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Management of Respiratory Disorders and the Pharmacist's Role: Cough, Colds, and Sore Throats and Allergies (Including Eyes)

Jack Charles Collins, Rebekah Jane Moles, The University of Sydney School of Pharmacy, The University of Sydney, Camperdown, NSW, Australia

Background

Complaints relating to the upper airways are arguably one of the most common reasons for presentation to community pharmacies and other primary care providers, and contribute to a substantial loss of productivity and absence from work and school (Deckx et al., 2016; Sclar et al., 1996). The common cold, influenza, and allergies affect a large proportion of the population every year. Infections of the upper respiratory tract (URTI) show a seasonal trend, with cases peaking in the winter months. Allergies may be either seasonal or perennial depending on allergen sensitivity. It is necessary to elicit a sufficient history from patients to reach a differential diagnosis and manage symptoms appropriately (May and Dolen, 2017).

The respiratory tract serves the vital functions of bringing oxygen into the body for distribution throughout the body via the vascular system and expelling toxic carbon dioxide. The respiratory tract is divided into two sections: the upper and lower respiratory

tract. The upper airways, also referred to as the upper respiratory tract, consist of the nose, the nasal passages, the paranasal sinuses, the pharynx (throat), and the larynx (voice box). The lower airways consist of the trachea, bronchi, and lungs. The purpose of the upper airways is to take in, filter, and humidify the air, as well as expel carbon dioxide during respiration.

Common Cold, Influenza, Sore Throats, and Cough

The Common Cold

The common cold is the most common infection of the upper respiratory tract. The common cold is caused by over 200 virus strains, which are predominantly rhinoviruses, but also human coronaviruses and adenoviruses (Heikkinen and Järvinen, 2003; Mäkelä et al., 1998). A successful vaccine for the common cold has not yet been developed (Heikkinen and Järvinen, 2003). The common cold primarily affects the nose, pharynx, and sinuses, presenting symptoms often include a blocked or runny nose, fever, headaches, coughing, a sore throat, and sneezing. The common cold is transmitted through air droplets from infected individuals, which are then breathed in or, more commonly, enter the body through the eyes or mouth via the hands after coming into contact with a contaminated surface (Arroll and Kenealy, 2018). Unlike influenza, there is no antiviral therapy available to eradicate the causative virus (Jefferson and Tyrrell, 2001). The common cold is usually mild and self-limiting in nature with an average duration of 7–10 days (Arroll and Kenealy, 2018). The virus penetrates the tissues of the airways, resulting in local inflammation which presents as nasal discharge, sneezing, sore throat, and cough. Children experience between 5 and 7 colds each year, and adults have 2–4 infections each year. Infections may be more severe in the young or elderly or those who are immunocompromised (Arroll and Kenealy, 2018).

Influenza

Unlike the common cold, influenza, colloquially referred to as "the flu," is a more serious infection that tends to present with an abrupt onset of symptoms and may include systemic symptoms that are not restricted to the upper airways such as lethargy, diarrhea, nausea, and muscular aches. There are a number of strains of the influenza virus, and those known to infect humans are broadly divided into Type A, Type B, and Type C influenza. The influenza virus is transmitted similarly to the common cold, via air droplets from infected individuals (Radojicic, 2018). Individuals will often say that they are experiencing influenza when they are presenting with the common cold, it is important for pharmacists to differentiate between the two and educate patients on the difference. Although seasonal influenza infection may prove fatal to the young or elderly or those who are immunocompromised, epidemic strains such as the recent "swine flu" A/H1N1 strain also have the potential to kill otherwise fit and healthy individuals (Donaldson et al., 2009). Unlike the common cold, influenza can be treated with antiviral therapy such as the neuraminidase inhibitors oseltamivir and zanamivir, which stop the virus from replicating (Jefferson et al., 2006b). Seasonal attenuated live influenza vaccines are produced annually and are recommended as routine vaccinations for certain populations such as those who are immunocompromised and pregnant women (Radojicic, 2018). Pharmacists may be able to administer these vaccines in certain jurisdictions. It is worthy to note that these vaccines are produced using chicken eggs, and people with a known allergy to eggs should not receive the vaccine (Radojicic, 2018).

Pharmacological Management

Pharmacological management of upper respiratory tract infections in the community pharmacy consists primarily of symptomatic relief for the presenting symptoms. Choice of product should be based on patient preference, presenting symptoms, and clinical considerations such as contraindications and potential drug–drug interactions.

Cough

In patients presenting with an upper respiratory tract infection, coughs can be classified as productive (chesty) or nonproductive (dry). Nonproductive coughs may be the result of increased throat irritation due to sensitization from the virus, whereas productive cough results from increased mucosal secretions (Fuller and Jackson, 1990). Opioid derivatives are commonly sold as cough suppressants (antitussives) to suppress the cough reflux from the medulla in the brain stem to provide relief from frequent coughing. Common drugs include dextromethorphan, pholcodine, dihydrocodeine, and codeine. These may be sold as syrups, medicated lozenges, or as tablets or capsules. There is limited quality evidence for the benefit of these agents (Smith et al., 2014); however, consumer demand for these products may be high. Caution should be taken with preparations that may cause drowsiness such as codeine and dihydrocodeine. Dextromethorphan has been implicated in serotonin toxicity and should not be given to patients taking other drugs known to contribute to serotonin toxicity. Patients presenting with a nonproductive cough who are known to have asthma should not be supplied cough suppressants as these may contribute to respiratory depression or mask signs and symptoms of asthma flareups. Narcotic cough suppressants may be subject to misuse and abuse and this must be considered when supplying. In order to combat misuse and abuse, some formulations contain laxatives such as sorbitol to discourage consumption of supratherapeutic doses.

Productive coughs present as a cough where mucus is expectorated when coughing. Drugs licensed for the management of productive coughs fall into two categories: expectorants (protussives) and mucolytics. Like antitussives, these drugs come as syrups, medicated lozenges, and tablets or capsules. Expectorants, such as guaifenesin, stimulate the secretion of mucus in the airways and

reduce adhesion to improve the efficacy of coughing in clearing mucus. Mucolytics, for example, bromhexine, act to thin the mucus to facilitate easier clearance. Mucolytics and expectorants are sometimes sold in combination products to provide a synergistic effect in aiding cough management. Similar to antitussives, quality evidence for the clinical efficacy of expectorants and mucolytics is limited (Rubin, 2007; Smith et al., 2014).

In 2008, the United States Food and Drug Administration advised that cold and flu products should be avoided in children under 2 years of age due to the risk of serious adverse effects. Following this announcement, manufacturers in the United States changed the packaging of cold and flu products to state they should not be used in children under 4 years of age (Fashner et al., 2012; U. S. Food and Drug Administration, 2018). In response to this withdrawal from market, products containing complementary medicines such as ivy leaf (Hedera helix) have entered the market as a treatment option in children. Although individual studies suggest some efficacy of these preparations, quality data from randomized controlled trials are lacking (Holzinger and Chenot, 2011).

A nonmedicated alternative for cough syrups is demulcents such as simple syrup or honey. These ingredients are included in many cough syrups and are thought to be responsible for some of the reported symptom relief from the use of these syrups. It has been proposed that these may increase salivation and the secretion of pulmonary mucus (Eccles, 2002; Fuller and Jackson, 1990). These are safe to use in children and other populations where medicated syrups or lozenges are contraindicated.

Sore Throat

Sore throats manifest during an infection with the common cold or influenza due to an increase in inflammation in the throat. Sore throats may be either viral or bacterial in nature, with the vast majority (up to 90%) of cases caused by a virus. Sore throats attributed to a bacterial infection are most often caused by *Streptococcus pyogenes*, resulting in the term "strep throat." Pustules on the throat and tonsils do not necessarily indicate a bacterial infection, and the causative organism of a sore throat can only be determined through culturing a throat swab and considering associated symptoms. Sore throat lozenges, gargles, and sprays may contain a combination of antiinflammatory agents (such as flurbiprofen and benzydamine hydrochloride), antiseptic agents (such as dichlorobenzyl alcohol), and local anesthetics (such as lidocaine). Povidone-iodine throat gargles are also used with the notion that the use of these gargles reduces viral load in the throat (Satomura et al., 2005) as povidone–iodine has been shown to exert antibacterial, antifungal, and antiviral activity. In addition to throat-specific products, patients experiencing a sore throat may also benefit from simple analgesia such as acetaminophen (paracetamol) or ibuprofen. Regular dosing of simple analgesia has been shown to improve sore throat symptoms for patients (Schachtel et al., 1988).

Pain and Fever

Pain and fever are common symptoms during an infection with the common cold or influenza as the body's immune system responds to the invading virus. Simple analgesics such as acetaminophen (paracetamol) or ibuprofen also exert antipyretic effects and can be used to manage both pain and fever. Nonsteroidal antiinflammatory drugs (NSAIDs) have been shown to be effective in improving pain symptoms associated with the common cold (Kim et al., 2015). Aspirin should not be used in children as there is an increased risk of Reye's syndrome, and caution may be required with the use of the ibuprofen and other NSAIDs in patients with asthma, hypertension, electrolyte disturbances, and renal impairment. Fever in children is of particular concern to parents and may be managed overaggressively (Crocetti et al., 2001), the pharmacist has a role to educate parents on fever and reduce "fever phobia." Routine monitoring of body temperature is not necessary in uncomplicated cases of upper respiratory tract infections.

Nasal Congestion

As mucous production increases in the nose and sinus cavities, patients may experience a blocked nose, which results in difficulty breathing through the nose and discomfort. Patients may also describe thick, purulent discharge from the nose. Sympathomimetics are most commonly used for blocked noses and may be systemic (oral) or topical (as a nasal spray or drops). Sympathomimetics used in these preparations include pseudoephedrine, phenylephrine, and oxymetazoline. Although the quality of the evidence available is poor, decongestants may improve the subjective measures of symptoms. There is insufficient evidence to suggest whether systemic or topical agents provide superior relief (Deckx et al., 2016). Topical preparations of sympathomimetics should not be used for more than three-to-five consecutive days due to the risk of "rebound congestion" (rhinitis medicamentosa), this does not seem to occur with oral decongestants. Topical decongestants are preferred in pregnancy and in people with poorly controlled hypertension due to the low level of systemic exposure. Sympathomimetics (including topical) should be avoided in patients using monoamine oxidase inhibitors (e.g., moclobemide, phenelzine) due to the risk of hypertensive crisis. Systemic sympathomimetics can be used in children over 12 years of age, whereas most topical agents are appropriate from 6 years and above. In some jurisdictions, the sale of pseudoephedrine may be controlled or prohibited due to its use as a precursor for methamphetamine, leaving phenylephrine as the only remaining systemic option. The efficacy of oral phenylephrine compared to both placebo and oral pseudoephedrine has been questioned (Eccles, 2006). In addition to medicated nasal sprays, saline douches, drops, and sprays may also be used to clear mucus from a blocked nose. These saline preparations present a viable option in patients who cannot use sympathomimetics, and limited evidence suggests that saline irrigation may help relieve symptoms associated with an URTI, although this may not be clinically significant (King et al., 2015).

Rhinorrhea

Rhinorrhea may occur in an upper respiratory tract infection, or as a result of allergic rhinitis (allergies). In the case of rhinorrhea as a result of an upper respiratory tract infection, symptomatic management can be achieved with muscarinic antagonists, such as

atropine, in a nasal spray formulation (AlBalawi et al., 2013). Antihistamine (H_1 antagonist) monotherapy (both sedating and less sedating) appears to have a limited effect on rhinorrhea of an infectious origin or any symptoms of the common cold (Sutter et al., 2003). There is currently insufficient quality evidence for or against the use of intranasal corticosteroids to relieve the symptoms associated with a common cold (Hayward et al., 2015). For the management of allergic rhinorrhea, see the Section "Allergic Rhinitis."

Diarrhea and Vomiting

Gastrointestinal syptoms, such as diarrhea and vomiting, may present in some patients infected with influenza, in particular, pediatric patients (Dilantika et al., 2010). The mainstay of therapy for patients experiencing diarrhea and/or vomiting is ensuring adequate hydration. This can be achieved through the use of oral rehydration solutions, available in a number of brands and formulations worldwide. Oral rehydration solutions replace essential electrolytes lost from diarrhea and vomiting, glucose aids sodium absorption, and citrate counters acidosis that results from dehydration. The revised WHO reduced-osmalarity formula contains 75 mmol/L glucose and sodium, 20 mmol/L potassium, 65 mmol/L chloride, and 10 mmol/L citrate. Preparations may be sold as powders or effervescent tablets, which require reconstitution in clean water or ready-to-drink formulations. Patients should be discouraged from reconstituting oral rehydration solutions using, or rehydrating with, caffeinated drinks, soft drinks (soda), milk, or fruit juice. Opioid antidiarrheal agents such as loperamide and diphenoxylate (often supplied in combination with atropine to reduce abuse potential) are available in some jurisdictions and may be considered in adult patients in combination with rehydration therapy as a short-term management of symptoms for social convenience.

Antiviral Medicines

In some jurisdictions, antiviral medicines may be available from a pharmacist under certain circumstances without the prescription of a physician. There are two main classes of antiviral medicines that are available to manage infection with influenza: neuraminidase inhibitors and M2 ion channel inhibitors. Pharmacists should follow local guidelines on the supply of these medicines with regard to time since onset of symptoms and seasonal supply restrictions. Reviews of evidence state poor quality trials are a barrier to evaluating the role of these agents as prophylaxis and treatment in both seasonal and pandemic influenza (Jefferson et al., 2006b); however, one review stated that the use of M2 ion channel inhibitors in influenza infection should be discouraged (Jefferson et al., 2006a). Patient demand for antibiotics in upper respiratory tract infections may be high and this may be further driven by patient beliefs that antibiotics help them get better faster and prevent mores serious illness when they are experiencing a common cold (Gualano et al., 2014). Current evidence suggests that antibiotics have no benefit in the management of the common cold and place users at risk of adverse effects (Kenealy and Arroll, 2013). As such, patients should be reminded that antibiotics do not play a role in the management of the common cold or influenza as the causative organism is viral and not bacterial in nature.

Combination Products

Products containing various combinations of active ingredients are available on the market. Combinations may include ingredients to manage more than one symptom, such as analgesia and a decongestant. Combination products may be more convenient for patients, but may also contain subtherapeutic doses, irrational combinations (such as an antitussive and an expectorant), or may increase the risk of duplication of therapy. Evidence suggests that combination products are effective, convenient for patients, and not inherently more dangerous than single ingredient preparations (Eccles et al., 2014). Pharmacists should ensure patients are aware of the ingredients in combination products and that only ingredients to manage symptoms that are present are used.

Complementary Medicines

Complementary medicines may be often sought by consumers in upper respiratory tract infections to either reduce symptom severity or decrease the duration of symptoms. Preparations may commonly include ingredients such as vitamin C (ascorbic acid), zinc, garlic, propolis, Echinacea, ivy leaf (Hedera helix), and Andrographis paniculata (Fashner et al., 2012). Evidence supporting the use of these preparations is of mixed quality and individual patient circumstances, the potential for adverse effects and drug interactions, and patient expectations must be considered when complementary medicines are used for the common cold. Precaution must be taken in certain patient groups with some common complementary preparations, for example, the use of Echinacea in patients with asthma and Andrographis in pregnant women.

A Cochrane Review on the use of regular vitamin C in prevention and treatment of the common cold suggests that there is a mixed evidence regarding its efficacy for prevention but may have a role in those who undertake extreme exercise or are placed under cold stress. Some efficacy was demonstrated in reducing the duration of cold symptoms; however, current evidence is not sufficient to recommend routine supplementation (Hemilä and Chalker, 2013). Given the limited risk of adverse effects from using vitamin C and its low cost, some patients may wish to trial vitamin C supplementation. Similarly to vitamin C, there is some evidence to suggest that zinc, in particular zinc lozenges, may be beneficial in reducing the duration of cold symptoms if taken close to onset of symptoms (within 24 h), although the use of zinc in prophylaxis has not been established (Singh and Das, 2013).

Echinacea is another complementary medicine commonly marketed in tablets and lozenges with claims of benefits in preventing and treating the common cold. The most recent Cochrane Review to examine the effects of Echinacea was unable to establish a

recommendation based on the included trials, although it did acknowledge some preparations may have a benefit (although the clinical significance is questionable) (Karsch-Völk et al., 2014).

Nonpharmacological Management

Patients presenting with the common cold are often told to rest and drink plenty of fluids. Increasing fluid intake is recommended with the notion that dehydration may occur in episodes of upper respiratory tract infections and may also assist with reducing the viscosity of mucus. A review article was unable to establish the benefit of this advice in a primary care setting due to the majority of studies being observational in nature and in an in-patient setting (Guppy et al., 2011).

In addition to rest and increasing fluid intake, steam inhalation is also commonly recommended to patients with upper respiratory tract infections. It is believed that inhaling heated and humidified air helps to relieve congestion associated with the common cold, and it is also hypothesized by some that the increased temperature may limit the ability for rhinoviruses to replicate. Current evidence does not demonstrate significant benefits or harms from using steam inhalation, with the exception of some nasal irritation, lightheadedness, and worsening of congestive symptoms (Singh et al., 2017).

Topical preparations containing camphor, menthol, and eucalyptus oil (vapor rubs) are used by adults and children alike to alleviate common cold symptoms and are commonly applied to the chest area or above the upper lip. A recent randomized trial compared the effects of vapor rub, white petroleum jelly, and no treatment on parents' perceptions of their child's symptoms found that vapor rub was superior to petroleum jelly and no treatment, although irritation was reported in those using the vapor rub (Paul et al., 2010).

When to Refer

Pharmacists in the community setting should be able to reach a diagnosis of a common cold with relative ease. In the event a clear diagnosis cannot be reached, or a more serious infection is suspected, for example, influenza or involvement of the lower airways, then patients should be referred to a medical practitioner for further assessment.

Referral is also warranted in the event of prolonged or recurrent symptoms (especially cough), infections resulting in exacerbation of chronic respiratory conditions (asthma or chronic obstructive pulmonary disease), suspected dehydration, high-grade fever, neck stiffness, young infants, and the elderly. A cough that persists for greater than 3 weeks, or is concomitant with breathing difficulties, wheezing, pain on inspiration, or blood in the sputum or a persistent nocturnal cough (particularly in children) also requires referral.

Allergies

Allergic Rhinitis

Allergies affecting the nose (allergic rhinitis) are common among the population, and it is estimated that approximately 23% of the European population and up to 40% of the world's population experiences allergic rhinitis (Bauchau and Durham, 2004; May and Dolen, 2017). Allergic rhinitis is characterized by inflammation of the nasal passages, congestion, itching, sneezing, and rhinorrhea. These symptoms are a result of the inflammatory chemical mediators released (histamine, leukotrienes, and prostaglandins) due to the activation of immunoglobulin type E (IgE) on the surface of mast cells in the nasal passages in response to the presence of triggering allergens. This immune response tends to result in sneezing and bilateral watery rhinorrhea at first, which may progress to nasal congestion. In addition to nasal symptoms, ocular symptoms may also be present. After the initial activation of the immune response, extra inflammatory cells, such as eosinophils and T-lymphocytes, are attracted to the site resulting in chronic inflammation. The presence of these cells also results in "priming" of the immune response, resulting in increased sensitivity to the offending allergen as well as other allergens (Greiner, 2018).

Formal diagnosis is not common, and patients often (correctly) self-diagnose and self-manage their symptoms (May and Dolen, 2017). Allergic rhinitis can be classified several ways, including whether it is seasonal or perennial (intermittent or persistent), and mild or moderate–severe. As the name suggests, seasonal allergic rhinitis (hay fever) is triggered by seasonal allergens such as high pollen counts during spring. The presence of allergens implicated in seasonal rhinitis and the duration of the presence of allergens, can differ depending on both the time of year and geographical location. Unlike seasonal allergic rhinitis, those who experience perennial allergic rhinitis may experience symptoms at any time when exposed to allergens such as animal dander, dust mites, or mold spores. Although individuals experiencing allergic rhinitis symptoms have a high degree of presenteeism at work and school, productivity may be reduced when symptoms are present, quality of life is impacted, and the economic burden of allergic rhinitis is estimated to be billions of dollars each year in the United States alone (Crystal-Peters et al., 2000).

Individuals may present to the pharmacy with symptoms they attribute to the common cold, when they may in fact be experiencing allergies. To reach a differential diagnosis, the pharmacist should consider associated symptoms, timeline of symptoms, recent social history, and personal and familial medical history. Unlike an upper respiratory tract infection, fever, headache, cough, thick nasal discharge, and cough are not common with allergic rhinitis. Symptoms are bilateral in nature (i.e., both nostrils are affected), cases where symptoms are unilateral require referral for further investigation. If the symptoms suggest allergic rhinitis, it may be worthwhile taking a recent social history to identify if any possible triggers can be identified, for example, the patient may

have been exposed to a friend's cat or a moldy room. A personal and familial medical history may assist in confirmation of differential diagnosis as a personal of familial history of atopy such as allergic rhinitis, asthma, and/or atopic dermatitis (the "atopic triad") is often present. Up to 85% of patients with asthma may have comorbid allergic rhinitis. Poorly controlled allergic rhinitis in those who are comorbid with asthma results in poorer asthma control and increased asthma medication use.

Pharmacological Management

Management of symptoms is not specific to the offending allergen, and so identification of causative allergens is not necessary to commence therapy. Treatment should aim to reduce the severity of symptoms and their subsequent impact on quality of life, and in some cases reduce the likelihood of future flare ups or complications. There are a number of preparations for the management of allergic rhinitis symptoms available both over-the-counter and on prescription. Classes of medicines used in these preparations include H_1 antihistamines (oral and intranasal), intranasal corticosteroids (INCS), mast cell stabilizers, anticholinergic agents, decongestants (oral and intranasal), and intranasal leukotriene receptor antagonists. Choice of treatment should be based on frequency and severity of the symptoms and patient preference (including the cost of treatment). There are regional variations in guidelines for the management of allergic rhinitis and these must be considered when making therapeutic recommendations.

Intranasal Corticosteroids (INCS)

Intranasal corticosteroids are considered first-line therapy for patients with moderate to severe allergic rhinitis as they are the most effective in controlling symptoms resulting from the inflammatory response (May and Dolen, 2017). INCS exert their effects by decreasing the release of cytokines and other chemicals implicated in the inflammatory mechanism of allergic rhinitis from cells in the nasal mucosa by exerting immunosuppressive effects via glucocorticoid receptors. Many agents are available on the market including budesonide, fluticasone, and mometasone. Each has been shown to be effective in the management of allergic rhinitis, and so patient preference in terms of device, dosing frequency, and cost must be considered in order to choose between them. When supplying INCS, patients should be counseled on the correct use of the device to ensure therapy is successful. Patients should also be informed that some benefit should be seen within 24 h; however, it can take 7 days or more before the full benefit of treatment is seen. Some patients may wish to use an oral or topical antihistamine during initiation of INCS therapy due to their faster onset of effects, although Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines state there is limited evidence supporting the need for routine recommendation of an oral antihistamine in conjunction with INCS (Brożek et al., 2017). For convenience of those who use both INCS and an intranasal antihistamine, combination products are available. Much like the use of inhaled corticosteroids in asthma, adverse effects typically associated with systemic corticosteroids (e.g., adrenal suppression) are unlikely with the use of INCS, with adverse effects restricted to local irritation in the nose and throat.

Antihistamines (H_1)

H_1 antihistamines act by blocking the actions of the histamine-1 receptor, thereby reducing the inflammatory effects of the receptors. These antihistamines can be categorized as either sedating ("first generation") or less-sedating ("second generation"). Sedating antihistamines include promethazine and dexchlorpheniramine. Examples of oral less-sedating antihistamines are cetirizine (most likely to cause sedation), fexofenadine, and loratadine. Oral antihistamines may be preferred by some patients due to ease of use and cost and may be particularly useful in patients with both nasal and ocular symptoms due to their systemic effects. The systemic use of antihistamines, in particular sedating antihistamines, may result in undesirable adverse effects such as sedation, dry mouth, and constipation. There is no evidence to suggest that either sedating or less-sedating antihistamines are more efficacious.

In addition to oral preparations, intranasal antihistamines, such as azelastine, are also available (with or without an INCS). Intranasal antihistamines have been shown to be at least as effective as oral antihistamines and work faster, and may be preferred by some patients. Combination therapy of intranasal antihistamines and INCS may have some benefit over INCS alone; however, ARIA guidelines place emphasis on INCS as the preferred choice for therapy over antihistamines alone (Brożek et al., 2017).

Leukotriene Receptor Antagonists

Leukotriene receptor antagonists, such as monteleukast, block the effects of leukotrienes at leukotriene receptors, thus reducing nasal inflammation and subsequent nasal congestion. Leukotriene receptor antagonists are only available with a physician's prescription in many jurisdictions. These agents may be more expensive than antihistamines and there is limited evidence to suggest using them over antihistamines; however, some evidence suggests they may be useful in patients with comorbid asthma (Brożek et al., 2017).

Decongestants

Much like in the management of cold symptoms, decongestants (either topical or oral) may be used in allergic rhinitis to alleviate congestive symptoms. As these medicines have no effect on the inflammatory response and simply constrict blood vessels to reduce mucus production, they may not be useful in monotherapy for the management of allergic rhinitis. In some markets, oral decongestants may be sold in combination with antihistamines. Topical agents (e.g., oxymetazoline and phenylephrine) should not be used for extended periods due to the risk of rhinitis medicamentosa ("rebound congestion"). Adverse effects of systemic agents, such as pseudoephedrine, include tachycardia, insomnia, and reduced appetite. The sale of pseudoephedrine is restricted in some markets due to its use as a precursor to methamphetamine.

Anticholinergics

Much like decongestants, the anticholinergic ipratropium may be used in allergic rhinitis as it is in the common cold to alleviate rhinorrhea by reducing mucus secretion in the nasal passages. Again, this has no effect on the underlying inflammatory processes implicated in allergic rhinitis and may be of little use in monotherapy.

Mast Cell Stabilizers

Mast cell stabilizers, such as sodium cromoglycate, are available as intranasal preparations and reduce the secretion of inflammatory mediators such as histamine from mast cells in the nasal mucosa, thus reducing inflammation. Intranasal preparations are generally well-tolerated with adverse effects restricted to local irritation. Sodium cromoglycate is less efficacious than INCS and so may not be a preferred option.

Nonpharmacological Management

Where possible, people who experience allergic rhinitis should attempt to avoid allergens that are known to trigger their allergies (although causative allergens may not always be known). In the case of pollen, windows should be kept shut, outdoor time restricted (particularly if pollen counts are high), and clothes and bedding should be dried in a clothes dryer rather than on an outdoor washing line. Air filters either inside the home, or on air conditioning units may also prove useful. In the instance of allergic rhinitis from mold spores or dust mites, regular cleaning may help reduce exposure to these allergens. In some cases, physicians may decide that the patient is a candidate for skin prick allergy testing in an effort to determine any allergens that may be responsible for allergic rhinitis.

Saline irrigation (nasal douching, wash) is another practice that is sometimes recommended for patients with allergic rhinitis. This is achieved through using either isotonic (0.9% sodium chloride), hypotonic, or hypertonic saline preparations, which are administered into the nose and sinus cavities through either a spray or a squeeze bottle or similar device. The proposed mechanism of action for this procedure is the mechanical "flushing out" of mucus, allergens, and inflammatory mediators. A recent Cochrane Review found that there is limited quality evidence investigating the use of saline irrigation in allergic rhinitis, but that it may have a role in its management (Head et al., 2018). Given the favorable adverse effect profile (uncommonly local irritation, a feeling of ear fullness, and nose bleeds), and the low cost of treatment, saline irrigation may be considered in the management of allergic rhinitis.

Allergic Conjunctivitis

Allergic conjunctivitis (allergies affecting the conjunctiva of the eyes) is characterized by red, itchy eyes with a watery discharge. It is estimated that approximately 25% of the American population experiences allergic conjunctivitis in their lifetime. As with allergic rhinitis, allergic conjunctivitis is the result of an IgE-mediated allergy in response to the presence of allergens in the eye. Allergic conjunctivitis may be classified as seasonal (occurring at particular times during the year according to pollen counts, for example) or perennial (occurring at any time of the year in response to allergens such as dust mites, mold, and animal dander). Allergic conjunctivitis is highly comorbid with allergic rhinitis, and a personal or familial history of atopy (atopic dermatitis, asthma, and/or allergic rhinitis) should be confirmed during history-taking.

Table 1 outlines the distinguishing characteristics of the three primary classifications of conjunctivitis. Individuals with red eye symptoms may come to the community pharmacy seeking advice and treatment with what they may misdiagnose as infectious (bacterial) conjunctivitis. The pharmacist should be able to reach a differential diagnosis with relative ease with adequate history-taking. The presence of itch is a key differentiating factor for the diagnosis of allergic conjunctivitis, along with a personal or familial history of atopy. Watery discharge may be present both in viral conjunctivitis and dry eye syndrome, the presence of itch and consideration of associated symptoms will help in distinguishing allergic conjunctivitis from these conditions. The management of bacterial and viral conjunctivitis and dry eye syndrome is covered elsewhere in this book.

Table 1 Characteristics of different types of conjunctivitis

Characteristic	*Bacterial conjunctivitis*	*Viral conjunctivitis*	*Allergic conjunctivitis*
Discharge	Thick, purulent, yellow	Watery	Watery
Sensation	Gritty	Gritty	Itchy
Affected eyes	One at first, commonly spreads to other after initial infection of first eye	One at first, commonly spreads to other after initial infection of first eye	Both eyes
Associated symptoms	Nil	Recent signs and symptoms of an upper respiratory tract infection	May be associated with a personal or family history of allergic rhinitis or atopy (eczema, asthma)
Pathology	Infection with bacterial organism (commonly *Staphylococcus aureus*, *Streptococcus pneumoniae*)	Infection with a virus such as adenovirus (most common) or herpes simplex	Exposure to allergens such as animal dander, dust mites, pollen
Contagious	Highly	Highly (if adenovirus infection)	No

Management

The goals of management for conjunctivitis are to reduce the severity of symptoms and, in some cases, reduce the chance of reoccurrence. If eye drops are recommended as part of therapy, patients should be reminded of correct eyedrop administration technique, the importance of hygiene when using eye drops, and the appropriate discard date after opening dropper bottles (if not supplied as single dose units). Single-dose units (preservative-free preparations) may preferred in those with known sensitivity to commonly used preservatives such as benzalkonium chloride. Users of contact lenses should be advised to remove their lenses for administration of eye drops and replace them no earlier than 15 min after administration.

Antihistamines (H_1)

Both oral and topical antihistamines may be considered for use in patients presenting with allergic conjunctivitis. Oral antihistamines may be preferred in patients who are also experiencing nasal symptoms so both nasal and ocular symptoms can be managed. Oral antihistamines, in particular sedating antihistamines such as promethazine, may contribute to drying of the eyes, and hence less-sedating antihistamines should be recommended over these agents. Topical antihistamines include levocabastine, ketotifen, and pheniramine and are administered as eye drops. This local delivery results in a faster onset of action than oral agents. Adverse effects of topical antihistamines are limited to local irritation of the eye and bad taste. A recent review found that topical antihistamines are beneficial for controlling signs and symptoms in allergic conjunctivitis in short-term use, but was unable to make a recommendation between the available agents (Castillo et al., 2015).

Mast Cell Stabilizers

Mast cells stabilizers, including nedocromil sodium and sodium cromoglicate, are sold in eye drop preparations for the management of allergic conjunctivitis. Adverse effects are mild and limited to the eye and nose. A recent review found that mast cell stabilizers may be useful in controlling signs and symptoms of ocular allergy, but could not make a recommendation between the available agents (Castillo et al., 2015).

Ocular Decongestants

Ocular decongestants, for example, naphazoline, are available in single-ingredient eye drops and in combined preparations with topical antihistamines. Their role in allergic conjunctivitis is limited to superficial reduction in redness of the eye as they have no effect on the underlying pathology of the allergic response. As with topical agents used in nasal congestion, extended use of ocular decongestants may result in conjunctivitis medicamentosa (rebound hyperemia), as such patients should be advised to avoid using these preparations for extended periods of time. Due to the risk of systemic absorption with poor administration technique, caution should be taken when recommending ocular decongestants in patient groups who would be excluded from taking oral decongestants (e.g., uncontrolled hypertension, concomitant use of phenelzine) as well as those at risk of angle-closure glaucoma.

Lubricating Drops and Saline

Lubricating eye drops (artificial tears) or normal saline (0.9% sodium chloride) may be useful in conjunction with other therapies to relieve discomfort in the eye and dilute both allergens and inflammatory mediators released during the allergic response. Lubricating eye drops contain lubricants such as carmellose and may be used as often as required. If insufficient lubrication is achieved with an eye drop, a gel or ointment applied before sleep may be considered.

Nonpharmacological Management

Prevention of allergic conjunctivitis is achieved through allergen avoidance. Where the causative allergen(s) are known patients should take necessary measures to avoid or minimize exposure to these. Practical measures may include limiting time outdoors during high pollen counts, keeping windows and doors shut, using air filters in air conditioning units, and undertaking strict cleaning routines to reduce animal dander and dust mites. If a specific allergen cannot be identified a physician may refer patients for further investigation such as a skin prick test.

When to Refer

Community pharmacists should be able to reach a differential diagnosis when it comes to allergies and conditions that present similarly. In the event, a clear differential diagnosis cannot be reached, and patients should be referred to either a medical practitioner or optometrist for further assessment. In nasal allergies obstruction or rhinorrhea from just one nostril may indicate the presence of a foreign object in the nose and this should be particularly considered in pediatric patients. Rhinitis symptoms persisting despite over-the-counter treatment should be assessed for the possibility of prescription therapy by a medical practitioner, as should rhinitis that is associated with pain or suspected to be the result of medication use (either prolonged use of topical decongestants or other drugs known to cause rhinitis medicamentosa). Due to the association between poorly managed allergic rhinitis and worsening asthma, patients who are comorbid should have their asthma control assessed by the pharmacist (e.g., frequency of "reliever" use) and referred if worsening of asthma symptoms occurs.

In the case of ocular allergies, in addition to nonspecific referral points such as over-the-counter treatment failure, specific referral points include if there is a change in vision, a foreign body present, eye pain, or photophobia then the patient should be referred.

Some eye conditions (including allergic conditions) may result in scaling or other changes to the eye lids and surrounding tissue, these conditions are beyond the scope of community pharmacy practice and should also be reviewed by a medical practitioner.

The Role of the Pharmacist

Similar to many other common minor ailments, the community pharmacy (among other primary health-care providers) is often the first port of call for people experiencing allergies and signs and symptoms of upper respiratory tract infections. Pharmacists have a unique opportunity, due to their accessibility and expertise in medicines, to make a differential diagnosis, educate patients on the management of these common conditions, and provide appropriate therapy and advice.

Consumer expectations of over-the-counter products for management of the common cold and associated symptoms may be high, and pharmacists can educate patients on the expected effects of any over-the-counter medicines (including complementary and alternatives medicines) and comment on the limited evidence supporting their use. Patients should be reminded that there is no cure for the common cold or influenza and that antibiotics do not play a role in the management of infections of viral origin, this is of particular importance in jurisdictions where antibiotics are available over-the-counter without a physician's prescription and consumer demand may be high. As always, pharmacists should promote safe, judicious, and appropriate use of medicines. Consumers may have misconceptions about the common cold and influenza, including the need to seek medical attention for a common cold, in this case the pharmacist can dispel myths surrounding these common infections and act as a "triage" for those who truly need referral for medical assessment based on their presenting symptoms, thereby reducing burden on the health system for ailments that can be easily managed in the scope of the community pharmacy. Where local laws permit, pharmacists should also offer (and administer) vaccination against seasonal influenza or other infectious diseases to patients who are eligible.

Literature has demonstrated that people living with allergic rhinitis do not frequently speak to health-care professionals about their condition, and instead make a (correct) self-diagnosis and self-select over-the-counter treatments, which are readily available. Several reasons have been proposed for this, including the self-perception that allergic rhinitis is relatively less severe than asthma (given that the two are frequently comorbid). Given that consumers may not be discussing their allergic rhinitis with a physician, pharmacists can take the opportunity to engage with consumers requesting medicines such as antihistamines or intranasal corticosteroids to elicit a history and make a differential diagnosis. Pharmacists can assist these patients in optimizing therapy, explain the correct use of devices, and educate patients about allergic rhinitis, for example, emphasizing the benefit on comorbid asthma if allergic rhinitis is managed appropriately. Finally, pharmacists can identify patients who require referral to another health-care provider (medical practitioner, optometrist).

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Further Reading

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Relevant Websites

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- Centers for Disease Control and Prevention, *Cold and Flu*: https://www.cdc.gov/flu/about/qa/coldflu.htm
- Centers for Disease Control and Prevention, *Rhinoviruses*: https://www.cdc.gov/features/rhinoviruses/index.html
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