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FIGURE 1
The allergic salute, i.e. wiping the nose upwards with palms/fingers

What are the common triggers?

How should diagnosis be confirmed?

What are the management approaches?

ALLERGIC RHINITIS IS DEFINED CLINICALLY BY THE PRESENCE OF SYMPTOMS CAUSED by an IgE-mediated inflammation of the nasal mucosa on exposure to airborne allergens. Symptoms include sneezing, rhinorrhoea, nasal obstruction and pruritus.[1]

It is a multifactorial immunological condition with both genetic and environmental factors influencing disease development. Risk factors include: an atopic background; a family history of rhinitis; microbe exposure; allergen exposure and being a firstborn child. Common triggers include: house dust mite; animal dander; tree and grass pollen.

Allergic rhinitis typically develops in older children or early adulthood. According to the International Study of Asthma and Allergies in Childhood (ISAAC) survey, the average prevalence of allergic rhinitis symptoms among 6 to 7 year olds was 8.5% (10.1% in the UK) and among 13 to 14 year olds 14.6% (14.9% in the UK).[2] The prevalence of symptoms among adults in the UK was 26%.[3]

Allergic rhinitis can affect a child's physical health, reduce their quality of life, sleep and concentration, and impact on their school performance. Adolescents with seasonal allergic rhinitis perform significantly worse than their unaffected peers in their summer exams compared with their winter mock exams. This is more evident in children treated with sedating antihistamines.[4]

Common comorbidities include asthma; conjunctivitis; rhinosinusitis; middle ear effusion; eustachian dysfunction and adenoidal hypertrophy.

Children with allergic rhinitis are at increased risk of developing asthma. Around 85% of those with asthma have allergic rhinitis, which can complicate diagnosis and management and also raise the risk of hospitalisation for asthma exacerbations.[5] However, appropriate management of allergic rhinitis can improve asthma control.[6]

PATHOPHYSIOLOGY

Allergic rhinitis involves the production of the allergen specific antibody IgE which binds the specific epitopes of environmental allergens. When there is subsequent allergen exposure this causes mast cell degranulation leading to the acute symptoms of sneezing, runny nose and itching.

The late phase of the inflammatory response leads to eosinophilic infiltration and chronic symptoms of nasal obstruction and post nasal mucous discharge. »

SYMPTOMS

It is important to ask about asthma symptoms in patients with allergic rhinitis and vice versa. The Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines recommend algorithms to categorise patients' symptoms, see table 1, below.[7]

'It is important to ask about asthma symptoms in patients with allergic rhinitis and vice versa'

There are two distinct groups of allergic rhinitis, perennial and seasonal, see table 2, below. Perennial allergens include house dust mite, pet dander and mould spores, and seasonal allergens include grass and tree pollen. Some children may be affected by both groups of allergens and present with acute on chronic exacerbations during spring and summer.

Some patients with seasonal allergic rhinitis can develop pollen food syndrome (also known as oral allergy syndrome) due to the cross-reactivity of protein components in pollen with certain fruits and nuts. Patients typically have symptoms such as oral tingling and itching when they eat raw fruit but they are able to tolerate cooked/baked food.

The symptoms of allergic rhinitis may overlap with other conditions. Upper respiratory symptoms can be commonly associated with infective and obstructive causes. It is important to assess what form of treatment has been trialled and the resulting response.

Persistent mucopurulent discharge suggests infectious rhinosinusitis. Rhinitis symptoms which are not responsive to treatment or explained by infectious causes should be further investigated. Possible causes include hormonal, neurogenic or vasomotor dysfunction or may be secondary to triggers such as irritant exposure (e.g. smoking) or gastro-oesophageal reflux.

Table 1

Classification of allergic rhinitis according to ARIA guidelines[7]

Intermittent symptoms ● < 4 days a week **or** ● < 4 weeks	**Persistent symptoms** ● ≥ 4 days a week **and** ● ≥ 4 weeks
Mild symptoms ● Normal sleep ● Normal daily activities, sports and leisure ● Normal school performance ● No troublesome symptoms	**Moderate/severe symptoms** One or more of: ● Sleep disturbance ● Impairment of daily activities, sports and leisure ● Impaired school performance ● Troublesome symptoms

Table 2

Distinguishing seasonal from perennial aeroallergen exposure in allergic rhinitis (AR)

Type of AR	Aeroallergen	Time of year
Seasonal	Tree pollen	February–June
	Grass pollen	May-August
Perennial	Dust mite	All year
	Mould spores	All year
	Domestic animals	All year

DIAGNOSIS

Current guidelines state that the diagnosis of allergic rhinitis can usually be made on the basis of the patient's history and examination alone. Further details about symptoms, and the influence of seasonal variation, indoor or outdoor location and geographical location can also help inform diagnosis. Questions should be asked regarding timing and severity of symptoms, alleviating factors and other symptoms of atopy (e.g. asthma).

Software for mobile devices which patients can directly interact with is currently in development and may aid assessment, diagnosis and management of rhinitis in the future. Such software will also embed data on air pollution and pollen count.[8]

Examination and investigations

There are several signs that can support the diagnosis of allergic rhinitis:

- Allergic salute gesture, i.e. wiping the nose upwards with palms/fingers, see figure 1, p11
- A horizontal nasal crease formed by frequent rubbing of the nose
- Mouth breathing
- Allergic shiners – darker lower eyelids caused by chronic congestion
- Impaired nasal airflow – assessed by observing unequal misting over a cold metal spatula placed under the nostrils
- Normal or bulky and pale inferior or middle turbinates

Anterior rhinoscopy will enable examination of part of the endonasal cavity.

'Skin prick tests and serum immunoassay are not necessary in order to make a clinical diagnosis in primary care'

Skin prick tests (SPTs) and serum immunoassay are useful in identifying the allergen-specific IgE but are not necessary in a primary care setting to make a clinical diagnosis. SPTs are useful in the context of the clinical history to help determine if the symptoms of rhinitis are allergic or non-allergic and when to target pharmacotherapy.

Around 15% of people with positive SPT results do not develop symptoms on exposure to the tested allergen[9] but

SPTs have a high negative predictive value. Some studies in children have shown that there is a small group where SPT tests are negative despite a strong clinical history of seasonal allergic rhinitis. However, nasal provocation tests were positive for the suspected allergen in these cases.[10,11]

MANAGEMENT

A holistic approach is necessary to manage allergic rhinitis effectively. This involves education, preventative measures, accurate diagnosis, pharmacological treatment and, when appropriate, desensitisation which may require referral to an allergy centre.

The key to any management plan is patient education. The patient and parents should understand the importance of symptom control as adherence is pivotal. (For helpful online resources see the Useful information box, p15.)

Avoidance

Outdoor allergens such as pollens are difficult to avoid but avoidance of indoor allergens is easier. There are a number of strategies to reduce exposure, see table 3, right.

Pharmacotherapy

Overall, allergen avoidance is difficult and symptoms can persist despite best efforts. It is important to follow a stepwise approach to treatment to help alleviate symptoms and strict adherence is advised, see table 4, p14.

The following therapies are used in the management of allergic rhinitis:[12]

Antihistamines: Oral antihistamines are considered as first-line treatment. They can significantly improve quality of life and rhinitis symptom scores.[12]

Topical eye-drop preparations such as olopatadine can be helpful in persistent eye symptoms.

It is preferable to avoid first-generation antihistamines (e.g. chlorphenamine) because of their sedative effect.[13] Long-acting, non-sedating antihistamines such as cetirizine and loratadine should be considered in the first instance. Generally, it is important to emphasise that children should take their antihistamines regularly in order to prevent exacerbation of allergic rhinitis. However, in less persistent cases they can be taken as required.

Intranasal corticosteroids: These are effective and safe. Corticosteroids may take a couple of days to start having an effect, around two weeks to achieve optimum efficacy, and require appropriate administration and continuous use. To obtain maximum benefit in children with established seasonal symptoms it is important to commence intranasal steroids 2-4 weeks before the pollen season.

Beclomethasone intranasal spray is generally avoided as there is 44% systemic absorption and a potential impact on growth rate.[12]

No growth retardation has been observed in children treated with fluticasone or mometasone, both of which have 0.5% systemic absorption and they are generally well tolerated.[14] There are combination nasal sprays containing a steroid and an antihistamine (fluticasone propionate and azelastine hydrochloride), licensed for use in 12 year olds, which have improved response rates.[15] Nose bleeds are a common side effect of nasal spray administration and a small percentage of children complain of a bad taste. It is important that children and parents are taught the appropriate nasal spray technique to ensure optimum drug delivery. An illustrated guide on good nasal spray technique can be found at: www.bsaci.org/Guidelines/SOPs

Oral leukotriene antagonists: Oral leukotriene antagonists (e.g. montelukast) can be effective but are not superior to intranasal steroids. They may work well in a small percentage of patients with asthma. Montelukast is licensed in children who have seasonal allergic rhinitis and asthma.

Nasal decongestants: These agents relieve a blocked nose through vasoconstriction. Evidence shows optimal benefit when used with antihistamines. Treatment with nasal decongestants should always be limited to a few days owing to a risk »

Table 3

Advice on avoidance measures

Pollen

Reduce indoor pollen
- Keep windows closed
- Shower and wash your hair once you arrive home
- Change clothing on arriving home
- Avoid air drying laundry outside when pollen count is high

Reduce exposure when outside
- Apply a barrier balm in the nose and under the eyes to trap any pollen
- Wear wraparound sunglasses

Note: Check the pollen count at metoffice.gov.uk

House dust mite

Reducing dampness
- Open windows and ventilation in kitchen and bathroom
- Avoid drying clothes indoors
- Run central heating a few degrees lower
- If possible, use a dehumidifier to keep humidity at 30-50%

Reducing dust
- Damp-wipe surfaces weekly
- Vacuum carpets and upholstery twice a week
- If possible remove carpeting from the bedroom

Soft toys
- Wash soft toys at 60°C. If not possible then place in freezer for at least 12 hours and then wash at recommended temperature

Bedding
- Air bedding before remaking beds
- Wash bedding weekly at 60°C
- Replace pillows with new ones every 6 months
- Avoid sleeping in the bottom bunk bed
- Use house dust mite impermeable covers for mattresses and bedding

Pet dander

Indoor exposure
- Pets must be kept outside the bedroom
- Do not allow pets to sit on beds, sofas and cushions
- Remove carpeting from the bedroom
- Wash pet bedding regularly on a hot wash
- Wash the child's bedding and any soft toys regularly on a hot wash
- Wash hands after touching a pet
- Wash and groom pet regularly

Outdoor exposure
- Avoid contact with causative animals
- If exposure is likely, take a non-sedating antihistamine beforehand

key points

SELECTED BY

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Allergic rhinitis is defined clinically by the presence of symptoms caused by an IgE-mediated inflammation of the nasal mucosa on exposure to airborne allergens. Symptoms include sneezing, rhinorrhoea, nasal obstruction and pruritus. It typically develops in older children or early adulthood. Allergic rhinitis can affect a child's physical health, reduce their quality of life, sleep and concentration, and impact on school performance.

Common comorbidities include asthma; conjunctivitis; rhinosinusitis; middle ear effusion; eustachian dysfunction and adenoidal hypertrophy. It is important to ask about asthma symptoms in patients with allergic rhinitis and vice versa. Children with allergic rhinitis are at increased risk of developing asthma. Around 85% of those with asthma have allergic rhinitis, which can complicate diagnosis and management and also increase the risk of hospitalisation for asthma exacerbations. However, appropriate management of allergic rhinitis can improve asthma control.

There are two distinct groups of allergic rhinitis: perennial and seasonal. Perennial allergens include house dust mite, pet dander and mould spores, and seasonal allergens include grass and tree pollen. Some children may be affected by both groups of allergens and present with acute on chronic exacerbations during spring and summer.

The diagnosis of allergic rhinitis can usually be made on the basis of the patient's history and examination alone. A holistic approach is necessary to manage allergic rhinitis effectively. This involves education, preventative measures, accurate diagnosis, pharmacological treatment and, when appropriate, desensitisation which may require referral to an allergy centre.

Oral antihistamines are considered as first-line treatment. Long-acting, non-sedating antihistamines such as cetirizine and loratadine are preferable. Intranasal corticosteroids are effective and safe. Corticosteroids may take a couple of days to start having an effect, around two weeks to achieve optimum efficacy, and require appropriate administration and continuous use. To obtain maximum benefit in children with established seasonal symptoms it is important to commence intranasal steroids 2-4 weeks before the pollen season. No growth retardation has been observed in children treated with fluticasone or mometasone. Nasal saline douching can reduce symptoms if used daily and can be used alongside other medications. GPs should consider referral to an allergy clinic if symptoms continue to interfere with sleep or lifestyle activities, where a wider diagnosis or referral for immunotherapy can be duly considered.

of rebound congestion referred to as rhinitis medicamentosa.

Cromones: Cromones are mast cell stabilisers. Topical application to the nose and eyes can be effective but frequent application is required throughout the day.

Nasal anticholinergics: Although useful in controlling rhinorrhoea in older patients they not commonly prescribed in children.

Nasal saline douching (NSD): This is a cheap, safe and easy to use therapy. There is a misconception among parents and physicians that children may not tolerate it; however, around 86% of children, regardless of age, find NSD tolerable.[16] It can reduce symptoms if used daily and can be used alongside other medications.

Immunotherapy: In cases where allergic symptoms remain poorly controlled despite optimal pharmacotherapy, consideration should be given to allergen immunotherapy (AIT). AIT is an allergen-specific, disease-modifying treatment that requires commitment from the child and family. The recommended treatment period is at least 3 years. There are two forms of the treatment currently available, subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT).

Patients receiving SCIT are required to attend hospital to receive regular injections of the allergenic extract, as there is a significant risk of severe allergic reactions. In the SLIT group, patients will administer either a liquid or a tablet form of the allergenic extract under their tongue. SLIT needs to be given daily to achieve optimum efficacy but can be administered at home as it has an excellent safety profile.

Studies have shown that both SCIT and SLIT can produce a clinically significant improvement in symptom scores, quality of life, and reduction in medication use.[17] Longitudinal studies of children receiving grass SCIT and SLIT have demonstrated that it may prevent the development of asthma.[18,19] The effect on symptoms has been shown to persist beyond the end of a 3-year course of treatment.[20]

The aim of AIT is to bring about a reduced reactive response when exposed to the allergen. This is achieved by regularly exposing the child's immune system to a high dose of the causative allergen.

Immunotherapy works by downregulating the inappropriate immune response towards the allergen to a level similar to that of a non-allergic individual. The mechanisms of immunotherapy are complex and are still under investigation.

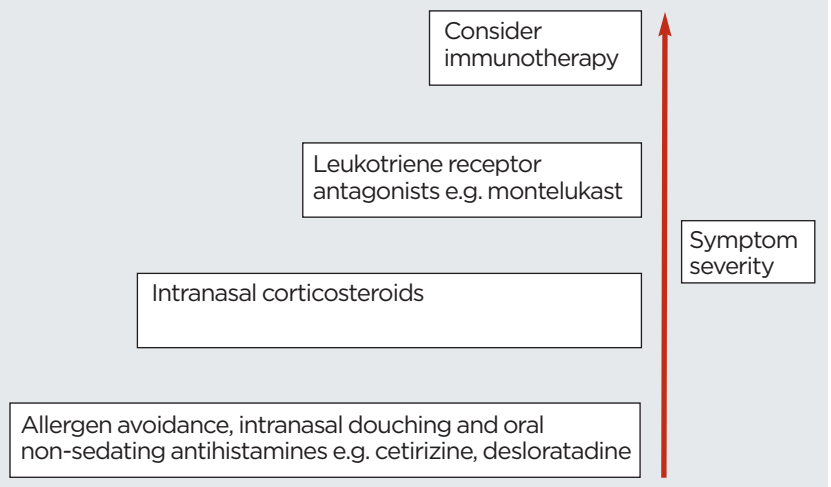
AIT can affect the inflammatory cell population, the cytokine expressions and the allergen-specific antibody responses, leading to a reduction in the early and late phase inflammatory response.[21]

CONCLUSION

Allergic rhinitis is a common, chronic health problem that adversely impacts on children's quality of life and

Table 4

Stepwise management of allergic rhinitis adapted from ARIA guidelines[4]



education. It is underdiagnosed and is linked with other allergic diseases such as asthma. Diagnosis is usually straightforward with appropriate history taking to exclude other differential diagnoses of nasal symptoms.

Symptom control can be achieved with allergen avoidance and where appropriate, regular nasal irrigation and medication, such as non-sedating antihistamines. Additional nasal steroids should be considered if symptoms persist. Appropriate education, adherence and correct nasal spray technique are vital.

'GPs should consider referral to an allergy clinic if symptoms continue to interfere with sleep or lifestyle activities'

GPs should consider referral to an allergy clinic if symptoms continue to interfere with sleep or lifestyle activities, where a wider diagnosis or referral for immunotherapy can be duly considered.

Competing interests
Dr Adam Fox and Ms Roisin Fitzsimons have received research funding from ALK-Abello. Dr Adam Fox has received consultancy fees from ALK-Abello, Stallergenes and Mylan. All authors have been partly employed by the KCL Allergy Academy which receives corporate sponsorship from ALK-Abello, Stallergenes, Mylan and Allergy Therapeutics

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Useful information

For healthcare professionals
British Society for Allergy & Clinical Immunology
Clinical guidelines and other professional resources including an illustrated guide on good nasal spray technique
www.bsaci.org

For patients
AllergyUK
Information and advice
www.allergyuk.org

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