10]. As such, AR ranks among the most common primary diagnoses for outpatient office visits in the USA [14,15] and is the leading chronic medical condition in children [16]. Overall, the estimated direct medical cost of treating AR in the USA in 2005 was \$11.2 billion and rising [17–19].

AR is frequently associated with a number of other conditions, including asthma, sinusitis, allergic conjunctivitis, otitis media, nasal polyps, and dental malocclusion [20,21]. Although 19–38% of individuals with AR have concomitant asthma and 80% of asthmatics have concomitant AR, many have AR alone [2,22] and are appropriate candidates to self-manage their AR with OTC medications or receive care from an HCP. Beyond the genetic factors that increase the propensity toward AR and comorbid conditions, the primary risk factors for AR are associated with the environment and the patient's lifestyle, some of which are amenable to modification. Environmental triggers for seasonal AR are most commonly pollens from trees, grasses, and weeds, while perennial AR triggers include common allergens such as cats, dogs, and dust mites [20].

Most patients who consult with an HCP have moderate-to-severe AR, and about half report experiencing persistent AR symptoms more than 4 days per week and for more than 4 consecutive weeks [22]. The most common symptoms associated with AR are nasal congestion, sneezing, runny nose, itchy nose, and post-nasal drip [22]. According to the Allergies in America survey, patients rated nasal congestion

as the most frequent and bothersome symptom [23]. Notably, the intensity and impact of these symptoms on health-related QOL (HRQOL) from problems such as sleep disturbance may actually be more important to patients than the symptoms themselves, and should dictate the level of treatment [24].

AR has been shown to have a significant impact on HRQOL [25–28], with almost 1 in 5 adults and adolescents over 12 years of age reporting that symptoms can have a moderate or severe impact on daily activities and approximately half stating that AR symptoms caused sleep disturbances, daytime somnolence, and fatigue [22]. In a number of surveys, up to 74% of adults and adolescents experienced a negative impact on sleep and daily activities, including work and school attendance/performance, because of allergy symptoms [22,29,30]. One study found rates of absenteeism of 4.1% and presenteeism (i.e. going to work or school but not performing up to usual standards) of 23.5% for patients with AR [4]. The predominant symptom of AR, nasal congestion, is associated with particularly negative effects on sleep, QOL, productivity, and the ability to perform daily activities [31,32]. AR also has a profound negative impact on younger children aged 4–17 years, including sleep disruptions, limitations in (or avoidance of) daily activities, interference with school performance, and decreased activity and performance when allergy symptoms are at their worst [33,34]. HCPs should work to assess the impact of symptoms on each individual patient and their family, as well as the symptoms themselves, to guide the level of treatment [24]. The severity of symptoms and impact of AR on productivity and activities in older children and adults can be assessed in primary care with simple tools such as a visual analog scale for evaluation of rhinitis symptoms [35,36] and the Work Productivity and Activity Impairment: Allergy Specific (WPAI-AS) questionnaire [37,38]. Copies of these tools can be found in the supplementary materials (Supplemental Figures 1 and 2).

3. Unmet needs in primary care

Despite the prevalence of AR and the accessibility of OTC drugs, AR remains uncontrolled for many patients. One possible reason for this is that patients may underestimate the value of pursuing adequate treatment, dismissing AR as a trivial medical issue not worthy of bothering their physician or other clinician with, resulting in delayed treatment [13,39]. Even after medical intervention, patient engagement may not be optimal. In a survey of AR sufferers, more than half did not know whether or not their prescription medication included a steroid, and almost all considered themselves more educated about the disease than they actually were [40]. Another study of AR patients recruited by their primary care physicians found that 26% were untreated despite symptoms, and a further 13.5% were treated inadequately [39]. Notably, patients with asthma and allergic conjunctivitis were at lower risk of being undertreated or untreated, as were those with seasonal AR alone. Poor adherence to treatment has been documented in studies of medications for nasal allergies, which is likely another contributor to the observed rate of inadequate control. Lack of efficacy, side effects, treatment duration, poor understanding of treatment objectives, improper spray

technique, and cost are all factors associated with lower adherence to treatment [23,39,41,42]. Taken together, these data highlight the need for better patient education [40].

Many patients have reported being unsatisfied with their current AR treatment, and almost half indicate confusion regarding the number of different options available [40]. Patients have also expressed dissatisfaction with the amount of time HCPs spend talking to them about the issue [40]. HCPs should take every opportunity to ask all patients about the presence of any allergy symptoms, noting signs such as rubbing of the nose during examinations and allergic shiners. It is important to also query patients and families about their experience and outcomes with any treatments, including OTC therapy, they may have tried, in order to ensure that this important issue is being addressed.

4. Guidelines for management of allergic rhinitis

A number of guidelines for the management of AR have been developed by various organizations [7–10,43,44]. The most widely used include the practice parameters for diagnosis and management of rhinitis developed by the American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma and Immunology joint task force [10] and the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines [8,9]. These guidelines recommend that an important part of diagnosing and addressing AR is to take a complete patient history, including determining which OTC medications are used and how frequently [7,43]. Symptoms of clear rhinorrhea, nasal congestion, pale discoloration of the nasal mucosa, and itchy and watery eyes are consistent with a diagnosis of AR [7,43].

Obtaining a patient history can help to identify potential environmental triggers, allowing for physicians to advise patients to take steps to avoid known allergens or follow environmental controls, including removal of pets at a minimum from sleeping rooms, and the use of air filtration systems (high-efficiency particulate air filters or HEPA filters), bed covers, and other environmental control measures [7,8,10]. There is, however, only limited evidence that allergen avoidance is effective, and this requires confirmation with an allergy test before being recommended [7,43,45]. A careful history may also assist in determining if the patient's triggers are only seasonal or if there is a perennial component as well. Allergy testing may be required to identify the specific causative allergens in certain cases, especially if the patient does not respond to initial therapy.

The various guidelines recommend use of non-sedating antihistamines for treatment of mild AR, and INS for moderate or severe disease [7,8,43,44]. Some variability exists among these guidelines, however, with some also recommending INS and oral antileukotrienes for mild, persistent AR [44], and others recommending combination therapy for moderate or severe symptoms [7].

5. Treatment options for allergic rhinitis

The most common medications used to treat AR include oral and intranasal antihistamines, oral decongestants, INS, and oral

leukotriene receptor antagonists. The indication (seasonal vs. perennial), step in therapy, and symptom coverage of these and other potentially appropriate treatment options are summarized in Table 1 [10,46,47]. A number of studies have indicated that INS are more effective than oral and intranasal antihistamines for treatment of AR [48–52]. Although immunotherapy is regarded as the most effective treatment for AR, based on the available data, major guidelines consistently rank INS as the most effective class of medication for treatment of AR symptoms in the primary care and OTC settings [7–10].

A comprehensive review and meta-analysis by Benninger et al. found that INS produced the greatest improvements in nasal symptoms in patients with seasonal AR, and concluded that this class is the most effective for treatment in this setting [53]. In this analysis, the total nasal symptom score for patients with seasonal AR using an INS improved by 43.7% (range 24.5–50%; $p < 0.001$), compared with an approximate 20% improvement for oral and intranasal antihistamines and oral leukotriene receptor antagonists and 15% for placebo. When Benninger et al. looked at individual symptom scores, INS provided greater improvements in intranasal congestion ($p = 0.007$) and sneezing ($p = 0.02$) compared with other modes of treatment, and at least equal improvements in nasal itching and rhinorrhea [53]. Because they are overall the most effective agents for treatment of symptoms, INS are appropriate for mild, moderate, and severe disease, as well as seasonal and perennial AR. Intranasal antihistamines are regarded as more effective than oral antihistamines, which are recommended only for mild-to-moderate AR [7,43].

Oral leukotriene receptor antagonists are thought to be the least effective class [7]. In a comparative study of montelukast or levocetirizine versus placebo in ragweed-sensitized patients, levocetirizine improved major symptom scores by a significantly greater degree and more rapidly than montelukast and placebo; any improvements seen with montelukast were not significantly different from placebo [54]. In another study in a similar population, fluticasone propionate showed significant improvements compared with montelukast in daytime and nighttime total nasal symptom scores ($p < 0.001$), as well as all daytime ($p < 0.001$) and nighttime individual nasal symptom scores ($p \leq 0.02$) [55].

6. Over-the-counter options for allergic symptoms

Possible reasons why AR is often undertreated include the reluctance of patients to see a doctor for what they regard as a minor issue, and concerns regarding cost, lack of efficacy, or side effects of available treatments, which may preclude or delay initiating treatment, or lead to poor adherence to treatment [13,41,56]. In a European study, half to two-thirds of patients delayed seeing a medical professional about their allergies until symptoms became intolerable [13]. In another study, 63.9% of patients did not consult a doctor about allergy symptoms because they felt their symptoms were not serious enough to bother a doctor, including 83.0% with mild AR, 46.5% with moderate AR, and 19.4% with severe AR [56]. However, with a majority of American consumers being increasingly willing to self-medicate, the availability of OTC medications may help to reduce these barriers to accessing effective treatments [57].

OTC options for treatment of AR include decongestants, oral antihistamines, intranasal mast cell-stabilizer cromolyn sodium, and, more recently, INS. The dosing and indications of individual OTC AR treatments are summarized in Table 2 [58–67]. In addition to the products listed in Table 2, first-generation antihistamines such as diphenhydramine and chlorpheniramine, as well as decongestants (pseudoephedrine, phenylephrine, and oxymetazoline), are available as OTC drugs in various formulations and combinations. Since access to pseudoephedrine became controlled by moving it behind the counter, use of phenylephrine has increased. However, phenylephrine has been shown to be no better than placebo in treatment of AR [68]. Although generally regarded as less effective than INS, oral decongestants and antihistamines have a faster onset of action [7,10] and can provide relief in ≤ 1 h [66,69]. Given that many patients take OTC medications only on an as-needed basis [70], these may be an adequate option for some individuals. Patients should be counseled to take INS regularly to ensure maximal benefit.

In addition to pharmacologic medications, a number of studies have investigated the role of saline irrigation. A meta-analysis of these studies found this to be an inexpensive and effective alternative or adjunct to other treatments [71].

Table 1. Allergic rhinitis management options [10,46,47].

Treatment	Place in therapy	Symptom relief
Second-generation antihistamines (oral)	First-line treatment of SAR and PAR; can be used long term	Rhinorrhea, sneezing, itchy and watery eyes, itchy throat
Decongestants (intranasal, oral)	Short-term congestion management of SAR; use may be limited by safety/tolerability profile	Nasal congestion ^a
Intranasal steroids (intranasal)	First-line treatment of SAR and PAR; can be used long term	Rhinorrhea ^a , sneezing ^a , nasal itching ^a , nasal congestion ^{a,b}
Leukotriene receptor antagonists	Appropriate for treatment of symptoms of SAR and PAR; may be considered for patients with comorbid asthma ^c	Rhinorrhea, sneezing, nasal itching, nasal congestion
Mast-cell stabilizers (intranasal)	Appropriate in prevention and treatment of some symptoms of SAR and PAR	Rhinorrhea, sneezing, nasal itching, nasal congestion
Nasal saline solution (intranasal)	Adjunctive care of AR symptoms	Provides some relief of dry/irritated nasal passages

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AR, allergic rhinitis; PAR, perennial allergic rhinitis; SAR, seasonal allergic rhinitis.

^aHighest efficacy.

^bIntranasal fluticasone propionate (Flonase® Allergy Relief) and fluticasone furoate (Flonase® Sensimist™ Allergy Relief) also treat itchy, watery eyes.

^cIndicated for both asthma and AR.

Table 2. Available over-the-counter medications for management of allergic rhinitis.

Drug	Indication	Adult dose	Child dose
Intranasal steroids			
Triamcinolone acetonide [58]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: nasal congestion, runny nose, sneezing, itchy nose	• 2 sprays into each nostril once daily in the morning • 55 µg/spray	• Children ≥6 years of age • 1 spray into each nostril once daily in the morning
Fluticasone propionate [59]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: nasal congestion, runny nose, sneezing, itchy nose, itchy/watery eyes	• 2 sprays into each nostril once daily for 1 week • 1–2 sprays into each nostril once daily from week 2 to month 6 • 50 µg/spray	• Children ≥4 years of age • 1 spray in each nostril once daily
Budesonide [60]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: nasal congestion, runny nose, sneezing, itchy nose	• 2 sprays into each nostril once daily • Reduce to 1 spray in each nostril/day once symptoms improve • 32 µg/spray	• Children ≥6 years of age • 1 spray in each nostril once daily • Increase to 2 sprays in each nostril/day if symptoms do not improve; reduce to 1 spray/day again once symptoms improve
Fluticasone furoate [61]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: nasal congestion, runny nose, sneezing, itchy nose, itchy/watery eyes	• 2 sprays into each nostril once daily • Reducing to 1 spray in each nostril/day once symptoms improve may be effective in maintaining control • 27.5 µg/spray	• Children ≥2 years of age • 1 spray in each nostril once daily • 27.5 µg/spray
Oral antihistamines (second generation)			
Loratadine [62]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, itchy/watery eyes, itchy nose or throat	• 10-mg tablet once daily	• Children ≥6 years of age • 10-mg tablet once daily
Cetirizine [63]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, itchy/watery eyes, itchy nose or throat	• 10-mg tablet once daily	• Children ≥6 years of age • 10-mg tablet once daily
Fexofenadine [64]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, itchy/watery eyes, itchy nose or throat	• 180-mg tablet once daily	• Children ≥12 years of age • 180-mg tablet once daily
Oral antihistamine/decongestant			
Loratadine 10 mg/ pseudoephedrine 240 mg [65]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, itchy/watery eyes, itchy nose or throat; temporarily relieves nasal congestion due to the common cold, hay fever, or other respiratory allergies; reduces swelling of nasal passages; temporarily relieves sinus congestion and pressure; temporarily restores freer breathing through the nose	• 1 tablet every 24 h	• Children ≥12 years of age • 1 tablet every 24 h
Cetirizine 5 mg/ pseudoephedrine 120 mg [66]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, itchy/watery eyes, itchy nose or throat; reduces swelling of nasal passages; temporarily relieves sinus congestion and pressure; temporarily restores freer breathing through the nose	• 1 tablet every 12 h	• Children ≥12 years of age • 1 tablet every 24 h
Fexofenadine 180 mg/ pseudoephedrine 240 mg [64]	Temporarily relieves the following symptoms of hay fever or other upper respiratory allergies: runny nose, sneezing, nasal congestion, itchy/watery eyes, itchy nose or throat; reduces swelling of nasal passages; temporarily relieves sinus congestion and pressure	• 1 tablet every 24 h	• Children ≥12 years of age • 1 tablet every 12 h
Mast cell stabilizer			
Cromolyn sodium [67]	Temporarily relieves the following symptoms of hay fever and other nasal allergies: runny/itchy nose, sneezing, allergic stuffy nose	• 1 spray into each nostril up to 6 times/day • 5.2 mg/spray	• Children ≥2 years of age • 1 spray into each nostril up to 6 times/day

Some studies also demonstrated a reduction in medicine consumption [71]. Although not addressed by all AR management guidelines, some have indicated that nasal irrigation may be appropriate for mild intermittent AR [45], or as second-line therapy [43].

7. Over-the-counter intranasal steroids

INS were approved for OTC use in the USA in 2013, making them the most recent class of AR treatment to become available without a prescription [72]. Fluticasone propionate,

budesonide, triamcinolone acetonide, and, most recently, fluticasone furoate have been approved for OTC use, and more agents are likely to switch from prescription to OTC in coming years [61,73–74]. Given their status as relative newcomers to the scene, many patients may not be aware of the availability of OTC INS. As a result, it may be necessary for HCPs to recommend and advise patients on their use. Since the different available products have different delivery systems, it will be important for HCPs to also ensure that patients are using the correct device technique.

As discussed, negative perceptions about their sensory attributes (e.g. taste, scent, feel), perceived ease of use of the device, and concern about the potential side effects of INS are also likely to affect the use of these drugs. It has been shown that as many of 48% of AR patients are concerned about potential side effects of INS, including habituation, damage to mucous membranes, influence on other organs, and weakened resistance to infection [75]. Despite these concerns, INS have a good safety record overall, with more than 20 years of clinical experience [76,77]. For those products that are now available OTC, additional measures, such as shorter duration of use, are in place to minimize risk and promote safe use in the self-care environment compared with prescription use. Reviews of safety data from INS studies up to 1 year in duration revealed no evidence of damaging local effects to the nasal mucosa, increased risk of ocular events such as glaucoma or cataract, or hypothalamic-pituitary-adrenal (HPA) axis suppression [76,77]. However, it is important to note that glaucoma and cataract have been reported in patients taking long-term INS and they are described as potential adverse effects in the prescribing information for the class [58,59,78]. Likewise, some studies have found evidence of growth effects with INS even in the absence of HPA axis changes [79–81], which could indicate a subtle systemic corticosteroid effect below the threshold of commonly used assessments of HPA axis suppression. Moreover, results of the most recent studies designed per updated US Food and Drug Administration (FDA) guidance using more sophisticated methods to measure growth have indicated that regular use of INS (12 months of daily use at recommended doses with triamcinolone [82] and at higher doses with fluticasone furoate [81], a newer-generation INS with low systemic bioavailability) in children with perennial AR may result in small but statistically significant reductions in growth velocity [80,81]. The long-term clinical implications of these findings remain unclear at this time, as long-term studies evaluating the effect of INS – if any – on final adult height have not been conducted using these more rigorous FDA-recommended design elements. These potential effects should be considered when assessing the benefits and risks for pediatric patients [82]. For children who do require INS, the lowest effective dose that relieves symptoms should be used, and routine monitoring of growth is recommended [78].

Patient preferences for the sensory attributes of INS can affect their long-term use and adherence, despite being preferred by HCPs [83–85]. Patients' dislike of the scent, immediate taste, aftertaste, throat rundown, nose runout, and/or feel of the spray in the nose and throat can impact their willingness to use and pay for intranasal products [84]. Rather, some patients may prefer oral formulations over intranasal therapies [11].

It is important to note, however, that patients have preferences for certain features of the different INS, and different formulations and delivery methods have been developed in an effort to minimize certain negative attributes and potentially improve medication adherence [86]. In a comparative study of triamcinolone acetonide, fluticasone propionate, and mometasone furoate, patients preferred triamcinolone acetonide because it had significantly less odor ($p < 0.01$), less taste and aftertaste ($p < 0.01$), less dryness of the nose and throat ($p < 0.05$), and greater overall preference (all $p < 0.05$) compared with the other two INS [87]. In similar studies, fluticasone furoate was preferred to mometasone furoate and fluticasone propionate, demonstrating significantly less odor/scent, less nose runout/throat rundown, and less aftertaste [88,89]. It should be noted that cost may also have had an impact on patient preference in these studies [89]. Education is therefore required to allay the concerns and perceptions regarding the sensory attributes of different INS, and to help patients choose a product that is acceptable to them to a degree that they are willing to take it.

The cost of OTC INS can be a barrier to use. In some cases, copays and negotiated rates for the prescription product are less than for OTC INS. However, other costs associated with obtaining a prescription, such as copays to see a doctor and time missed from work, should also be considered. Recently, however, generic formulations of some OTC INS have become available, increasing competition and driving prices lower, leading to greater accessibility.

8. Role of the primary care provider in management of allergic rhinitis

For patients who have inadequate control or seek medical care for treatment of their symptoms, it is the role of the HCP to collect a clinical history, including asking the patient about any history of asthma or the presence of asthma symptoms [9], and to select further assessment and therapy as appropriate. An exam is also necessary to exclude non-allergy-related conditions such as upper respiratory tract infection, rule out other more serious conditions including cerebrospinal fluid rhinorrhea, sinonasal tumors, or chronic rhinosinusitis, as well as review concomitant medications (e.g. antihypertensives that may cause nasal symptoms) [7]. Patients with 'alarming symptoms' should be referred to an otolaryngologist; these symptoms include bloody discharge, pain, nasal blockage, nosebleeds, crusting, and nasal deformity due to a perforated septum [43]. Although allergy testing is required to confirm a diagnosis, this is not usually necessary for the majority of patients seen in the primary care setting [43]. This is an opportune time to address patient goals, discuss issues of and barriers to adherence, and educate patients on correct INS therapy technique (see Figure 1). A number of treatment options, both OTC and prescription, are available to manage these patients.

In addition to the OTC INS, a number of INS are still available by prescription only (Table 3), including beclomethasone dipropionate [90], flunisolide, ciclesonide, and mometasone furoate [42]. Fluticasone propionate is also available by

Table 3. Prescription-only agents for treatment of allergic rhinitis.

Intranasal steroids	Oral antihistamines	Intranasal antihistamines	Leukotriene receptor antagonists	Immunotherapy
Beclomethasone dipropionate ^a	Levocetirizine	Olopatadine	Montelukast	Sublingual immunotherapy
Ciclesonide	Desloratadine	Azelastine		Subcutaneous immunotherapy
Flunisolide		Azelastine plus fluticasone ^b		
Mometasone furoate				

^aBeclomethasone is also available as an aerosol [90].

^bCombination with steroid.

prescription in combination with the antihistamine azelastine [91]. In 3 randomized controlled clinical trials, this combination was shown to be significantly more effective than either azelastine or fluticasone propionate alone, indicating that the combination is the most effective treatment for seasonal AR [92]. The safety profile of fluticasone propionate/azelastine was similar to the single-agent comparators in these trials [92].

At initial follow-up, the nasal mucosa should be examined to ensure that the nasal spray has not caused any damage [93]. For those with a good response, treatment can be continued or tapered. There are a number of additional steps that can be taken for patients who do not have an adequate response from available OTC and prescription medications, which may require referral to an allergy specialist. These steps include skin prick tests, specific IgE tests, and other blood tests to characterize the nature of the allergic condition. Patients who are intolerant of medications may also require referral to a specialist [43]. For those who have no response, it is necessary to exclude other potential causes of symptoms; this may require referral to a specialist, as discussed above. Other groups that should be referred to a specialist include children with asthma and suspected IgE-mediated food allergy who are at increased risk of fatal food reactions, children in whom there is diagnostic uncertainty or who need specialist investigations or care, and those with suspected occupational rhinitis or asthma [43].

Immunotherapy is often considered the domain of the allergy specialist. This treatment modality, which is available in subcutaneous and sublingual forms, can be offered to patients who have an inadequate response to other pharmacologic therapies [7]. Importantly, immunotherapy is the only treatment modality that has been shown to alter the natural history of the disease, potentially preventing the development of asthma and new allergic sensitivities [7]. While subcutaneous immunotherapy is generally regarded as more effective, it does require injections generally in an office setting. Sublingual immunotherapy is generally safer, with no reported deaths and a lower reported rate of systemic adverse effects. However, sublingual therapy is FDA approved only for a limited number of allergens at this time [7].

9. Conclusions

Successful self-management of AR requires patients to be fully educated regarding available treatment options, proper use of nasal spray devices, need for prevention-based therapy, and allergen avoidance. While the majority of patients are able to self-medicate, some will need guidance from a physician to ensure optimal results. Education may be required to ensure that patients with moderate-to-severe AR symptoms

understand that INS are believed to be the most effective option and are now available OTC. HCPs must be aware of their patients' AR condition, what measures they are taking to manage it, educate them on the availability and proper use of INS, determine when to intervene and treat with prescription medications, and, if necessary, refer to a specialist.

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Declaration of interest

W Carr is a consultant for Boehringer Ingelheim, Genentech, Mylan, and Teva, and a speaker for Alcon, AstraZeneca, Boehringer Ingelheim, Meda, and Teva. B Yawn is a consultant for ThermoFischer for developing guidelines for use of ImmunoCap in patients with asthma. The authors have no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript apart from those disclosed.

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For each rate, the following nasal symptoms by marking a mark on each line

	1	2	3	4	5
Grizzling					
Runny nose					
Congestion (stuffy nose)					
Itchy nose					
Postnasal drip					
Total nasal symptoms					

KEY TO SYMPTOMS

1 = None – to an occasional limited episode

2

3 = Mild – steady symptoms but easily tolerable

4

5 = Moderately bothersome – symptoms hard to tolerate, may interfere with daily living and/or sleep

6

7 = Unbearably severe – symptoms are so bad, person can't function

1	2	3	4	5	6	7
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Severely affected

KEY TO SYMPTOMS

1 = None -- no noticeable linked apnoea

2

3 = Mild -- Slight symptoms but easily tolerable

4

5 = Moderately bothersome -- Symptoms hard to tolerate, may interfere with daily living and/or sleep

6

7 = Unbearably severe -- Symptoms are so bad, person can't function