Diagnosis and management of allergic rhinitis in children

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Allergic rhinitis is a very common disease of childhood, and its impact on quality of life is often underestimated. This article discusses the diagnosis of allergic rhinitis in children and the management options that can be tried, including allergen avoidance, pharmacological therapies and allergen immunotherapy.

The prevalence of allergic disease has been on the rise for some time and now represents a global health problem. In the UK, allergic disease affects up to 40% of children. Clearly, this has a significant impact on workload in primary and secondary care, medication usage and admissions to hospital. Current evidence shows as many as one in five children in the UK describe symptoms of allergic rhinitis, compared with one in eight worldwide.

Causes of rhinitis
In children, there are a number of different causes for rhinitis. Whereas adults tend to suffer from intrinsic rhinitis, the most common cause of rhinitis symptoms in children is allergic rhinitis. Allergic rhinitis is an IgE-mediated inflammatory condition of the nasal mucosa, characterised by anterior nasal symptoms of pruritus, sneeze, discharge, blockage or ‘stuffiness’.

In the UK, clearly defined seasonal differences in allergen exposure have led to allergic rhinitis being described as either seasonal, usually due to tree or grass pollens and referred to as hay fever, or perennial, usually due to house dust mite, mould or animal dander. However, allergic rhinitis can also be classified according to the globally-oriented Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines, described below.

Impact on quality of life
Although the symptoms of allergic rhinitis are not life-threatening, they can be detrimental to the physical, psychological and social aspects of affected children’s lives and can significantly decrease quality of life – something that is often underestimated by physicians and non-sufferers alike.

Allergic rhinitis can have a substantial negative impact on childhood. Adolescents report difficulties in concentration, which can be of particular concern with regard to education. Symptoms of rhinitis and the associated underlying inflamma-
Diagnosis

Children with allergic rhinitis will present with one or more of the following classic symptoms: rhinorrhea, nasal itch, sneezing and nasal obstruction, with or without conjunctivitis. The presence of two or more of these symptoms normally confirms a diagnosis of allergic rhinitis. A clinical history should establish the duration and seasonality of the symptoms.

Allergic rhinitis can be further classified using the ARIA guidelines. This is based on the duration and frequency of symptoms, and the effect of symptoms on sleep, school and daily activities (see Figure 1). Some children may experience purely seasonal symptoms according to their allergies, for example tree pollen from March to June or grass pollen from April to September. Perennial symptoms occur year-round, with or without seasonal exacerbations.

There is usually, but not always, a family and personal history of atopy. Allergic rhinitis is a risk factor for development of asthma and children presenting with moderate to severe allergic rhinitis should be routinely screened for asthma with an appropriate history and examination. Studies have shown that increased severity of allergic rhinitis symptoms correlate with poorer asthma control, with asthma attacks being more common when the pollen count is higher in individuals allergic to grass pollen. Furthermore, children with co-morbid allergic rhinitis and asthma are likely to require more GP appointments and hospital admissions than those with just asthma alone. Effective diagnosis and treatment of both conditions will have a positive impact on outcome.

Unilateral symptoms should raise the possibility of septal deviation or the presence of a foreign body. However, alternation of the obstruction from one side to the other suggests a generalised rhinitis that makes the normal ‘nasal cycle’ more apparent. Some children may present atypically with disrupted sleep and persistent cough, but also lethargy, poor appetite and stunted growth.

The typical facial features of affected children may include a long, pale face, allergic ‘shiners’ or Dennie-Morgan folds under the eyes. The child may be mouth-breathing with dry, cracked lips and associated lip-licking eczema. There may be halitosis, dental malocclusion and postnasal drip.

Nasal examination may reveal an external nasal crease due to persistent rubbing and a boggy nasal bridge. A metal speculum may be used to demonstrate reduced nasal airflow. Typical mannerisms such as the ‘allergic salute’ – a habitual rubbing of the nose with the hand – reflect the intensity of the nasal itch. Internal examination of the nose – an auriscope is sufficient – will reveal a pale purple or pink, swollen inferior turbinate with a narrowing of the nasal airway. An important differential diagnosis is nasal polyps, which are pale, non-tender and mobile – in children, these should be considered to be due to cystic fibrosis until proven otherwise.

Allergy testing, ie skin-prick testing or specific IgE blood testing (see Figure 2), provides a quick and cheap method of supporting the diagnosis and allows for the targeting of allergen avoidance measures. The majority of children with allergic rhinitis can be diagnosed through selection of a relatively small panel of allergens (see Table 1).

Management

The ARIA guidelines propose a stepwise approach to the management of allergic rhinitis. The aim of treatment is to achieve
unimpaired sleep, remove any limitation to daily activities and school attendance and minimise side-effects of treatment.

As well as pharmacological treatments, allergen avoidance measures also need to be considered, particularly when identified by successful allergy testing. Unlike the pharmacotherapies, the evidence supporting allergen avoidance is limited, but is still recommended by ARIA guidelines and allergists.

**Allergen avoidance**

Avoidance of seasonal allergens such as pollens is notoriously difficult. Some simple advice should be offered to patients (see Table 2). Perennial allergens may be more amenable to manipulation but, particularly in the case of dust mites, these measures may be expensive, time consuming and of limited benefit (see Table 3). Advice to remove pets may not be well received and it could take many months, even with intense cleaning, to remove all traces of the allergen – this particularly true for cats. A simple compromise is keep the animal outside and wash it frequently. Hypoallergenic animals have been bred but are prohibitively expensive.

**Pharmacological treatment**

In most instances, allergen avoidance is neither possible nor sufficient to control symptoms, and thus medications are required. Historically, a large range of medications have been used for rhinitis management, although the mainstay of treatment usually comprises oral antihistamines and nasal steroids. Topical antihistamines, anticholinergics, sodium cromoglicate and decongestants may all have their place in defined circumstances, while leukotriene-receptor antagonists (LTRAs) and immunotherapy are important options for resistant cases. A practical guide to escalating treatment is given in Figure 3.

**Antihistamines**

Oral antihistamines are the most commonly prescribed first-line agent. Antihistamines are particularly effective against runny nose, itching and sneezing, as these symptoms tend to be histamine mediated. Second- or third-generation non-sedating antihistamine also improve allergic symptoms at sites other than the nose such as the conjunctiva, palate, skin and lower airways. They are less effective against nasal obstruction, although the newer third-generation antihistamines, e.g. levocetirizine and desloratidine, may offer some benefit. The greatest benefit is seen in patients taking antihistamines regularly rather than ‘as required’.

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**Table 1.** Suggest panel of skin-prick tests for diagnosing allergic rhinitis in children

- House dust mite
- Grass pollen
- Tree pollen
- Cat allergen
- Dog allergen
- Positive histamine control
- Negative saline control
once-daily use of mometasone or fluticasone nasal spray, making these the best choices. Clinicians should be mindful of the dose of intranasal corticosteroids prescribed to children already on inhaled steroids for asthma or more potent topical steroids for eczema.

Combination treatments such as Dymista nasal spray, which contains the antihistamine azelastine and the steroid fluticasone, are particularly effective at reducing nasal inflammation and itching and may reduce symptoms more rapidly than intranasal steroids in isolation. They also offer some benefit for other symptoms including conjunctivitis.® Dymista is currently licensed for children aged 12 years and over but may be used in younger children with moderate to severe symptoms at the discretion of the clinician.

It is important to demonstrate the correct technique for intranasal administration to children (see Figure 4), as this will optimise deposition and reduce the incidence of side-effects such as nose bleeds. Treatment failure is commonly due to irregular use – often as a consequence of symptomatic relief. Ideally, use of the spray should be commenced one to two weeks prior to when symptoms normally occur. This ‘priming’ helps prevent inflammation from occurring in the first place and makes it easier to control.

**Leukotriene-receptor antagonists**
LTRAs antagonise inflammatory mediators released from nasal cells and eosinophils in both the early and late phases of the allergic response. LTRAs are administered orally and appear to be particularly effective against nasal obstruction and mucus production, with enhanced symptom control achieved when used in conjunction with an antihistamine, although this is still less effective than a nasal steroid.

For patients with resistant symptoms and those with co-existing asthma, LTRAs can be used as an add-on therapy, although some individuals respond better than others. They also provide a useful alternative therapy for those unable to properly co-ordinate a nasal spray, children with ‘steroid-phobic’

### Table 2. Advice for avoidance of pollen allergens

The main issue with antihistamines is their sedative potential, which is of particular concern for young children. For this reason, first-generation antihistamines such as chlorphenamine should be avoided as a regular therapy. Second- and third-generation antihistamines do not have such a sedating effect and have fewer major drug interactions. As cetirizine has a good safety record in children over six months of age, this tends to be our first choice, usually once daily.

Topical antihistamines, eg azelastine nasal spray or olopatadine eye drops, are sometimes used first line for mild symptoms and are useful for rhinitis or conjunctivitis symptoms respectively as they have a fast onset of action; however, they do not have any effect on symptoms at other sites.

**Topical corticosteroids**

Topical corticosteroids are the mainstay for treatment of moderate/severe rhinitis and can be used in addition to oral antihistamines. They should be used as a first-line treatment in patients who have persistent moderate to severe symptoms. This class of medication best addresses underlying chronic inflammation and symptoms of nasal obstruction. The intranasal route of corticosteroid administration is significantly safer than potentially harmful oral or intramuscular corticosteroid preparations.

A small proportion of the intranasal corticosteroid spray is always swallowed after administration and, despite liver metabolism, presents a potential risk of systemic side-effects if taken in frequent and/or high doses. Consequently, parents are often concerned about the potential risk to childhood growth. Long-term follow-up studies demonstrate no reduction in growth with once-daily use of mometasone or fluticasone nasal spray, mak-
parents and those who dislike the sensation, taste or odour of nasal sprays. Parents should be warned about potential side-effects of LTRAs in children, including possible nightmares and behaviour change.

**Allergen immunotherapy (desensitisation)**

While most children will find relief from their symptoms through a combination of allergen avoidance and the pharmacotherapy detailed above, a significant minority still have troublesome symptoms. There are also many children whose parents remain resistant to short- or long-term use of steroid-based medications in their child, especially knowing that these treatments are suppressing symptoms, rather than addressing the underlying allergic cause. In these scenarios, allergen immunotherapy has an important role. The practice of administering gradually increasing doses of allergen extract in order to reduce the symptoms associated with subsequent exposure has a history dating back to 1911.

Subcutaneous immunotherapy (SCIT) became increasingly widespread over the course of the 20th century, albeit not without problems – 26 deaths were recorded in the UK between 1957 and 1986 and 46 deaths in the USA between 1959 and 1984. These deaths were due to anaphylaxis and bronchospasm, mostly the result of incorrect dose administration, failure to recognise and treat reactions, lack of resuscitation equipment and the inclusion of patients with unstable asthma. However, more recent work has demonstrated the safety of SCIT when conducted under standardised protocols – with systemic reactions complicating only 0.37% of injections, mostly restricted to urticaria. The long-term efficacy of a three-year course of SCIT in allergic rhinitis has been proven, demonstrating that the significant effect on symptom reduction extends for years beyond the treatment itself. However, its use in the UK is restricted due to the limited number of specialist centres, requirement for multiple supervised injections and concern over side-effects.

Sublingual immunotherapy (SLIT) in the form of soluble tablets and sprays is usually preferable in children, as it removes the need for injections and requires fewer resources. As with SCIT, treatment should be continued for at least three years. There are a limited number of SLIT products licensed for use in children over the age of five years in the UK, eg Grazax for grass pollen. However, many unlicensed products, widely used throughout Europe, are available for tree pollen, dust mite, and cat and dog allergies through specialist clinics. The first dose should be supervised in hospital but treatment is then continued at home once daily. Several studies have shown SLIT to be efficacious in reducing symptom and medication scores in children with allergic rhinitis. One study showed a reduced risk of development of asthma symptoms and asthma medication use in patients with allergic rhinitis who had completed treatment with SLIT compared with placebo. However, the reliance on daily patient administration does raise the issue of adherence, something that appears to influence efficacy.

A systematic review of multiple randomised controlled trials reporting the use of SLIT and its safety profile confirmed its efficacy in reducing symptoms and medication use and reported no severe systemic reactions, anaphylaxis or use of adrenaline. Over one billion doses of SLIT have been given globally, with no fatal reactions recorded. The relative benefit of using SCIT over SLIT remains unclear and usually the choice is made based on patient preference and availability of resources.

Access to SLIT or SCIT remains problematic for those children with persistent symptoms despite maximal pharmacotherapy. An audit in 2011 estimated that only 2% of those children who fulfilled the diagnostic requirements for pollen immunotherapy were actually receiving it. Subcutaneous and sublingual immunotherapy are suppressing symptoms, rather than addressing the underlying allergic cause. In these scenarios, allergen immunotherapy has an important role. The practice of administering gradually increasing doses of allergen extract in order to reduce the symptoms associated with subsequent exposure has a history dating back to 1911.

**Conclusion**

Allergic rhinitis is a very common disease of childhood that can have considerable impact on quality of life. In most cases, allergic rhinitis can be treated safely and effectively using simple medications such as oral antihistamines and nasal steroids, with newer combination treatments being increasingly used. LTRAs provide a useful adjunct to treatment, particularly in children with concomitant asthma.
Allergen immunotherapy is a proven, safe treatment that is underutilised in the UK, particularly compared with our European counterparts. Currently, treatment with SCIT and initiation of SLIT is only undertaken at a limited number of specialist centres. This means patients have to be referred from primary or secondary care and may have to travel considerable distances to their nearest centre. In some cases, it may not be clear how to refer children for immunotherapy or where the local immunotherapy service is; therefore, it is important for clear referral pathways to exist in local networks.

Through educational initiatives, clinicians are becoming more aware of the different methods of ‘desensitisation’ and the practicalities of providing an immunotherapy service. Hopefully, this will lead to immunotherapy clinics becoming more widely available in secondary care in the near future. In the meantime, research continues to focus on ways to make immunotherapy more effective, to enhance compliance with treatment, to understand the underlying mechanisms involved and to search for biomarkers of its efficacy.

There is also ongoing work to increase our understanding of the longer-term impact of immunotherapy on progression of disease from rhinitis to asthma and also the possible role of immunotherapy in infancy as a way of preventing allergic sensitisation and asthma developing in the first instance.

References

Declaration of interests
None to declare.

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