THE ASSOCIATION
OF OTOLARYNGOLOGISTS
OF INDIA

Indian Guidelines on Allergic Rhinitis

Formulated by

The Association of Otolaryngologists of India

2025

Message from the President, Association of Otolaryngologists of India (AOI)

It gives me immense pleasure to present the revised AOI Guidelines on Allergic Rhinitis, a condition that continues to significantly impact the quality of life of millions across our nation. As ENT specialists, we stand at the forefront of early diagnosis, evidence-based management, and patient education. These updated guidelines reflect the latest scientific advancements, current clinical best practices, and a strong commitment to standardized, patient-centric care across all levels of healthcare delivery.

I congratulate the dedicated committee members who have worked tirelessly to ensure that this document is comprehensive, practical, and aligned with global standards while addressing the unique needs of our diverse population. Their collaborative efforts exemplify the vision and spirit of AOI—advancing knowledge, fostering innovation, and strengthening clinical excellence.

The dodged determination and hard work of all the committee members Dr.Deepak Haldipur, Dr.Ashim Desai, Dr.Pendakur Ananad, Dr.Subir Jain, Dr.Gayantri Pandit, Dr.Samir Bhargava, Dr.Prashant Kewale, Dr.Anirban Ghosh & Dr.Yogesh Dabholkar are mightily appreciated for doing this job.

My special thanks to Dr.Nitika Gupta for going extra mile in coordinating everything in a time bound manner.

My colleague in AOI President Elect Dr.Kaushal Sheth, Secretary Dr.Samir Chaudhaury & Treasurer Dr.Samir Thakare contributed immensely as has been a normal norm nowadays.

I am confident that these revised guidelines will serve as a valuable resource for practitioners, postgraduate students, and institutions across the country, ultimately improving patient outcomes and enhancing public health.

Let us continue to work together with dedication, compassion, and scientific rigor in shaping a healthier future.

Warm regards,

Dr.Dwaipayan Mukherjee
President, AOI

Long live AOI

Message from the Honorary Secretary, Association of Otolaryngologists of India (AOI)

It is with great pleasure that I present the Revised Allergy Guidelines Booklet of the Association of Otolaryngologists of India (AOI). Allergy-related disorders continue to form a significant and growing part of ENT practice, impacting patients across all age groups and demanding an evidence-based, multidisciplinary approach to diagnosis and management. In this context, the timely revision of our guidelines is both essential and impactful.

The updated document reflects the latest scientific understanding, contemporary diagnostic tools, and evolving treatment strategies in the field of allergy. It aims to offer clear, practical, and implementable recommendations that will assist ENT practitioners in delivering high-quality, patient-centred care. By integrating global advances with the realities of Indian clinical practice, these guidelines serve as a dependable resource for clinicians, academicians, and postgraduate trainees alike.

AOI remains committed to supporting its members with robust academic material that enhances both professional competence and clinical outcomes. This revised booklet is a testament to that commitment. I extend my heartfelt appreciation to the contributors, editors, and expert committee members whose diligence and expertise have shaped this comprehensive update.

I am confident that these revised guidelines will not only streamline allergy management across the country but also strengthen our collective efforts in combating the rising burden of allergic disorders.

Warm regards,

Dr. Samir Choudhary
Honorary Secretary,AOI

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INDIAN GUIDELINES ON DIAGNOSIS AND MANAGEMENT OF ALLERGIC RHINITIS: A CONSENSUS APPROACH

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Introduction

Allergic rhinitis (AR), the most common type of chronic rhinitis, is a symptomatic inflammatory disorder of the nasal mucosa. The inflammation is induced by allergen triggers, and mediated by immunological response.[1,2] AR can also be influenced by non-allergenic triggers. There are four major clinical manifestations of AR – sneezing, rhinorrhoea, nasal itching, and nasal congestion1. AR has an estimated worldwide prevalence of 10% to 25% and is one of the most common diseases in childhood with a prevalence reaching up to 40% in some regions.[3,4] It was previously considered that AR is a localized disorder of the nose and the nasal passages. However, current clinical knowledge indicates that AR may manifest as a component of systemic airway disease involving the entire respiratory tract. Studies have indicated that trigger of the upper airways by an allergen leads to a local inflammatory response as well as other inflammatory processes in the lower airways, supported by the fact that rhinitis frequently coexists with asthma2. In India, around 20–30% of the people suffer from AR and 15% progress to develop asthma.1 Also, symptoms of AR may cause other clinical manifestations such as sleep disturbance, fatigue, depressed mood, and decline in cognitive function, thus impairing quality of life and functional productivity.

Thus, AR should be considered as a systemic disease and should not be overlooked as a local disease.

Phenotypes of rhinitis Allergic rhinitis is one of the common phenotypes of rhinitis. On the basis of aetiology, other phenotypes of rhinitis are classified into - autonomic, infectious, other, and idiopathic[2,6]
(Table 1).

Table 1: Phenotypes of rhinitis (based on aetiological factors)

Aetiology	Component
Allergic (IgE-mediated)	• IgE-mediatedinflammationofthenasal mucosa, resultingin eosinophilic andTh2-cell infiltration of thenasallining [2] • Intermittent or persistent[2]
Non- allergic, non- infective rhinitis	• Drug-induced (rhinitis medicamentosa)[2,6] • Hypothyroidism [2] • Hormonal (rhinitis of pregnancy)[2,6] • Rhinitis of elderly[2,6] • Occupational rhinitis[2] • Non-allergic rhinitis with eosinophilia syndrome • (NARES)[2,6] • Gustatory rhinitis[6] • Vasomotor rhinitis [6] • Nasal mastocytosis[6] • Atrophic rhinitis[6]
Infectious	• Viral (most common), bacterial, or fungal infection[2]
Idiopathic	Not determined [2]

Classification of AR Allergic rhinitis, traditionally, has been classified as seasonal i.e. occurring during a specific season, or perennial, i.e. occurring throughout the year. However, this classification system fails to include all patients affected with AR[2] .In some cases, symptoms of perennial AR may not necessarily persist throughout the year. AR due to pollen may be seasonal in cooler climates, but perennial in warmer climates.[2,7] In addition, seasonal exacerbations may be observed in patients with perennial AR when they are exposed to pollens. Moreover, people with multiple allergies may present with perennial AR.[2,7]

In 2001, a new classification system was proposed by ARIA[7], Allergic Rhinitis and its Impact on Asthma, based on frequency and severity of the symptoms (Figure 1)

- Frequency/Symptom duration-based: Intermittent or persistent
- Severity-based: Mild, moderate, or severe

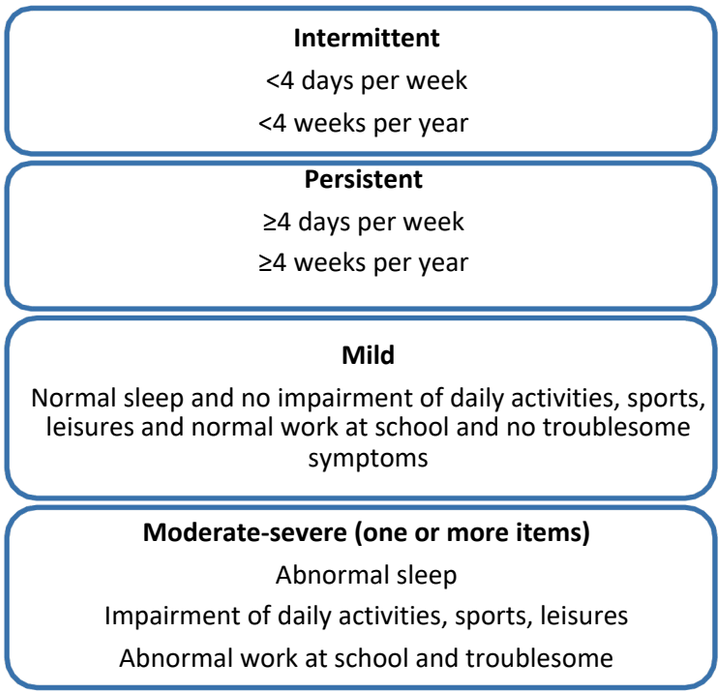


Figure 1: Classification of AR based on duration and severity of symptoms

Although AR is a global health problem and one of the most common clinical presentations, the actual prevalence of AR may be underestimated. There also exists significant geographical variation in prevalence of AR,[1] however regional estimates for AR prevalence in India are lacking. In addition, many people with AR are underdiagnosed or misdiagnosed or do not seek treatment for their clinical condition. Misdiagnosis or untreated AR/inadequately treated AR contribute to exacerbation of AR symptoms, increased risk of comorbid conditions like asthma, rhinosinusitis, etc. and overall poor quality of life of affected people.[8]

Need for AR practice guideline

There exists a lack of high quality clinical evidence on AR diagnostic approach and treatment decisions. Although, clinical trials have generated huge amount of clinical evidence on various therapeutic options in the management of AR, they have often failed to compare active treatments and use endpoints that are regulatory driven. Moreover, a common knowledge of AR and measures to control is lacking between clinicians and/or patients. Also, currently available guidelines on diagnostic workup and therapeutic pathways seldom refer to real-life scenarios, leading to significant clinical gaps in everyday practice. Thus, it is important to address the practical challenges with respect to diagnosis and treatment aspects of AR.

Methodology

The objective of the present guideline is to attempt to fill in the clinical gaps to ensure systematic and step-wise diagnostic work-up with clinically relevant treatment decisions, which are in compliance with other existing guidelines. An extensive literature search was carried out through PUBMED database and Google search engine to obtain clinical evidences for diagnostic and treatment recommendations in the management of AR. An experts' committee critically reviewed available evidences, correlated them with their respective clinical practice and discussed clinical relevance of the available evidence in order to draw consensus recommendations. In case of lack of evidence, a practice-based consensus was reached among the experts.

Grading system

Levels of scientific evidence	
1++	High-quality meta-analyses, high-quality systematic reviews of clinical trials with very little risk of bias.
1+	Well-conducted meta-analyses, systematic review of clinical trials or well-conducted clinical trials with low risk of bias.
1-	Meta-analyses, systematic reviews of clinical trials or clinical trials with high risk of bias.
2++	High-quality systematic reviews of cohort or case and control studies; cohort or case and control studies with very low risk of bias and high probability of establishing a causal relationship.
2+	Well-conducted cohort or case and control studies with low risk of bias and moderate probability of establishing a causal relationship.
2-	Cohort or case and control studies with high risk of bias and significant risk that the relationship is not causal.
3	Non-analytical studies, such as case reports and case series.
4	Expert opinion.

Grades of recommendations	
A	At least one meta-analysis, systematic review or clinical trial classified as 1++ and directly applicable to the target population of the guideline, or a volume of scientific evidence comprising studies classified as 1+ and which are highly consistent with each other.
B	A body of scientific evidence comprising studies classified as 2++, directly applicable to the target population of the guideline and highly consistent with each other, or scientific evidence extrapolated from studies classified as 1++ or 1+.
C	A body of scientific evidence comprising studies classified as 2+, directly applicable to the target population of the guideline and highly consistent with each other, or scientific evidence extrapolated from studies classified as 2++.
D	Level 3 or 4 scientific evidence, or scientific evidence extrapolated from studies classified as 2+.

Allergic Rhinitis Atopic Disease

Evidence of a Familial Component and Environmental Factors containing Allergens and Non-Allergic Triggers

Key Points:

Allergy is a Systemic Disease.

Manifestation of the disease can be at or in a particular tissue which will be the Primary Allergic Condition or Primary Clinical Condition.
Allergy is a non-infectious disease.

Allergic Rhinitis is the most common manifestation of atopic allergy.

Allergy was first described and defined more than a 107 years ago by Clemens Von Pirquet, a Professor of Pediatrics in Vienna, Austria. He and his associate Bela Schick coined this term for the first time and brought it to clinical use.

Atopy Atopy is a genetic predisposition to respond immunologically to diverse antigens or allergens, leading to CD4+ Th2 differentiation and overproduction of immunoglobulin E (IgE). There are many types of potential allergies, and they can involve other mechanisms besides IgE. So all atopic conditions are allergic conditions, but not all allergic conditions are atopic. Broad clinical spectrum of atopy includes allergic conjunctivitis, allergic rhinitis, allergic sinusitis, allergic otitis media, allergic laryngo- tracheitis, bronchial asthma, oral allergy syndrome; allergic migraine, allergic menière's disease, IgE-mediated drug reactions, sensitivities to insect bites, urticaria, angioedema, atopic dermatitis, food allergies and anaphylactic shock. Two or more of these clinical conditions can coexist simultaneously in an individual or at different times.[9-12]

Aetiology of Atopic Allergy:

The aetiology of atopy is unknown. Twin and epidemiological studies, along with family and animal experiments, have demonstrated that genetic factors play a crucial role in atopy by regulating IgE synthesis and its specificity to different epitopes. The inheritance of several genes results in the overproduction of IgE. Although the concept of allergies running in families is partially demonstrated in the autosomal transmission of allergies, the full inheritance pattern is believed to be multigenic.[13]

One theory that explains the genesis of atopy suggests the involvement of abnormal regulation by T-helper cells and suppressor T lymphocytes, which facilitate the production of IgE by plasma cells.[14-15] Examples of genes associated with atopy are

associated with chromosome 5q and cytokine gene clusters and include several interleukins (such as IL-3, IL-4, IL-5, and IL-13), CD14, granulocyte-macrophage colony-stimulating factor (GM-CSF), and β2-adrenergic receptors.

IL-4 and IL-13 promote IgE switching, whereas IL-5 stimulates eosinophil growth and activation. β2-adrenergic receptors regulate the contraction of bronchial smooth muscles. Chromosome 6p contains genes that code for major histocompatibility complex (MHC) class II proteins, and some of these alleles regulate T-cell responses to environmental antigens or allergens. A gene in chromosome 11q, which codes for the high-affinity IgE receptor β-subunit, mediates mast cell activation. Chromosome 12q houses genes that code for stem cell factor (affects mast cell growth and differentiation), interferon-γ (IFN-γ; inhibits IL-4 synthesis), and STAT6 (mediates IL- 4 signal transduction). Atopic allergies, including atopic dermatitis (eczema), allergic rhinitis (hay fever), and asthma, are caused by a combination of genetic predisposition and environmental factors that lead to an overactive immune response. Specifically, atopy involves a heightened immune response to harmless substances (allergens) like pollen, dust mites, or certain foods, resulting in inflammation and characteristic symptoms. Here's a more detailed look at the aetiology:

1. Genetic Predisposition:

- Family History: Atopic conditions tend to run in families, suggesting a strong genetic component.

  Specific Gene Variations:

- Mutations in genes like FLG (encoding filaggrin, a protein crucial for skin barrier function) are strongly linked to atopic dermatitis. Other genes involved in immune response (e.g., those related to IgE production and cytokine signalling) also play a role.

  "Atopic March":

- Many individuals with atopic dermatitis develop other atopic conditions (asthma, allergic rhinitis) in succession, suggesting shared genetic underpinnings.

2. Environmental Factors:

- Allergens:

Exposure to allergens like pollen, dust mites, pet dander, and certain foods (e.g., eggs, milk, peanuts) can trigger immune responses and symptoms in susceptible individuals.

- Skin Barrier Defects:

  Atopic dermatitis is characterised by a compromised skin barrier, making it more susceptible to allergens and irritants. This defect can be due to genetic factors, immune system abnormalities, or environmental exposures. Skin offers a strong barrier which is a great protection. Contact and infiltration of allergens is facilitated by the loss of protection.

- Infections:

  Skin infections with bacteria like Staphylococcus aureus act as a strong trigger and can worsen atopic dermatitis symptoms.

- Irritants:

  Contact with irritants like soaps, detergents, and certain fabrics can exacerbate skin inflammation.

- Other Factors:

  Climate, temperature changes, stress, and even certain medications can also influence the severity of atopic symptoms.

3. Immune System Abnormalities:

- Increased IgE Production:

  Atopic individuals tend to produce higher levels of IgE antibodies, which are involved in allergic reactions.

- Th2 Immune Response:

  Atopic conditions are associated with a dominant T helper 2 (Th2) immune response, characterized by the release of specific cytokines (IL-4, IL-5, IL-13) that promote inflammation and allergic reactions.

- Dysregulation of Immune Cells:

  Abnormalities in various immune cells (T cells, B cells, monocytes) contribute to the overactive immune response in atopic conditions.

In essence, atopic allergies arise from a complex interplay between genetic susceptibility and environmental triggers, leading to an immune system that is overly sensitive to harmless substances and causing a range of inflammatory reactions.

Allergy is a hypersensitive inflammatory immune response to innocuous environmental antigens, mediated by immunoglobulin type E (IgE) antibodies. This is the underlying cause of Allergic Rhinitis (AR); as well as that of several other allergic conditions.

Among the clinical conditions of allergy, respiratory allergy is the commonest. Nose being the main door to the respiratory system, bears the brunt of allergic insult; thus we have maximum number of allergy patients presenting with the symptoms of AR. For anybody to develop allergy, you need an individual who has an inherent susceptibility. Kjelmann's algorithm created few decades ago showcased the significance of genetic predisposition in the causation of allergy. Even when there is no evident h/o allergy among the parents, the risk for a child to develop allergy is about 12%, the risk increases to about 20%-25% if one of the parents has an allergy, the risk grows up to 40%-45% if both parents have an allergy, and that it could be as high as 70%-75% if both parents have same type of an allergic clinical condition. Environmental changes are thought to have contributed to the increased incidence of allergy in recent years with evidence for a role for tobacco smoke exposure, respiratory viral infections, use of antibiotics, diet and exposure to allergens. The first study to identify the heritability of allergy found that 48.4% of a group of 621 sensitised individuals had a family history of sensitisation to common environmental allergens, compared with only 14.5% of the control group of 76 non-sensitised individuals[14]

Hereditary contribution of susceptibility for AR has been estimated at 91%.

Recent studies have revealed that modern western type of food habits, is a major cause of increase in the incidence of allergy in India. Processed and ultra-processed food, have been found to be the cause of increased incidence of allergy. Play of colouring agents, addition of preservatives and food additives are considered a major health hazard. Immune system of children exposed to these substances, gets compromised and the susceptibility to develop allergy is increased. Microbiota in the gut has immense qualities and effects on the well-being of a human being. It has become necessary for us to protect our microbiome structure.

Disturbance in the symbiotic and compatible Microbiota in the human gut and in the indoor environment is another major reason for the increased susceptibility. Inadvertent usage of antibiotics in pregnant women and in very young children can disturb the Microbiome structure of the GIT of infants. There is evidence to support this. Some of the floor-cleaning substances contain a pesticide which kills all the indoor microbiomes. An infant growing in a sterile atmosphere will have a very high susceptibility to develop allergy and asthma. The message is clear: 'we need clean homes but not sterile homes.' Thomas Platt-A-Mills claimed with substantial supportive information that children growing with farm animals had relatively lower susceptibility of developing allergy. These animals like a cow, release an endotoxin at very low levels which may cause mild respiratory inflammation in a growing child

providing immunity against allergy. These mild catarrhal conditions could be a small nuisance but can provide that required sustenance to the growing child.

A susceptible individual and their exposure to allergen-rich environment will increase the possibility of causation of allergy. Non allergic triggers are the substances which do not cause allergy themselves but they aggravate an existing allergy. Various dusts other than house dust, like road dust, construction dust and paper dust are such triggers. Smokes and fumes of any kind including kitchen smoke, agarbathi smoke, tobacco smoke; smells both good and bad like that of fragrances, perfumes and atomizers, decaying matter and that of urinals, are triggers. Infections and Infestations and hormonal imbalances; emotional traverses and chronic stress are also the non-allergic triggers. Last several decades, there has been a lot of attention paid to the compromised air quality due to pollution caused by industry, traffic emissions and respiring humans.

India has witnessed an unreasonable increase in the population. Densely populated urban and semi-urban cities and towns cause congestion and make demands on the infrastructure. More people, more is the consumption of oxygen and more is the release of carbon dioxide. Similarly, less green trees, lesser is the absorption of carbon dioxide and lesser is the availability of oxygen in the ambient air. Badly maintained vehicular emissions will contain unreasonable amounts of gases related to Nitrogen, Sulphur, Carbon and SPM in addition to Ozone and other elements.

Some vehicles emit carbon monoxide which is a very toxic gas; especially at traffic islands when the vehicles are idling. Carbon monoxide has a high affinity to combine with haemoglobin, about 100% more than that of oxygen; it forms a very stable compound carboxy-methemoglobin. Instead of oxygen, there will be carbon monoxide both at the central level and at the peripheral level of the respiratory system. In a normal individual, the cilia present on the pseudostratified columnar epithelium, propel anything that enters the nasal chambers into the nasopharynx which are then gulped into the stomach.. The ciliary function will be damaged due to the presence of these noxious gases; the allergens and the triggering pollutants are retained in the respiratory system for a longer tenure.

Recent studies have revealed that exposure to air pollution within the first 6 months of life, alters infant microbiome status, increasing the risk for allergies; also, for diabetes, obesity and development of the brain.

Unified Airway Disease (United Airway Disease)

Introduction

Unified Airway Disease (UAD), also known as United Airway Disease, is a modern medical concept that emphasizes the interconnectedness of the upper and lower respiratory tracts. Rather than referring to a single disease entity, it represents a unifying principle explaining the shared pathological, immunological, and inflammatory mechanisms underlying chronic airway diseases. The concept recognizes that the respiratory system functions as an integrated unit, where diseases affecting one part of the airway frequently influence the other. This has significant implications for diagnosis, management, and treatment strategies across otolaryngology, pulmonology, and allergy specialties.

The "One Airway, One Disease" Hypothesis[32] The cornerstone of the unified airway concept is the "One Airway, One Disease" hypothesis. It postulates that the upper and lower airways function as a single, continuous anatomical and physiological entity. Consequently, inflammation in one segment can extend to and affect the other.

Supporting Evidence

1. Shared Pathology: Both the upper and lower airways possess similar epithelial lining, mucosal structures, and immune responses. Inflammatory processes in allergic rhinitis and asthma exhibit comparable histopathological features, including eosinophilic infiltration and cytokine-mediated inflammation.
2. Inflammatory Link: The inflammatory response can spread between the upper and lower airways via multiple mechanisms such as postnasal drip and systemic circulation.
3. High Comorbidity: Epidemiological studies demonstrate a strong association between allergic rhinitis and asthma. For example, a significant majority of people with asthma also have allergic rhinitis, and many with allergic rhinitis also have asthma.
4. Neural Reflexes: Reflex neural pathways link the nasal mucosa and bronchi. Nasal stimulation can induce bronchoconstriction through parasympathetic reflexes.

Clinical Manifestations

Unified Airway Disease encompasses both upper and lower respiratory tract involvement. Patients may present with a combination of upper airway symptoms such as nasal congestion, rhinorrhea, and sneezing, and lower airway symptoms such as cough, wheezing, and dyspnea. The overlap of symptoms underscores the importance of evaluating both airway segments during assessment and management.

Pathophysiology The inflammatory process in UAD involves multiple immunologic pathways
characterized by Type 2 (Th2) inflammation. Key mechanisms include activation of mast cells, eosinophils, and Th2 cells, release of cytokines such as IL-4, IL-5, and IL-13, Type 2 innate lymphoid cells (ILC2) and regulatory T/B Cells explains immune tolerance induction with immune theory and structural remodeling of airway mucosa, leading to chronic disease.

Diagnosis

Diagnosis involves comprehensive evaluation of both upper and lower airways, including history, allergy testing, spirometry, nasal endoscopy, and imaging of the paranasal sinuses. An integrated diagnostic approach ensures accurate identification of comorbidities and guides holistic management.

Treatment

The unified airway concept promotes an integrated management approach rather than treating each condition in isolation. Effective treatment of one airway segment often improves symptoms in the other.

1. Corticosteroids: Intranasal and inhaled corticosteroids suppress airway inflammation.
2. Antihistamines: second generation non sedatingantihistamines are recommended.
3. Biologic Therapies: Anti-IgE and anti–IL-5/IL-4R agents target shared inflammatory pathways.
4. Allergen Immunotherapy: Addresses hypersensitivity in both allergic rhinitis and asthma.
5. Management of Co-morbidities: Treating associated conditions like chronic rhinosinusitis and COPD improves outcomes.
6. Lifestyle Modifications: Allergen avoidance and smoking cessation remain essential.

Clinical Implications

Recognition of Unified Airway Disease emphasizes the need for multidisciplinary collaboration among otolaryngologists, pulmonologists, and allergists. A shared treatment strategy leads to improved disease control, reduced exacerbations, and enhanced quality of life.

Conclusion

Unified Airway Disease represents a paradigm shift in understanding respiratory pathology. The “One Airway, One Disease” hypothesis integrates upper and lower

airway disorders into a single continuum of inflammation. Comprehensive management results in better outcomes and a more rational therapeutic strategy.

Key Points

- The upper and lower airways form a continuous functional and immunologic unit.
- Inflammation in one part affects the other through systemic and neural mechanisms.
- Integrated treatment of rhinitis and asthma improves overall airway health.
- Biologic and immunotherapy approaches target shared inflammatory pathways.
- Collaboration among ENT, pulmonary, and allergy specialists is essential for optimal care.[16]

A) Preliminary investigation

A thorough history along with physical and clinical examinations forms the basis of establishing a diagnosis of AR.

a) ***History*** – A detailed history evaluation is an essential preliminary investigation as a part of diagnosing AR. History includes personal history such as symptom severity and frequency, seasonality, triggering factors, family history, social environment, presence of comorbid conditions, medication or drug use, response to previous medications if any, etc.[2,17] (Table 2) As a part of history, it is also important to know the impact of symptoms on the quality of life of patients by assessing reduced performance, school/work absenteeism, and lack of sleep. It helps in classifying the symptoms as mild, moderate or severe. Assess for impact on quality of life for both children and adults as it helps to not just classify but also decide treatment to be initiated in patients. Its also important to ask about presence of pet in the house and potential exposure of molds in the household and other potential occupational exposures. It helps to differentiate AR from other causes of rhinitis.

Table 2: List of the components of a complete history examination[2,9]

Sr. no.	History	Component
1.	Symptoms	• Nasal itch, rhinorrhea, sneezing, eye involvement • Presence of seasonal variation of symptoms • Diurnal pattern of symptoms • Symptom trigger when indoor or outdoor • Any triggers
2.	Personal	• Pregnancy (to rule out pregnancy-induced rhinitis)
3.	Family	Allergy or asthma
4.	Environmental	Potential allergens – Outdoor or Indoor • House dust mites, pollens, furred animals, flooring/upholstery, molds, etc. • Tobacco exposure • Humidity levels • Pets
5.	Occupational exposure	Industrial smoke, cotton, asbestos, chemicals, latex, etc.
6.	Medication/ drug use	• Beta-blockers, aspirin, Non-steroidal anti- inflammatory drugs (NSAIDs), angiotensin-converting-enzyme inhibitor (ACE inhibitors) • Hormone therapy • Recreational drug use
7.	Comorbidities	• Mouth breathing, snoring, sinus involvement, otitis media, nasal polyps, conjunctivitis, hyper-reactive airway diseases and skin allergies
8.	Response to previous medications	• Antihistamines • Intranasal corticosteroids

b) Physical and clinical examination

In a patient with suspected AR, physical examination includes visual assessment for outward signs such as mouth breathing, frequent sniffling or throat clearing, allergic salute or nasal crease.[5] Clinical examination involves anterior rhinoscopy and nasal endoscopy for abnormal secretions, or structural abnormalities (Table 3 and 4). Other assessments include examination of ears, sinus, oropharynx, chest and skin.[2]

Table 3: Clinical examinations in suspected AR

Technique	Examination
Anterior rhinoscopy2	Hypertrophic,pale and boggy inferior and/or middle turbinates suggesting inflammation
	Presence or absence of clear, colored or purulent secretions
	Presence of deviated septum (it usually does not cause rhinitis)
	Presence or absence of nasal polyps • Small polyps confined to sinuses might be missed • Larger polyps can be observed in the nasal vestibule in yellow/grey color (different from the inferior turbinate)
	Presence of nodules, crusting, granulations, and septal perforations • Yellow submucosal nodules with a cobblestone appearance suggest sarcoidosis • Crusting and granulations suggest vasculitis • Septal perforation may occur after septal surgery or due to chronic vasoconstriction (cocaine, alpha agonist) granulomatous polyangiitis, anti-phospholipid syndrome and nose picking
	Throat examination-cobblestoned lymphoid hyperplasia, post-nasal drip
Nasal endoscopy2	• Examination of both anterior and posterior parts of the nasal cavity • It is more specific than rhinoscopy

Table 4: Components of physical and clinical examination

Sr. no.	Assessment	Component
1	Physical2	Allergic salute and/or horizontal nasal crease across dorsum of nose and/or eye involvement
		Chronic mouth breathing
		Allergic shiners (dark circles under eyes)
		Frequent sniffling and/or throat clearing
		Anterior rhinoscopy or nasal endoscopy • Mucosal swelling, bleeding • Abnormal secretions - pale, thin • Polyps or other structural abnormalities
		Sinuses • Palpation of sinuses for signs of tenderness • Maxillary tooth sensitivity

2	Clinical2	Posterior oropharynx • Postnasal drip • Lymphoid hyperplasia (“cobblestoning”) • Tonsillar hypertrophy
		Chest and skin • Atopic disease • Wheezing

c) **Differentiating indicators between common cold and allergic rhinitis** Common cold is anexample of infectiousrhinitis which could be acute or chronic. Symptoms of chronic infectious rhinosinusitis include mucopurulent nasal discharge, facial pain and pressure, olfactory disturbance, and postnasal drainage with cough.10 Additionally, symptoms of AR are frequently mistaken for those of common cold. The main difference between common cold and AR is duration of symptoms. In addition, presence of fever, malaise, and sore throat are more indicative of common cold. If the symptoms last for more than 2 weeks, regardless of the time of the year, it should be an indication of a cause other than common cold infection. Also, AR may have a seasonal component or clear allergic aggravation, and is unlikely to have an accompanying sore throat as in common cold.[18]

d) Identification of common signs and symptoms of allergic rhinitis

The classic symptoms of rhinitis aresneezing, rhinorrhea(runny nose), nasal congestion, and itching. Rhinitis condition suggestive of allergy includes sneezing, itchy nose, itching palate, and eye involvement.[19]

An appropriate diagnosis of allergic rhinitis is based on examining the history of allergic symptoms and identifying features of sneezers and runners1 (Table 5).

Table 5: Features of sneezers/runners and blockers

Symptoms	Sneezers and Runners1	Blockers1
Sneezing	Especially paroxysmal	Little or more
Rhinorrhea	Watery anterior or posterior	Thick mucus more posterior
Nasal itching	Yes	No
Nasal blockage	Variable	Often severe
Diurnal rhythm	Worse during day Improving at night	Constant day and night May be worse at night
Conjunctivitis	Often present	---

I. Nasal symptoms of AR

➢ **Sneezing**

Paroxysmal repetitive sneezing (10 to 15 times in a row or even more), isaclassic symptom of allergic rhinitis, caused by stimulation of irritant receptors supplied by trigeminal nerve endings, which initiates a central reflex.[20]

• **Rhinorrhea –** In AR, rhinorrhea can be anterior or posterior, generally manifesting as postnasal drip. [5]

➢Bilateral clear secretion is a significant and common feature of AR, whereas, isolated, unilateral clear nasal discharge is uncommon.[5,19]

Discolored secretions can also be associated with allergy e.g. eosinophils in secretions give a yellow coloration (allergy or infection), neutrophils give green secretions (infection). [5,19]

• **Nasal obstruction –** In AR, nasal obstruction may be partial or complete. Its severity often correlates with systemic manifestations.[5,19]

➢ AR usually causes bilateral nasal obstruction; however, it may also be due to nasal polyps or septal deviation. [5]

➢ Alternating nostril obstruction may occur due to rhinitis, exposing the nasal cycle i.e. changes in blood pooling in capacitance vessels from one side of the nose to the other, contributing to mucosal swelling. Other causes of obstruction include nasal polyps, foreign bodies, and rarely tumors.[5,19]

• **Itching –** Another important clinical feature of allergic rhinitis is nasal itching. People with AR are also reported to have itching of the eyes, soft palate and inner ear.[21]

II. Extranasal symptoms

• **Ocular symptoms -**

AR also involves intense itching, redness and swelling of the conjunctiva ofthe eye with lacrimation, eyelid swelling and (in severe cases) periorbital oedema, which can be aggravated by eye rubbing.[19]

• **Other extranasal symptoms** - dry mouth, fatigue, mouth breathing, and daytime somnolence.[22]

Extranasal symptoms of AR are frequently overlooked in patients with AR, especially in chronic AR. They may significantly affect the health-related quality of life of the patients with AR.[22] These symptoms have been suggested to correlate well with physical health and mental health in allergic rhinitis patients, indicating assessment and therapeutic consideration for extranasal symptoms in AR.[22]

***e)* Aggravating factors and specific allergens contributing to AR**

Common triggers of AR are domestic allergens as mites, domestic animals, insects or may be of plant origin; common outdoor allergens include pollens and molds; occupational triggers as latex; tobacco smoke; automobile exhaust which includes ozone, oxides of nitrogen and sulphur dioxide; aspirin and other non-steroidal anti-inflammatory drugs.[1] An evaluation of the patient's home and work/school environments is recommended to determine potential triggers of allergic rhinitis. [2]

Recommendations: Preliminary evaluation

1. **History examination**
   should include personal history such as symptom severity and frequency, seasonality, triggering factors, family history, social environment, presence of comorbid conditions, medication or drug use, response to previous medications.
2. **Physical assessment** should include signs such as allergic salute, mouth breathing, throat clearing, and sniffling.
3. **Clinical assessment** should includeanteriorrhinoscopy or nasal endoscopy
4. **Identification of primary symptoms of AR –**
   - Sneezing (paroxysmal repetitive)
   - Rhinorrhea - Bilateral clear secretions; unilateral clear secretion is uncommon; discoloured secretions may indicate allergy or infection
   - Nasal obstruction – bilateral obstruction which can be partial or complete. Nasal polyps and septal deviation may also cause obstruction
   - Nasal itching and ocular symptoms (itching, redness and swelling)
5. **Nasal crusting or bleeding is uncommon in AR.** Its presence should indicate other conditions such as chronic rhinosinusitis, nose picking, atrophic rhinitis, etc. or frequent use of decongestants
6. **Identification of extranasal nasal symptoms should be routinely performed for all patients with AR**
   - The severity of extranasal symptoms implies chronicity of AR condition
   - It is important to assess their effect on physical and mental health of the patient
7. **Duration of symptoms for more than 2 weeks should indicate allergic causality**
8. **Evaluation and determination of potential triggers is essential**

A) Diagnosis Diagnosis of allergic rhinitis is made essentially by history and clinical examination. Skin prick allergy test remains as one of the important tests in diagnosing AR (table 6). Laboratory investigations are usually unnecessary, their use is guided by the history, examination and results of skin prick tests.5 **Table 6: Common clinical investigations in AT**

Test	Features
Skin-prick allergy test	Helps in diagnosing causative allergen
Cytology **Nasal secretion**	Useful investigation in NARES
Allergen-specific **IgE testing**	It can be done in individuals in whom skin prick allergy test is contraindicated
CBC, DC, Peripheral smear	Only if specifically anything in history
NARES: Non-allergic rhinitis with eosinophilia syndrome; CBC: Complete blood count; DC: Differential count	

a) Skin prick test

Skin prick testing is a strongly recommended procedure to confirm sensitization in IgE-mediated allergic reaction. It is minimally invasive, inexpensive, and rapid i.e. the results can be interpreted within 15-20 minutes. The test provides objective confirmation of sensitivity.[23] For allergens, the peak of the skin wheal to be reached around 10–20 min after the test, and a reading of the largest diameter of the skin wheals after 15 min is considered. It is recommended from infancy to old age.[24]

Skin prick test is contraindicated in -

- Pregnancy - Uterine contractions are a possibility when epinephrine is administered if a systemic reaction ever occurs[23]
- Patients with severe eczema, or those who are taking antihistamines, or other medications such as certain antidepressants, beta blockers or calcineurin inhibitors[15]
- People with chronic illnesses such as renal failure, or cancer which may decrease the skin test reactivity [23]

b) Allergen-specific IgE testing - It provides an *in vitro* measure of a patient's IgE levels against a specific allergen. It is performed typically by modified sandwich immunoassay[2]. It is carried out when skin testing is not possible (in case of eczema

or use of antihistamines) or allergen reagent is not available or if there is expected risk of anaphylaxis in skin prick allergy test.[11] It has low sensitivity and is cost ineffective compared to skin prick test.[2] It generally correlates with the results of skin prick test, showing similar sensitivity, especially for house dust mites, but not for other inhaled allergens.[19]

c) Total IgE -

Testing total IgE may lead to erroneous assumption of allergy as the cause of symptoms, if it is elevated, thus is of limited benefit. However, it may be used in cases like severe eczema, where total IgE may be grossly elevated and modest elevations in allergen-specific IgE may have a lower positive predictive value.[19]

Serum Specific Ig E

Measurement of serum specific immunoglobulin E (IgE) is an important diagnostic tool in evaluating type I hypersensitivity reactions and allergic diseases of the upper and lower airway. Estimation of allergen-specific IgE provides an objective assessment of sensitization to specific allergens and complements the clinical history and skin testing.

The test is based on the principle of detecting circulating IgE antibodies directed against defined allergens. The most widely used methods include ImmunoCAP (fluorescent enzyme immunoassay), enzyme-linked immunosorbent assay (ELISA), and chemiluminescent immunoassays. In these assays, allergens are bound to a solid phase and the patient's serum is added; specific IgE, if present, binds to the allergen. After washing, an enzyme-labelled anti-IgE antibody is introduced, and the resulting color or fluorescence intensity is measured quantitatively. Results are expressed in kilo units per litre (kU/L), with higher levels indicating stronger sensitization.

Specific IgE testing is particularly useful when skin prick testing cannot be performed, such as in patients with extensive dermatitis, dermographism, or those taking antihistamines. It is also valuable in paediatric or uncooperative patients. However, the presence of serum specific IgE indicates sensitization, not necessarily clinical allergy; therefore, interpretation must always correlate with the patient's history and symptoms.

The test assists in confirming the diagnosis of allergic rhinitis, allergic fungal sinusitis, asthma, and food or drug allergies. It also helps in selecting allergens for immunotherapy and monitoring response to treatment.

Component-Resolved Diagnosis (CRD)

Component-resolved diagnosis (CRD) represents an advanced approach in allergy diagnostics that allows identification of sensitization to specific allergenic molecules rather than whole allergen extracts. This molecular-based technique provides a more precise characterization of allergic responses and helps differentiate true sensitization from cross-reactivity.

Traditional tests such as skin prick testing and serum specific IgE assays use crude allergen extracts that may contain multiple proteins, leading to potential cross-reactivity among related allergens (e.g., between pollens and foods). In contrast, CRD employs purified natural or recombinant allergen components, enabling detection of IgE antibodies to individual allergenic proteins.

The principle involves measuring specific IgE antibodies to single allergenic molecules using technologies like ImmunoCAP ISAC (Immuno Solid-phase Allergen Chip) or microarray platforms. These assays allow simultaneous testing against a wide panel of molecular allergens with minimal serum volume.

Clinically, CRD offers several advantages. It helps distinguish primary sensitization from cross-reactive patterns (e.g., genuine peanut allergy versus birch pollen-related oral allergy syndrome), predicts the risk of systemic versus localized reactions, and guides allergen-specific immunotherapy selection. It is also valuable in polysensitized patients and in assessing prognosis and disease severity. However, CRD should not be used in isolation; results must always be interpreted in the context of clinical history and conventional allergy testing. The technique marks a shift toward personalized allergy diagnosis and management, enhancing precision and safety in therapeutic decision-making.

Nasal Provocation Test (NPT)

The nasal provocation test (NPT) is a standardized diagnostic procedure used to confirm allergic rhinitis by objectively assessing nasal reactivity to specific allergens. It is considered the gold standard for identifying the clinical relevance of a suspected allergen when skin prick testing or serum specific IgE results are inconclusive.

The test involves the controlled administration of a known concentration of allergen extract into the nasal cavity, usually by spray or drops, followed by serial evaluation of the patient's nasal response. The procedure begins with baseline assessment of nasal patency, typically measured using rhinomanometry, acoustic rhinometry, or peak nasal inspiratory flow. After allergen exposure, changes in nasal airflow, secretion, sneezing frequency, and subjective symptoms such as congestion or itching are recorded at defined intervals. A positive test is indicated by a significant reduction in nasal airflow or a marked increase in symptom scores following allergen challenge, compared with baseline or control (saline) challenge. NPT can also be used to assess non-allergic rhinitis with local IgE production (entopy) and to evaluate efficacy of immunotherapy or anti- allergic medications. The test is generally safe but may occasionally provoke severe nasal obstruction or systemic symptoms, requiring medical supervision and emergency preparedness.

Therefore it should be done in hospital setup and only by experienced specialist. Contraindications include severe asthma, acute rhinosinusitis, or recent nasal surgery. Thus, NPT remains a valuable diagnostic tool for establishing causative allergens, confirming clinical allergy, and guiding targeted therapeutic strategies.

Local Allergic Rhinitis (LAR)

Definition: Local allergic rhinitis (LAR) is a distinct phenotype of rhinitis characterized by localized nasal allergic inflammation in the absence of systemic atopy (i.e., negative skin prick test and serum specific IgE). Despite negative systemic allergy testing, these patients show local production of specific IgE antibodies within the nasal mucosa, leading to typical allergic symptoms.[46]

Pathophysiology: LAR represents a localized type I hypersensitivity reaction confined to the nasal mucosa. On allergen exposure, nasal mucosal mast cells and B cells produce specific IgE that binds to FcεRI receptors, causing degranulation and release of histamine, leukotrienes, and cytokines (IL-4, IL-5, IL-13). This induces eosinophilic inflammation and a Th2-dominant local immune response.[46]

Recent evidence has identified local IgE class-switch recombination in nasal mucosa, indicating that sensitization can occur locally without systemic involvement.

Clinical Features: Patients with LAR exhibit the same symptoms as classical allergic rhinitis — sneezing, watery rhinorrhea, nasal obstruction, and itching — but show negative skin prick and serum IgE tests. Symptoms are perennial or seasonal depending on exposure, with nasal eosinophilia commonly present.

Diagnosis: The gold standard test is the nasal allergen provocation test (NAPT) demonstrating a local allergic response. Additional supportive findings include:

- Positive nasal specific IgE detection (by nasal lavage or brush cytology).
- Elevated eosinophil cationic protein (ECP) or local tryptase levels.

Management:

Treatment parallels that of systemic allergic rhinitis:

- Intranasal corticosteroids and oral/non-sedating antihistamines are first-line.
- Allergen immunotherapy (AIT)—both SCIT and SLIT—has shown clinical benefit and reduction in local IgE synthesis.

AR with asthma

Clinical tests to diagnose AR with asthma involves allergic testing using skin prick test or IgE estimation long with lung function tests.[5]

AR with comorbid conditions Comorbidities in allergic rhinitis include conjunctivitis, chronic otitis media with effusion, eustachian tube dysfunction, sleep impairment, obstructive sleep apnea, rhinosinusitis, hyposmia and bronchial hyper-reactivity. A wide range of clinical tests are employed in order to diagnose AR with comorbid clinical conditions. These tests include pulmonary function tests, CT scan, endoscopy, sleep pattern test, thyroid function tests, etc.[11] There can also be association of other IgE-mediated disorder such as food allergy and drug allergy in these patients.

B)Differential diagnosis

Crusting of secretions within the nose is an unusual symptom of AR.[11] If nose-crusting and nose bleeding are primary complaints, it may suggest other conditions like chronic rhinosinusitis, nose picking, Wegener granulomatosis, sarcoidosis, other vasculitides, ozena/atrophic rhinitis (wasting away of the bony ridges and mucous membranes inside the nose), or frequent use of nasal decongestants.[5,11] The conditions that comprise differential diagnosis in a patient with AR are given in table 7 with their features.[11]

Table 7: Differential diagnosis of AT

Type	Feature
NARES	• Skin tests negative; nasal smears show eosinophilia • It may go on to develop nasal polyposis
Autonomic rhinitis (vasomotor)	• Physical/chemical triggers • More common in middle age with clear rhinorrhea, especially in the morning.
Drug-induced rhinitis	• β-adrenergic blockers, angiotensin-converting enzyme inhibitors. • Rhinitis medicamentosa with chronic nasal decongestant use
Hormonal	Pregnancy, oral contraceptives, thyroid disease
Cystic fibrosis	Children with polyps
Immunodeficiency	Chronic infective sinusitis secondary to antibody deficiency
Malignancy	Bloody, purulent discharge, pain, and nasal blockage – symptoms may be unilateral.
Structural abnormalities	Unilateral nasal obstruction secondary to nasal septal deviation
LocalAR	Skin and serum IgE test negative but positive response to nasal allergen challenge
Idiopathic/noninfectious non-AR	Cause unclear; may respond to topical capsaicin

Recommendations: Diagnosis and differential diagnosis

- For diagnosis of AR, laboratory investigations including blood count, cytology, is recommended.
- Skin prick test is strongly recommended as a routine procedure in all age groups in order to identify the specific allergen that the patient is sensitized with.
- Resuscitation therapy should be made accessible for emergency cases of skin prick test and should be written as adverse reaction of skin prick test (can become intradermal in some cases)
- IgE testing is recommended in unequivocal and unexpected skin test results.
- Differential diagnoses should be ruled out in order to direct appropriate treatment options for AR.
- In young children, nasal congestion often results from adenoid hypertrophy or chronic rhinosinusitis.
- During periods spent outside throughout the pollen season, pollinosis shows normal nasal mucosa findings and negative nasal eosinophil tests.
- Positive skin test results and serum specific IgE antibody measurements do not necessarily implicate the antigen as the cause, thereby necessitating a comprehensive diagnosis.
- Clinical diagnosis of allergic rhinitis is feasible in symptomatic individuals with typical nasal mucosal findings. In cases of an inadequate response to medication, allergy diagnosis or antigen identification tests are warranted.
- Discrepancies between medical history and results of skin tests or serum specific IgE tests may necessitate performing both tests for an accurate diagnosis.
- In cases where skin tests, nasal provocation tests, and serum specific IgE tests yield negative results, retesting should be considered, in conjunction with factoring in antigen selection and test sensitivity.
- Regional variations exist in positive antigens, which necessitate an awareness of local specificities.
- Allergies to pets (particularly cats and dogs) and insects (particularly moths) have recently become more prevalent and should be considered when suggestive history is there.
- Rhinitis with nonspecific hypersensitivity that requires differentiation includes eosinophilic rhinitis, vasomotor rhinitis, and local allergic rhinitis (LAR).
- Eosinophilic rhinitis presents with increased eosinophils in nasal secretions despite negative skin tests and serum specific IgE tests. Similarly, LAR features negative skin tests and serum specific IgE tests, but positive nasal provocation tests and detection of antigen-specific IgE in nasal secretions.

Oral allergy syndrome Oral allergy syndrome (OAS), also called pollen-food allergy syndrome, is a type of food allergy in which people sensitized to inhalant pollens develop itching or mild swelling of the lips, mouth, or throat after eating certain raw fruits, vegetables, or nuts. It is usually mild and limited to the oral cavity, but rarely it can progress to systemic reactions or anaphylaxis[26]. It is a IgE mediated allergic reaction caused by cross- reactivity between proteins in pollens (such as birch, ragweed, or grass) and structurally similar proteins present in plant foods. The immune system of a pollen-allergic person mistakes these food proteins for pollen proteins and triggers an immediate hypersensitivity reaction on contact with the oral mucosa. Typical associations include birch pollen with apples, pears, peaches, carrots, celery and certain nuts; ragweed with melons and bananas; and grass pollens with tomatoes and melons. Symptoms occur most often with raw foods, while the same items are often tolerated when well-cooked because heating denatures the labile cross-reactive proteins.

Clinical features

Symptoms usually start within minutes of eating the offending food and include itching or tingling of the lips, tongue, palate and throat, with mild swelling and sometimes a sensation of tightness. Systemic manifestations such as urticaria, wheeze, or hypotension are uncommon but can occur, especially with nuts or in highly sensitized individuals.

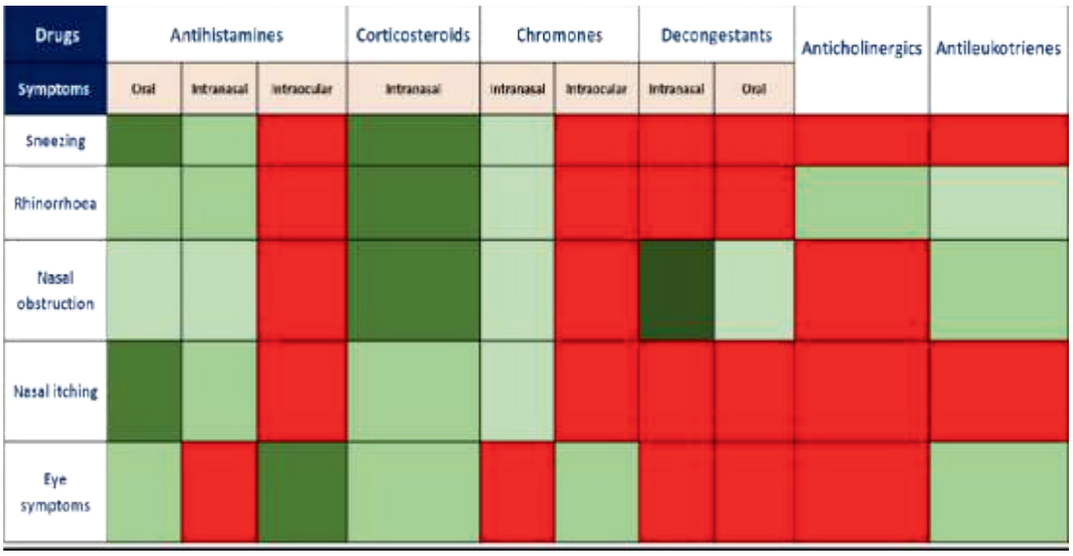
Diagnosis and management

Diagnosis is clinical, supported by a history of pollen allergy and reproducible oral symptoms after specific raw plant foods, and can be aided by skin prick testing or serum specific IgE to pollens and implicated foods. Management focuses on avoidance of trigger foods in raw form, using cooked or peeled versions when tolerated, and prescribing emergency medication such as an epinephrine autoinjector if there is any history suggesting systemic reactions.

Treatment

The main treatment goal for allergic rhinitis is symptom relief and prevention of disease progression and treatment complications.[2,25] The rationale for treatment choice depends on level of efficacy of the drugs and their affordable costs. Recommended drugs for the treatment of AR are oral/intranasal antihistamines, intranasal corticosteroids, leukotriene receptor antagonists, etc. along with decongestants and oral corticosteroids in particular group of patients. Each available treatment option has variable effects of symptoms of AR.1 (Table 8)[1,2]

Table 9: Treatment options and their effect on the symptoms of AR



Green – Effective (light to dark shade suggests strength of response); Red – Not effective

The goal of treatment is to achieve the following results for the patient:

1. Achieving an absence of symptoms or very mild symptoms, thereby allowing for an uninterrupted daily routine without the need for medication.
2. Maintaining stable and persistent symptoms, with only rare and brief acute exacerbations.
3. Avoidance of antigen-induced reactions altogether or the experiencing of only mild reactions.

Pharmacotherapy

1. Antihistamines

HistamineH1 receptor antagonists, commonly known as antihistamines, have been used to treat allergic rhinitis since the 1940s. First generation antihistamines such as diphenhydramine and promethazine hydrochloride were fast acting but had short-lived effects, causing sedation, cognitive impairment, drowsiness due to central

nervous system depression, and anticholinergic effects leading to dry mouth, urinary retention, and constipation. Second generation drugs are the preferred first-line treatment for all patients with AR.[2] They are largely non-sedating and have a better safety profile with no clinically significant anti-cholinergic activity at therapeutic doses.[5,27] Overall, antihistamines (oral, intranasal, ocular) demonstrate clinical efficacy with least adverse effects and improve quality of life of patients with AR.[5] They effectively improve sneezing, itching and rhinorrhea when taken regularly at the time of maximal symptoms or before exposure to an allergen.[2] They have only a modest effect on nasal congestion.[5,18] Given their more lipid solubility than second generation antihistamines, first generation antihistamines cross the blood brain barrier and are associated with sedation, fatigue, and impaired mental status.[27] Nonsedating second generation antihistamines are recommended as first line of treatment in mild intermittent Allergic Rhinitis.[5]

Advantages of intranasal antihistamines over oral antihistamines [5,27]

- Target delivery of the drug with faster onset of action
- Improvement of AR symptoms and decreased nasal obstruction
- Convenient rescue therapy, for breakthrough symptoms
- Effective in case of failed oral antihistamine therapy

2. Corticosteroids

When the disease becomes persistent, intranasal corticosteroids are the mainstay of management of AR.[2,27] They can be used alone or in combination with oral antihistamines. They are effective in reducing inflammation of the nasal mucosa and improve mucosal pathology.[2] They demonstrate significant total AR symptom reduction with variable effects on associated eye symptoms. Unlike other treatment options, they are effective in treating nasal congestion.[5] They also reduce lower airway symptoms in patients with concurrent asthma and allergic rhinitis.[2]

Intranasal steroids (INS) have low systemic absorption, and are extremely safe for prolonged local usage. Some of the intranasal corticosteroids like budesonide and beclomethasone have systemic side effects like glaucoma and local side effects like epistaxis.[28] Oral corticosteroids when used are only recommended for short-term (5-7 days) duration in severe cases, not responding to intranasal corticosteroids and oral antihistamines.[2,29] In chronic rhinosinusitis with nasal polyps where inflammation is more severe and accompanied with severe nasal obstruction, short bursts of oral steroids may be given under the care of the treating physician keeping the side effects in mind.[5] When a patient is symptomatic despite treatment with oral antihistamines and INS, the first step is to check adherence and the use of the correct technique by the patient[30]

Clinical practice suggests that most patients who have found INS unhelpful have not persisted with treatment for an adequate period.[31] Patients should be advised that the onset of action of INS takes some time and that they should be used regularly for a minimum of two weeks before considering them unsuccessful.[32] Patients with seasonal AR should commence therapy two weeks before the pollen season as this improves efficacy.[33,34] To maximize the response to treatment, patients using INS should be given clear instructions on this aspect. They must also be advised to direct the nasal spray laterally (rather than medially towards the nasal septum) towards the lowest and anterior most part of inferior turbinate of that side and not to sniff for at least 10 minutes after spraying. All these measures will increase benefit. Tipping the head back and sniffing hard decreases treatment efficacy because the spray will run down the nasopharynx and patients should be advised not to do this. To maximize effect patients may well be advised to douche with saline prior to using their nasal spray. Saline douching clears mucus and mucus plugs if any, from the nasal cavity permitting local absorption of the INS, thereby increasing its effectiveness. The use of saline douching has demonstrable benefit in symptom reduction in children and adults with seasonal rhinitis as well as in chronic rhino-sinusitis.[35,36]

When saline nasal douching is advised along with INS, it needs to be done followed by application of INS.

3. Anti-leukotrienes

Clinical studies have demonstrated that the therapeutic profile of leukotriene receptor antagonist or anti-leukotrienes is similar to antihistamines. However, their clinical response is less consistent than that observed with antihistamines. In addition, they are less effective than topical nasal corticosteroids.[5] They are well tolerated with frequent adverse events such as occasional headache, gastrointestinal symptoms or rashes. They also reduce bronchospasm and attenuate the inflammatory response, thus may be useful in patients with concomitant asthma.[27] In case of inefficacy or tolerability issues of oral antihistamines and/or intranasal corticosteroids, LTRAs may be considered.[2] In 2008, the US FDA issued an alert about an increased risk of psychiatric events such as sleep disturbances, suicidal behaviour, or psychotic reactions associated with montelukast use, especially in children and adolescents. There have been safety concerns regarding increased risk of sleep disturbances in infants and children and depression or anxiety symptoms and psychotic reactions in adolescents.[28]

Montelukast is recommended to be used for not more than 6 weeks.[38,39]

4. Decongestants

Oral and intranasal decongestants are useful for relieving nasal congestion in patients with allergic rhinitis.[2,18] Intranasal decongestants allow delivery of intranasal drugs beyond the inferior turbinates and relieve nasal congestion via vasoconstriction within minutes, faster and with greater impact than intranasal steroids. [5] Adding intranasal decongestants to INCS does not result in increase in efficacy but is associated with higher risk of adverse events and cost. When used as

combination drug in specific population patient should specifically be warned to switch to plain INCS in short time. In pregnant women, they act as uterine stimulants and may trigger pre-mature labour, hence are contraindicated during pregnancy.[40,41] Topical decongestant should be used for short duration of 5-7 days as their prolonged use carries risk of rhinitis medicamentosa [2,27]. Oral decongestant like pseudoephedrine have good efficacy but should be used with caution in patients with Hypertension, Ischemic Heart disease, Prostate hypertrophy, renal impairment and increased intraocular pressure. They should also not be used for prolonged periods, preferably for 10-14 days only.

5. Anticholinergics

Clinical evidence suggests use of anticholinergic drugs in presence of rhinorrhea.[5,27] It decreases rhinorrhea, particularly if it is of neurogenic origin rather than inflammatory. It usually has no effect on other nasal symptoms. They may be used as add-on if watery rhinorrhea persists despite using topical steroids and antihistamines.[5]

6. Biologics

Biologics are a recent addition to the therapeutic armamentarium for allergic rhinitis (AR), targeting specific immunologic pathways involved in the IgE-mediated allergic cascade According to the Indian Guidelines for Diagnosis and Management of Respiratory Allergy (Indian College of Allergy, Asthma and Applied Immunology, 2021) and consensus statements aligned with ARIA and ICAR 2023, biologics are not recommended as first-line therapy and are reserved for selected, severe, or refractory cases.

The main biologic agent approved and supported by evidence in AR is omalizumab, a recombinant humanized monoclonal antibody that binds to the Ce3 domain of free IgE, preventing its attachment to FcERI receptors on mast cells and basophils. This reduces allergen-induced degranulation and release of inflammatory mediators, thereby attenuating nasal and ocular symptoms. Omalizumab is considered in patients with severe, persistent AR unresponsive to optimal pharmacotherapy and allergen immunotherapy, particularly when there are comorbid conditions such as moderate-to-severe allergic asthma or chronic rhinosinusitis with nasal polyps (CRSwNP). Other biologics such as dupilumab, an anti-IL-4 receptor a monoclonal antibody that
inhibits both IL-4 and IL-13 signaling, have shown efficacy in Type-2 inflammatory airway diseases, including CRSWNP with associated AR. Anti-IL-5 agents (mepolizumab, reslizumab, benralizumab) have limited evidence in AR and are

primarily indicated for eosinophilic asthma and Mepolizumab in chronic rhinosinusitis with nasal polyposis with eosinophilic load.

7. Probiotics

Probiotics may help patients with allergic rhinitis mainly by modulating the immune system and, in some studies, by reducing symptom severity and improving quality of life, but the effect is strain-specific and not uniformly confirmed across all trials. They are best viewed as an adjunct to standard therapy rather than a stand-alone replacement

Immune modulation

In allergic rhinitis, the immune response is skewed toward a T helper 2 (Th2) profile, which promotes IgE production and allergic inflammation. Certain probiotic strains (especially Lactobacillus and Bifidobacterium) can shift the balance toward a more T helper 1 (Th1) or regulatory profile, reducing Th2-driven responses.[40,41]

Probiotics can influence cytokine production (for example, increasing regulatory cytokines and reducing pro-allergic cytokines), which may dampen nasal mucosal inflammation and reactivity to allergens.

Effects on gut microbiota and barrier

Probiotics are live microorganisms that alter the composition or activity of gut microbiota, which in turn interacts with the gut-associated immune system. This "gut–immune–airway" axis can affect systemic immune responses, including those in the nasal mucosa, potentially reducing allergic sensitization or reactivity.

Some strains may improve epithelial barrier function and reduce systemic exposure to allergens and inflammatory signals, indirectly lowering allergic rhinitis activity

Clinical symptom benefits

Multiple randomized trials and meta-analyses report that probiotics can reduce nasal symptom scores (such as sneezing and congestion), decrease medication needs, and improve disease-specific quality of life compared with placebo, although results are heterogeneous.

A recent network meta-analysis suggests that probiotic mixtures and certain genera (for example, Saccharomyces and Lactobacillus) may be particularly effective for lowering symptom scores, serum IgE, and eosinophil counts, but optimal strains and regimens remain unclear.

Pharmacological management of allergic rhinitis

Class	Mechanism of action	Available drugs	Recommendations and clinical use	Common adverse events
Antihistamines	Block histamine H1 receptors18	**First generation** Chlorpheniramine Diphenhydramine Triprolidine	Limited usage in specific clinical categories like infants below 6 months and pregnant women	Sedation[27]
		Second generation drugs* **Oral** Bilastine Cetirizine Desloratadine Ebastine Fexofenadine Levocetirizine Loratadine	• First-line therapy for mild to moderate intermittet and mild persistent AR[5] • Addition to intranasal steroids for moderate/ severe persistent AR uncontrolled on topical intranasal corticosteroids alone, particularly when eye symptoms are present[5] • Additional treatment for runners/ severe ophthalmic symptoms	Primarily non- sedative; may cause sedation in few susceptible patients only[27]
		Local Azelastine (intranasal) Olopatadine (intranasal/ intraocular)		Bitter aftertaste, headache, nasal irritation and epistax 27
*Second generation antihistamines are listed in alphabetical order				
Corticosteroids (Intranasal)	• Decreases the influx	Fluticasone furoate/propionate Mometasone Budesonide	• First-line therapy	Long term use of budesonide is associated with risk of glaucoma

	of inflammatory[27] • cells Inhibits the release of cytokines[18] • Reduces inflammation of the nasal mucosa[27]	Beclomethasone Triamcinolone acetonide	for moderate-to-severe persistent symptoms[5] • First line of therapy if presenting with severe nasal obstruction, possibly combined with a short-term nasal decongestant[5]	Long term use of beclomethasone and triamcinolone are associated with localized epistaxis and crusting
Budesonide is the only drug with FDA pregnancy B category[27] Mometasone and Fluticasone furoate molecule can be used in children above 2 years[27] Fluticasone is mostly preferred in furoate formulation than propionate given its higher receptor affinity, better absorption in tissues and longer duration of action[44]				
Decongestants	• Acts on adrenergic receptors[27] Causes • vasoconstriction	• Pseudoephedrine • (systemic) Phenylephrine • (systemic) Oxymetazoline and	• Decongestants may be considered for SHORT TERM use in patients without	• Sneezing and nasal dryness,drowsiness[18] • Pseudoephedrine is associated with cardiac

	in the nasal mucosa[27] • Decreases inflammation[27]	xylometazolin e (local)	improvement in congestion with intranasal corticosteroids [27]	issues, primarily palpitations in hypertensive patients Prolonged usage of local deconge stants causes Rhinitis Medica mentosa so usage should not be more than a few days at a time[27] Pseudoephedrine although more efficacious is associated with cardiac issues like palpitations in hypertensive patients and this effect can be reduced with extended release preparations.

Chromones	• Inhibit the degranulation of mast cells and release of histamine [27]	Sodium cromoglycate	Children and adults with mild symptoms only and sporadic problems in season or on limited allergen exposure[5] • ·Useful for individuals unable to take other medications, for example pregnant females[5] • Eye drops are useful ·in conjunctivitisas topical therapy[5]	Epistaxis, nasal irritation, sneezing[27]

Anticholinergics (Intranasal)	Block acetylcholine receptors [18]	Ipratropium	• Patients with watery rhinorrhoea despite compliance with intranasal steroid or intranasal plus antihistamine[5]	Dryness of the nasal mucosa, epistaxis, and Headache [33]
Antileukotrienes	Block leukotriene D4 receptors [27]	Montelukast	• LTRAs should be considered when oral antihistamines and/or intranasal corticosteroid · are not well tolerated or are ineffective in controlling the symptoms of allergic rhinitis[2] It may be particularly useful in patients with coexistent asthma[27]	• Elevated levels of alanine transaminase, aspartate transaminase, and bilirubin18 • Prolonged usage of montelukast has been reported to have neuropsychiatric disturbances especially in children [37]

Specific populations

a) Children

- The principles of treatment for children are the same as for adults, but special care is advised to avoid the side effects in this age group. Doses of medication have to be adjusted with special considerations [1]
- In children, symptoms of allergic rhinitis can impair cognitive functioning and school performance. Use of oral H1-antihistamines may further impair cognitive function1 Nasal saline irrigation is effective in the treatment of AR in children5
- Disodium cromoglycate is safe and is commonly used to treat allergic
- rhinoconjunctivitis in children[l]
- Oral and intramuscular glucocorticosteroids should be avoided in the treatment of rhinitis in young children. Intranasal glucocorticosteroid is an effective treatment for allergic rhinitis. However, their possible effect on growth is of concern [1]
- Mometasone and fluticasone furoate are the only intranasal corticosteroids which areindicated for children more than 2 years of age[27]

Topical concomitant use of decongestant for 3 days is effective in children with significant nasal blockage[5]

b) **Pregnancy**

- Caution is advised for all medications to be used in pregnancy since most of the medicines cross the placenta[5]

- Chromones have not shown teratogenic effects in animals and are the safest drug recommended in the first 3 months of pregnancy (they require multiple daily administration[5]) Budesonide is a FDA category B drug and is a preferred intranasal corticosteroid during pregnancy[5.27]
- There is considerable clinical experience with chlorphenamine, loratadine and cetirizine in pregnancy and may be used additionally [5]
- Decongestants should be avoided [1]
- The initiation of immunotherapy and up-dosing is contraindicated

Antihistamines and nasal steroids should only be used when the clinical imperative outweighs the potential harm to the child[1][5]

c) Treatment ofARwith asthma

Optimal management of rhinitis may improve the symptoms of coexisting asthma especially if it is mild asthma coexisting asthma. Glucocorticoids and anti-leukotrienes are effective in the treatment of both AR and asthma. Inhaled corticosteroids are the drug of choice in the treatment of both allergic rhinitis and asthma. Oral administration of drugs, only in severe refractory cases, may affect both nasal and bronchial symptoms.[1]

d) Treatment of AR in elderly

Allergic rhinitis in elderly patients involves nasal inflammation triggered by allergens like pollen, dust mites, or pet dander, often compounded by age-related nasal changes such as dryness and reduced mucociliary function. Symptoms and common signs include sneezing, itchy nose or eyes, runny nose, congestion, and postnasal drip, which may worsen when lying down. Elderly individuals might also experience nasal crusting, decreased smell or taste, and throat clearing due to structural nasal atrophy and drier mucosa.

Causes and Risk Factors

Allergens provoke IgE-mediated responses, but aging reduces allergic sensitization prevalence while increasing nonallergic rhinitis forms. Factors like polypharmacy, impaired liver/kidney function, and dry nasal passages heighten susceptibility and complicate symptoms.

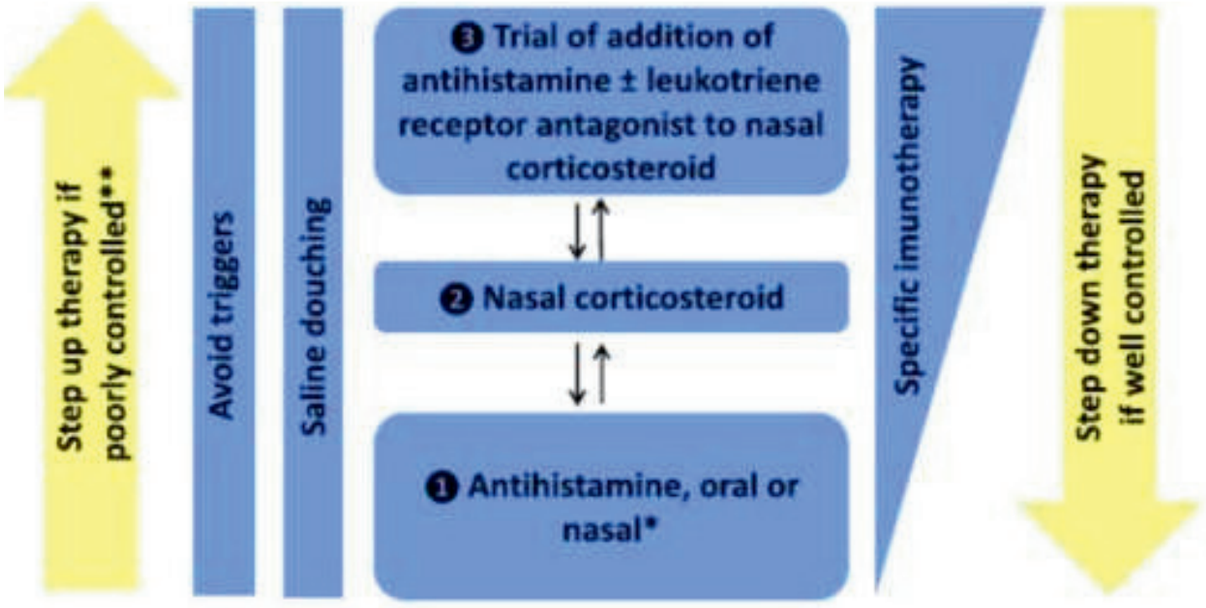
Treatment Options

Prioritize allergen avoidance and nasal moisturization with saline sprays. Second-generation antihistamines, intranasal corticosteroids like mometasone, or ipratropium are safer than first-generation options, which risk sedation and anticholinergic effects in seniors. Consult a physician for allergy testing or advanced therapies if needed.

Combination therapy (Oral/Nasal)

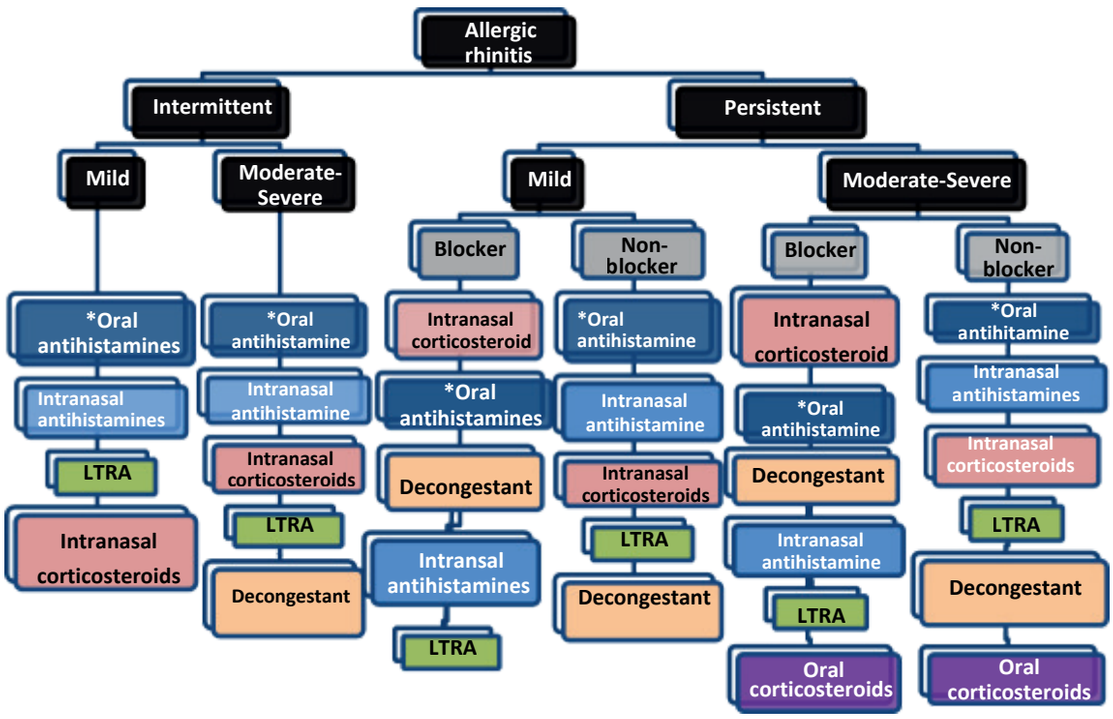
Combination therapy is indicated in patients with severe or persistent symptoms of AR. A wide range of combination therapies are available in the treatment of AR. These include combination of intranasal corticosteroid with oral antihistamines, intranasal corticosteroid and LTRA, intranasal anticholinergics and oral antihistamines, intranasal corticosteroids and intranasal decongestants, etc.45 Clinical studies demonstrate that combination therapy is no more effective than an intranasal corticosteroid alone. However, combination of azelastine and fluticasone has shown superior efficacy results with faster relief with individual treatments in patients with more severe AR.[27]

Recommended treatment approach for AR



*Oral antihistamines may be better tolerated, while intranasal antihistamines have a more rapid onset of action. **Reconsider diagnosis if not controlled within 1–2 weeks

Step-wise pharmacological recommendations for AR



Recommendations are based on the order of drug preference

Caution:

- ***Oral corticosteroids, if used, should be administered for short course i.e. 5-7 days at full adequate dose***
- ***Topical decongestants should be only used as a short-term therapy i.e. 5-7 days***

Step-down treatment to be continued for 3 months

After tapering, continue with minimal dose of the drug as per the patient's

Step-down treatment to be continued for 3 months

* ORAL ANTIHISTAMINES: Nonsedating 2nd generation OAH

ORAL DECONGESTANTS: Can be used in case of significant blockage

Treatment recommendations The panel provided the rationale for the recommendations and the consideration (in lines with the ARIA 2016 and 2024) of all factors influencing the recommendations such as availability and certainty of clinical evidence, values and preferences, feasibility, acceptability by stakeholders, requirements for resources, feasibility, and effect on health outcomes.[35]

Treatment option	Recommendati on		Assumed values and preferences	Explanations and other considerations
	A	B		

Combination of OAH and INCS versus INCS alone	In patients with SAR, either a combination of an INCS with an OAH or an INCS alone is recommended (conditional recommendation; low certainty of evidence)	In patients with PAR, we suggest an INCS alone rather than a combination of an INCS with an OAH is recommended (conditional recommendation; very low certainty of evidence)	• The choice of treatment would depend mostly on patient preferences and local availability and cost of treatment. • In the majority of situations, potential net benefit would not justify spending additional resources.	• This is a conditional recommendation, and thus different choices will be appropriate for different patients. In settings in which the additional cost of an OAH is not large and/or patients' values and preferences differ from those assumed by guideline panel members, a combination therapy might be a reasonable choice, especially in patients whose symptoms are not well controlled with an INCS alone, those with pronounced ocular symptoms, or those commencing treatment because of likely faster onset of treatment effects. This • recommendation concerns regular use of newer and less sedative OAHs and INCSs in patients with SAR. For older OAHs with more

				sedative effects , the balance of desirable and undesirable effects may be different. Currently available evidence suggests that there is no additional benefit from a combination therapy compared with INCS alone, and there might be additional undesirable effects. This recommendation is conditional because of sparse information and thus very low certainty of the estimated effects.

Combination of INAH and INCS versus INCS alone	In patients with SAR, either a combinatio n of an INCS with an INAH or an INCS alone is recommended (conditional recommend ation; moderate certainty of evidence)	In patients with PAR, either a combination of an INCS with an INAH or an INCS alone is recommended (conditional recommenda tion; very low certainty of evidence)	• The choice of treatment will mostly depend on patient preferences and local availability and cost of treatment. • At initiation of treatment (approximat ely the first 2 weeks), a combination of an INCS with an INAH might act faster than an INCS alone and thus might be preferred by some patients	• This is a conditional recommendati on, and thus different choices will be appropriate for different patients. • In settings in which the additional cost of combination therapy is not large and/or patients value potential benefits more than any increased risk of adverse effects, a combination therapy might be a reasonable choice.

Combination of an INAH and an INCS versus INAH alone	In patients with SAR, combinatio n of an INCS with an INAH rather than an INAH alone is recommend ed (conditional recommenda tion; low certainty of evidence)	-----	• This recommendation places higher value on additional reduction of symptoms and improved quality of life with a combination therapy compared with an INAH alone. It places a lower value on avoiding additional cost (expenditure of resources).	• This is a conditional recommendation, and thus different choices will be appropriate for different patients. In settings in which the additional cost of a combination therapy is large, an alternative choice (i.e., and INAH alone) might be equally reasonable. One panel member thought that the recommendation should be conditional for either the intervention or comparison.

LTRA vs an OAH	In patients with SAR, either an LTRA or an oral antihistamine is recommended (conditional recommendation; moderate certainty of evidence)	In patients with PAR, an oral antihistamine rather than a LTRA is recommended (conditional recommendation ; low certainty of evidence)	• The choice of an LTRA or oral antihistamine will mostly depend on patient preferences and local availability and cost of specific medications. In many settings an OAH might still be more cost-effective, but this will largely depend on availability of generic LTRAs and the local cost of various newer- generation OAHs and LTRAs. This recommendation places a higher value on possibly larger improvement of symptoms and quality of life	• Some patients with AR who have concomitant asthma, especially exercise- induced and/or aspirin-exacerbated respiratory disease, might benefit from an LTRA more than from an oral antihistamine However, this recommendation applies to treatment of AR but not to treatment of asthma. Patients with asthma who have concomitant AR should receive an appropriate treatment according to the guidelines for the treatment of asthma. This is a conditional

			with an OAH compare d with an LTRA. It places a lower value on possible increased risk of somnole nce.	recommendation, and thus different choices will be appropriate for different patients based on their preferences for reduction of symptoms vs avoiding the risk of adverse effects. This might be more important for patients with PAR than those with SAR because they might use those medications for longer periods of time. Some patients with AR and concomitant asthma, especially exercise- induced and/or aspirin-exacerbated respirator y disease, might benefit from an LTRA more than from an OAH. However, this recommendation applies to treatment of AR but not to treatment of asthma. Patients with asthma who have concomitant AR should receive an appropriate treatment according to the guideline s for the treatment of asthma.

INAH vs an INCS	In patients with SAR, an INCS rather than an INAH is recommended (conditional recommendation; moderate certainty of evidence)	In patients with PAR, we suggest an INCS rather than an INAH (conditional recommendation; low certainty of evidence)	• This recommendation places a higher value on likely small but greater reduction of symptoms and improvement of quality of life with an INCS compared with an INAH and a lower value on avoiding larger cost of treatment with an INCS in many jurisdictions. This recommendation places a higher value on probably greater reduction of nasal symptoms with an INCS compared with an INAH, although the overall difference is likely small. It places a lower value on avoiding larger cost of treatment with an INCS in many jurisdictions.	• This is a conditional recommendation, and thus different choices will be appropriate for different patients. Clinicians must help each patient to arrive at a decision consistent with her or his values and preferences, considering local availability and costs.

INAH vs an OAH	In patients with SAR, we suggest either an INAH or OAH (conditional recommendation ; low certainty of evidence)	In patients with PAR, we suggest either an INAH or OAH (conditional recommendation ; very low certainty of evidence)	• The panel members acknowledged that the choice of treatment will depend mostly on patient preferences and local availability and cost of treatment.	• This is a conditional recommendation, and thus different choices will be appropriate for different patients. Clinicians must help each patient to arrive at a decision consistent with her or his preferences, considering local availability, coverage, and costs.
INAH, Intranasal H1-antihistamine; INCS, intranasal corticosteroid; LTRA, leukotriene receptor antagonist; OAH, oral H1-antihistamine.				

Recommendations: AR in children, pregnancy, and patients with asthma, elderly

AR in children

- Mometasone and fluticasone furoate is recommended in children above 2 years of age
- Topical concomitant use of decongestant is effective for short term
- Oral and intramuscular glucocorticosteroids to be avoided in children
- Immunotherapy is recommended in subjects who have not adequately responded tomaximalpharmacotherapy

AR during pregnancy

- Chlorphenamine, loratadine and cetirizine are safe in pregnancy
- Intranasal corticosteroid budesonide is a category B drug
- Decongestants and initiation of immunotherapy are to be avoided
- Riskbenefitratio to be determined when using antihistamines and nasal steroids

AR with asthma

- Intranasalcorticosteroid is a preferred treatment option
- Anti-leukotrienes are also effective in AR with asthma

AR in elderly

- Duetoage related decline in organ function older adults may show different responses to medication.
- Consideration of other clinical conditions is important to avoid drug interactions.
- Specific concern for patients with clinical conditions like glaucoma, prostate hyperplasia, urinary incontinence, cognitive decline, hypertension before deciding the medical management.

Patient education:

1. Educating patient about allergic rhinitis and the correct technique to use nasal sprays.
2. To check for treatment adherence before changing the pharmacotherapy.
3. To educate about the potential danger of using nasal decongestants and first generation antihistamines for long duration.
4. In case of treatment of children with allergic rhinitis it is important to educate parents about the potential risk of long term over the counter medications.
5. Important to educate the duration of use of antihistamines and nasal sprays.
6. Seek medical help if symptoms persist, worsen, or affect sleep or breathing.

Non-pharmacological treatment

Along with pharmacotherapy, the management of AR includes patient education on avoidance of allergens, adjunctive treatments, allergen-specific immunotherapy, and surgery.

a) Allergen avoidance The most effective primary prevention measure of AR is avoidance of relevant indoor and outdoor allergens. In case of seasonal AR, allergen avoidance is effective for e.g. a person with AR triggered by pollen is symptom-free outside pollen season.[47]Table 10 shows types of triggers and their common examples.

Table 10: Types and examples of triggers

Trigger type	Examples of triggers	Types of AR
Indoor	Mites – house dust mites, storage mites	Perennial
	Pets – cats, dogs	Perennial
	Moulds	Seasonal/Perennial
Outdoor	Pollens	Seasonal
	Occupational allergens –Flour, latex, laboratory animals, wood dust, chlorine, chloramine, enzymes, other airborne proteins	Perennial
	Animals – rodents, horses	Perennial
	Smoke, traffic pollution	Perennial

Sensitization to inhalant allergens is a strong risk factor for asthma and allergic rhinitis. Domestic allergen exposure in early life increases the risk of the subsequent development of sensitization and asthma.[37]Relocation of allergic patients to low allergenic environment was found to improve allergic symptoms.[38]Guidelines have differing opinions on the effectiveness of currently used measures, suggesting that single intervention measures carry no benefit. ARIA suggests using combination methods instead of single clinical or physical preventing method of avoidance.[39] Avoidance measures for house dust mite was found to be beneficial in highly motivated patients with multiple allergen avoidance measures.[24]

Recommendations: Allergen avoidance

- Allergen avoidance is strongly recommended for in the management of AR for pollens, house dust mites, pets, and environmental allergens
- The cornerstones of a clinically successful intervention strategy involve effective control measures and identification of patients who may benefit from early intervention in the natural history of disease. Moreover, effective control measures must ensure that low allergen environment is achieved and maintained over a prolonged period.

Allergen	Recommended avoidance measures
House dust mites • Mite faecal particles were found to have major allergens Der p1, Der p 2 and Der p 7 of heavy particle size 15-40 mcg. • Maximum concentration of house dust mite remains in bed.	• Wash bedding and duvets regularly (every 1-2 weeks) at 55 -60°C to kill mites • Encase pillows and mattresses with mite impermeable encasings with size of 6 micrometer or less • Exposure of mattresses and rugs to detect strong sun light for more than 3 hours • Sufficient ventilation of dwellings to decrease humidity. Indoor relative humidity of below 50% is desirable • Replace carpets with hard flooring • Vacuum cleaning with High Efficiency Particulate Air (HEPA) filters may be of use • Keep away soft toys from bed room/ wash them at 55-60°C / freeze them in deep freezer • Replace fabric covered seating with leather or vinyl • Use wet mopping instead of dry dusting • Air purifiers are not useful in controlling house dust mite allergy
Pollens • Aerodynamic size of pollen is around 25-40 micrometers • Pollens get released from plants in the morning hours • In tropical country like India with varied flora, it becomes difficult to define a specific pollen season	• Keep windows closed at peak pollen time • Wear glasses with side covers to prevent pollen entering eye • Consider wearing mask • Install car pollen filter and pollen filter for air condition
Pets • Pet allergen particles are very light and range between 2-25 micrometers and hence they remain air borne for very long time and hence exposure level can be very high.	• Pet removal is the only appropriate advice[52] • Keep pets outdoor. If pet is not removed from home, exclude them from bed room • Vacuum carpets and mattresses regularly

• Unlike in mites, where dose response relationship is linear, response curve is bell shaped in cat allergen exposure,[53] and hence with high allergen exposure it could be protective effect.	• Change clothes before going out if you had contact with any PET • Washing pets reduces level of allergen in the fur and dander samples for few days [53]
Cockroach • It is observed that strategies that reduce cockroach allergen by environmental management are clinically beneficial to patients [43]	• Eradicate cockroaches with appropriate insecticidal bait • Seal cracks in floor and sealing • Enclose all food • Do not store waste in the home • Scrub floor with water and detergents
Moulds	• Use dehumidifiers, if relative humidity is consistently above 50% • Ensure that heating, ventilation or air conditioning systems are properly maintained • Use 5% ammonia solution to remove fungal contaminated surface • Replace carpets with hard flooring and replace wall papers with paint • Repair any indoor water damage immediately
Irritants	• Avoid exposure to vehicle exhaust pollution. PM10 / diesel exhaust can increase expression of allergenic pro inflammatory gene [54,55] • Avoid excessive exposure to ambient indoor Volatile Organic Component (VOC) from new woods and many synthetic materials • Avoid Incense sticks and Perfumes and Room fresheners • Avoid smoking

Lifestyle and allergic disorders: Over the last 60 years, the extent of increase in the incidence of allergic disorders is overwhelming, which is only going to continue rising in future. This allergic disease burden is not only because of exposure to allergens but also the way we have chosen to live. Primary hygiene and excessive sanitisation, furnishing of home, time spent on- screen, and dietary modifications have led to secondary complications.[55,56] A few lifestyle recommendations that may help prevent any allergic disorders are given below -

- Increase time spent outdoors
- Take up outdoor activity or physical exercise
- Spend more time in the sun for vitamin D
- Include healthy dietary habits
- Yoga exercises

Yogic breathing techniques are also known to have non-pharmacological supportive role in the management of asthma and related disorders. However, it should be made clear to the patients and respective family that yoga only has an adjunctive role and cannot not replace pharmacotherapy. [57]

b) Adjunctive therapy In the management of AR, a simple and inexpensive non-pharmacological therapy commonly recommended is nasal irrigation using saline solution. There doesn't exist any clear differentiation on use of nasal saline irrigation with respect to types of AR – mild, moderate or severe. However, nasal irrigation can be applied in addition to pharmacologic treatment and/or immunotherapy in moderate to severe forms of AR. Clinical evidence is still warranted in using nasal irrigation alone as initial symptomatic therapy in mild AR. It can help reducing medicine consumption and associated medical costs. [58]

Nasal irrigation Spectrum of application – nasal spray or douching i.e. rinsing the nose with 250 ml of saline solution.[58] The mechanical stimulus involved in the spray application of saltwater plays a role in the achieved effect by causing neuronal changes in the immunologic process. This could explain the greater effect of the spray application. Type of solution - Isotonic rinsing solution is generally preferred to the hypertonic solution because optimal mucociliary transport can only be ensured at a neutral pH.[58]

Clinical evidence on effectiveness of nasal irrigation treatment A meta-analysis[58] of prospective, randomized, controlled trials was conducted to assess the effects of saline nasal irrigation on four parameters, nasal symptom score, medicine consumption, mucociliary clearance time, and quality of life. The results demonstrated decrease in nasal symptom score by 27.66%, improvement in mucociliary clearance time by 31.19%, decrease in medicine consumption by 2.99%, and improvement in quality of life by 27.88%.58

Also, it was observed that application of spray with a much smaller volume yielded more distinct improvements (23%-45%) than the use of nasal irrigation with larger volumes (200–400 mL, 3.2 and 45.5%).[58]

Role of nasal saline irrigation The mechanism of action is unknown. The proposed mechanisms for improvement of mucosal function is[58]–

- Direct physical cleansing by flushing out thick mucus, crusts, debris, allergens, air pollutants, etc.
- Removal of inflammatory mediators
- Better mucociliary clearance by improving ciliary beat frequency

Recommendations: Nasal saline irrigation

- Beneficial as adjunctive therapy in the management of AR in both children and adults
- It may help in reducing the need of pharmacotherapy

c) Allergen Immunotherapy (AIT)

Allergen Immunotherapy (AIT) is the administration of gradually increasing quantities of an allergen vaccine to an allergic subject, reaching a dose which is effective in ameliorating the symptoms associated with subsequent exposure to the causative allergens.[59]AIT is the only treatment that can modify the course of an allergic disease either by preventing the development of new sensitivities or by altering the natural history of disease or disease progression.[59]

Indications for allergen immunotherapy

- Moderate-to-severe allergic rhinitis
- Allergic asthma
- Allergic conjunctivitis
- Allergic rhino-conjunctivitis
- Atopic dermatitis
- Immune-mediated and IgE-mediated food allergy
  Insect allergy that causes significant local reaction and anaphylaxis

AIT provides a window of opportunity of multiple benefits. Following are the benefits of AIT:

- AIT is the only available curative tool
- AIT can alter the course of allergic disease for good
- AIT is capable of changing the Th2 status (allergic) to Th1 status (normal)
- AIT is capable of impeding the onset of asthma in cases of allergic rhinitis
- AIT can impede poly-sensitization
- AIT is capable of providing medication-sparing effect
- There is enough evidence that the benefit of AIT continues to be present for a long tenure even after concluding the therapy
- AIT has the capacity to provide long-term protective benefit against development of various other allergic conditions

For an effective AIT, a proper specific diagnosis must be established. History and clinical examination are crucial but it is erroneous to make a specific diagnosis based on history alone. Causative allergens have to be determined by conducting specific allergy detection tests and must be correlated with clinical manifestations.

Allergy diagnosis and evaluation should be based on a combination of clinical history and judicious ordering of specific IgE tests, whether through skin or blood testing. Ordering of serum allergen-specific IgE tests for food allergies should be consistent with a clinical history of potential IgE-mediated food allergy and not food intolerance

Skin Prick Tests (SPT) can provide evidence of causative allergens and will demonstrate the presence of allergen-specific IgE. SPT done with good quality allergens is the best diagnostic option, and is accepted as the gold standard for determining IgE-mediated allergies by the WAO. A wide variety of allergens are available commercially for inhalant as well as ingestant allergy. For oral allergy syndrome induced by certain foods, raw foods, i.e., fresh fruits and vegetables are preferably used. The skin of the fruit or vegetable is pricked and then the skin of the allergic patient, in order to determine skin test reactivity.

SPT offers both qualitative and quantitative measure of an allergen activity. SPT is highly specific and sensitive, 70-95% and 80-97%, respectively, to diagnose inhalant allergies. The positive predictive value to diagnose allergic rhinitis increases to 97-99% if SPT is utilized correctly.

It is fairly simple, safe, cost-effective and reliable. SPT is not an invasive procedure.

Relative contra-indications to Skin prick Testing:

- Dermographism: mast cell instability in the skin can cause false positive readings

Unstable asthma: Asthma should be well-controlled before SPT

- Pregnancy: SPT is contra-indicated during pregnancy

• Patients on Beta-blockers Serum specific IgE (ssIgE) estimation can provide quantitative evidence of the antigen-
specific antibodies in the blood circulation of an allergic individual. Advantage of ssIgE estimation is that one blood sample is enough for the assay. These assays can be single-plex, e.g. Immunocap, or multiplex, e.g. ALEX2. Other tests available are not validated yet. Availability of normal skin is not a requirement. Immunosuppressive drugs need not be stopped when the test is conducted.

A patient can be sensitized to an allergen (possess IgE antibodies) but not experience symptoms when exposed to it (ie, have tolerance). Also, false-negative results may occur, so a negative serum allergen-specific IgE test should likewise be interpreted in light of the pretest probability of allergy to a specific antigen.

A positive result is excellent evidence of specific allergen sensitivity.

Proper diagnosis, good quality allergens, compatible and proper combination of allergens and compliance are crucial to successful treatment by AIT.

The choice of mode of administration of the allergen, Subcutaneous AIT (SCIT) or Sublingual AIT (SLIT) is left to the discretion of the clinician in discussion with the patient. Possibility of systemic reactions and anaphylaxis that is a major concern in SCIT, is eliminated in SLIT.

With evidence of SLIT providing excellent therapeutic benefit to patients of AR and allergic asthma and especially with its safety profile, it has emerged and has become the option of choice for AIT. SCIT has to be administered by a medical professional. The best option for SCIT is it being administered by the allergy specialist who would have done diagnostic evaluation and would have prescribed AIT. In India, it is practically not feasible. Patient has to commute and spend mandatory time in the doctor's office. So SCIT demands quite a bit of time and effort for administration of each dose. In the initial and build-up phase, injections are quite frequent (once a week). If the scheduled gap between injections is prolonged for any reason and if the subsequent higher dose is administered, there is a risk of a systemic reaction especially if the sensitivity is high. Danger of anaphylaxis is a possibility. For AIT to become effective, effort is necessary to reach highest possible concentration and dose. So, compliance and safety are a major concern in SCIT. SCIT is not the accepted option for food allergy at present. However, OIT (Oral Immunotherapy), in which the patient is given micrograms of the allergenic proteins, the dosage of which is escalated over a period of months, is gaining greater adoption in USA & Europe.

SLIT is remarkably safe and can be administered in children aged 5 and above. SLIT should not be initiated in a pregnant patient. However, if a patient gets pregnant while taking SLIT, the treatment can be continued during pregnancy at the same dose. Dose escalation is to be avoided for the duration of the pregnancy.

Considering all these difficulties, SLIT appears to be a safe and viable option. Much higher dose and concentration need to be achieved in SLIT for it to become therapeutically effective. Proper combination of allergens in the SLIT vaccine is necessary. Treatment happens in the comforts of the patient's home. It is the biggest benefit. This itself must not become a hindrance to the maintenance of treatment. SLIT works on trust. Patient and the family must be made to understand this fundamental aspect. Patient must also be made to understand that SLIT contains the same allergens to which the patient is allergic and that it is directed to shift the patient's status of allergy to normalcy, and that it does not directly relieve the symptoms like the medication does. SLIT can be started above 5 years of age under discretion of the allergy specialist and the recommended duration of SLIT is 5 years.

Process of AIT commences from the very first dose but it generally takes some time for its beneficial effect to reflect on the symptoms. Allergic Rhinitis, Allergic Conjunctivitis, Allergic Asthma, Sting Reactions are the classical indications for AIT. AIT may be a good option in some selected cases of drug allergy. Anaphylaxis and angioedema are conditions where AIT if possible, would be a boon to the patient and may actually be a life-saving tool. AIT has been approved as a major option of management for Atopic Dermatitis. When atopic dermatitis is so severe that it affects social and professional life of a patient, even if reasonable benefit can be obtained, AIT will be great. Selected cases of Migraine and Meniere's disease especially with co-morbid allergy conditions, would be worth the while candidates for AIT60-71.

Beneficial effect of AIT will not be appreciable if it is administered in cases of mild allergy conditions. When the disease is persistent and when the symptoms are moderate or moderate-severe, AIT would be a great option in addition to medical management.

Successful AIT will initiate a marked enhancement of protective blocking IgG antibodies. AIT will blunt the serum concentration of specific IgE antibodies. There will be a down-regulation of inflammatory cell recruitment, activation and mediator release. These will modify the T-Lymphocyte response to the benefit of the patient. Th2 response will get down-regulated resulting in enhanced Th1 response.72 Poly-sensitization is a common feature in patients.73 Poly-sensitization happens over a course of period. Poly-sensitization can be prevented by institution of AIT early. Children are the best candidates. Remodulation of the airways that happens due to persistent allergic inflammation is prevented with effective and early AIT. AIT also makes it cost effective in the long run. In patients where SPT results show positive response to too many allergens, only major allergens must be chosen considering cross reactivity profile and clinical correlation. This is to be decided by the allergy specialist.

When administering AIT it is important that only a physician with expertise and experience in the field of allergy must determine the type and dosage of the antigen extract and be able to deal with systemic reactions such as anaphylaxis.

Allergens and Triggers: Allergens have to be differentiated from non-allergic triggers. A clear distinction is necessary. Non-allergic triggers must never be included in prescriptions for immunotherapy. In fact, they should not even be included in the tests for allergy. Many of them are inanimate subjects. They do not contain any allergen themselves. Various dusts other than house dust, smokes, fumes, perfumes, dhoop, incense, plastic, paper, cement, gravel, nylon and polyester are such substances. Low molecular substances like monosodium glutamate (MSG), colouring agents and food additives are not to be included in SPT and hence AIT.

Allergens are substances which initiate and cause an allergic reaction in an individual who has developed specific IgE antibodies to those substances. They are protein in nature. They can be broadly classified into three main groups. They are injectants, ingestants and inhalants. In AR and other airway allergic conditions, inhalants are the predominant allergens.

SLIT as Food Allergen Immunotherapy: With SLIT, the food protein is delivered sublingually in a liquid form and then usually held for 2 minutes and swallowed. SLIT is thought to capitalize on the tolerogenic antigen-presenting cells in the oral mucosa. It is further thought that SLIT efficacy can be enhanced by exposure to the food protein in its intact form before possible epitopes are broken down through gastric digestion[74,75]

Both in adults and in children, a judicious combination of AIT, medical management and correction of allergen-rich environment have become the hallmark of providing complete solution to the persistent suffering of allergy patients. Wherever necessary, an effort must be made to change the existing life style to suit the prevailing condition to achieve best results. With better understanding, better techniques and better quality of allergens, AIT can only become a more powerful and sustaining tool and option of management of allergic diseases.

Allergens for SLIT:

Allergenproductsarerestrictedtoonlytrainedphysicians/professionals who have obtained practical training in allergy diagnosis and immunotherapy.

InIndia,SLIT isalsoused as off labeltreatment. It can beconsideredlegalfortrained physiciansto prescribeit and for apatienttotake it as prescribed.

Indian drug rules permit a doctor to prescribe, compound, dispense or dilute FDA approved products for his patients but cannot sell or commercialize.

The Drug Rule states: THE DRUGS AND COSMETICS RULES, 1945 as corrected up to the 30th November, 2004, which clearly indicates that private practitioners and hospitals are exempted from obtaining a license for dispensing drugs to their patients.

Chapter IV of the Drugs and Cosmetics Act,1940, Amended Act, 1955, 1960, 1962, 1964, 1972, 1982, 1986, 1995

Part XI of The drugs and Cosmetics Act, 1945(as corrected up to 30th Nov.2004) deals with exemption of IV of the Drugs and Cosmetics Act,1940

Extent and Conditions of Exemption:

All the provisions of Chapter IV of the Act and the Rules made there under, subject to the following conditions: The drugs shall be purchased only from a dealer or a manufacturer licensed under these rules and records of such purchases showing the names and quantities of such drugs together with their batch numbers and the names and addresses of the manufacturers shall be maintained. Such records shall be open to inspection by an Inspector appointed under the Act, who may, if necessary, make enquiries about purchases of the drugs and may also take samples for test.

Recommendations: Allergen Immunotherapy

- Proper diagnosis, good quality allergens, compatible and proper combination of allergens and compliance are crucial to successful treatment by AIT
- AIT is a great option in addition to medical management in persistent cases and the symptoms are moderate or moderate-severe,
- Causative allergens must be identified by conducting specific allergy detection tests and must be correlated with clinical manifestations
- SPT done with good quality allergens is the best diagnostic option before AIT. It is fairly simple, safe, cost-effective and reliable
- Although a clinician can choose between SCIT or SLIT, the safe and viable option is SLIT as SCIT has the possibility of systemic reactions and anaphylaxis
- SLIT can be started above 5 years of age under discretion of the allergy specialist and the recommended duration of SLIT is 5 years

d) Surgical management of allergic rhinitis In patients with allergic rhinitis, the predominant complaint of nasal obstruction can be very distressing. In the management of allergic rhinitis, surgical interventions are aimed at the underlying nasal obstructive component and other anatomical changes, especially in patients with nasal obstruction refractory to clinical treatment, and for those who exhibit inferior turbinate hypertrophy.[76,77] The inferior turbinate has proven to be the most important contributor to nasal obstruction. The main objective of the surgical treatment is to augment the nasal airway by primarily reducing turbinate tissue to

improve nasal obstruction and reduce static obstruction.[76] Observational studies have demonstrated clinical benefits of surgery as indicated by potential improvement in breathing and consequent improvement in quality of life, as well as better distribution of topical medications in the nasal cavity.[78] Surgery may also be indicated for anatomic obstruction, such as septal spurs, polyposis, chronic sinusitis, which are concomitant with allergic rhinitis.[76]

Sinonasal imaging, particularly CT scan is essential to define sinus anatomy prior to surgery in patients with acute rhinosinusitis, nasal polyposis, chronic rhinosinusitis, or complicated rhinosinusitis. CT imaging allows visualization of bony anatomy of the sinuses and patterns of bone destruction, as well as any formation of cartilaginous or bone matrix.[78]A meticulous operative technique considering the superficial mucosal layers should be employed with conservative reduction of lower turbinate tissue in order to reduce adverse outcomes such as empty nose syndrome and maximizing surgical outcomes and improving symptoms.[79]

Surgical techniques Reduction of the inferior turbinate is the primary means of augmenting the nasal airway in allergic rhinitis patients.[76]A number of techniques for turbinate reduction have been performed, including partial or total turbinate resection, cauterization, cryotherapy, laser therapy, and radiofrequency ablation. These traditional techniques have disadvantages like bleeding, crusting, synechia formation, osteitis, inadequate volume reduction, and atrophic rhinitis.[80]

There is no gold standard surgical technique for treatment of nasal obstruction in allergic rhinitis; instead the surgeon should be familiar with an armamentarium of surgical techniques.[76]Individualized approach for selection of surgical technique is employed; which depends on the factors such as greater or lesser bony or mucosal components of the inferior turbinate, surgeon's experience, available equipment, and cost.[78]

a) **Turbinoplasty** may be effective in patients with persistent allergic rhinitis refractory to intranasal steroids and antihistamines.[81] The respiratory mucosa is essential for proper physiologic functioning of the turbinates, such as warming and humidification of inspired air and mucociliary clearance. Thus, an ideal turbinate surgery effectively reduces the volume of the submucosal stromal tissue and preserves the overlying respiratory epithelium and prevents complications.[80]

b) **Submucosal turbinectomy**, a form of turbinectomy, has an excellent effect on reduction of nasal congestion, sneezing, and rhinorrhoea in patients with perennial allergic rhinitis. The major advantage of this technique, is that it reduces the infiltration of various inflammatory or allergy-related cells.[82,83] In addition, surgical damage to a peripheral nerve fibre (branch of postnasal nerve) might reduce the allergic symptoms such as sneezing and hypersecretion. [82]

c) **Radiofrequency turbinoplasty** has demonstrated significant subjective and objective improvement in nasal congestion through rhinomanometry, compared to intranasal steroids even after 12 months from surgery.[81]

d) **Turbinoplasty in combination with medical therapy** i.e. intranasal corticosteroid and antihistamine, demonstrates greater efficacy in improving the nasal flow, when compared with medical treatment alone in persistent moderate-to-severe AR.[84]

e) **Radiofrequency turbinoplasty is an effective and safe tool for treating allergic rhinitis refractory to medical therapy.**[85] It has been associated with significant improvement in nasal stuffiness, nasal obstruction and mouth breathing.[86] The outcome of radiofrequency turbinoplasty has been observed to decline and worsen with time.[85,86] However, the improvement in symptom scores was significant 5 years after surgery.[85]

f) **Septoplasty** alone has little role in the treatment of nasal obstruction for allergic rhinitis. **Endoscopic sinus surgery** is an important treatment method for allergic rhinitis when it contributes to chronic sinusitis, nasal polyposis, or allergic fungal disease.[76]

In addition, vidian neurectomy and posterior nasal neurectomy is also essential. They are helpful in refractory cases and are being used in many centres.[87]

Recommendation: Surgery for management of AR

- In allergic rhinitis, the major complaint of nasal obstruction significantly impacts the quality of life of the patients Surgery is a not a conventional treatment method
- for allergic rhinitis. It may only be exercised as an adjunctive option for relieving nasal obstruction in perennial allergic rhinitis, that is not responding to medical therapy alone
- No gold standard surgical treatment method exists. Most of the existing literature centres on reduction of the inferior turbinate for symptomatic improvement in patients afflicted with allergic rhinitis
- Endoscopic sinus surgery and septoplasty have hardly any advantage in the management of allergic rhinitis, unless when observed in conjunction with other conditions such as rhinosinusitis or polyposis
- Surgical management hardly finds any mention in international guidelines for allergic rhinitis and the evidence can be best described as 2A

ROLE OF ARTIFICIAL INTELLIGENCE IN THE MANAGEMENT OF ALLERGIC RHINITIS

Artificial intelligence (AI) is playing an increasingly significant role in allergy management, offering tools for improved diagnosis, personalized treatment, and enhanced patient care. AI algorithms can analyse vast amounts of data from various sources, including patient records, diagnostic tests, and even environmental data, to identify patterns and predict allergic reactions.

Here's a more detailed look at the role of AI in allergy management:

1. ENHANCED DIAGNOSIS:

Allergen Identification:

AI algorithms can analyse data from skin prick tests, blood tests, and patient questionnaires to identify specific allergens and determine the severity of allergy.

Early Detection of Atopic Dermatitis:

AI-powered tools can analyse skin images and other data to identify and predict the severity of atopic dermatitis, a common allergic skin condition.

AI-enhanced Biosensors:

AI can be integrated with biosensors to detect trace amounts of allergens, even in food, potentially preventing dangerous reactions in individuals with extreme allergies.

2. PERSONALIZED TREATMENT:

Tailored Immunotherapy:

AI algorithms can analyze patient data to create personalized immunotherapy regimens, helping patients build tolerance to specific allergen immunotherap

Predicting Treatment Outcomes:

AI can be used to predict how patients will respond to different treatments, helping clinicians tailor treatment plans for optimal effectiveness.

Personalized Medication Recommendations:

AI can analyse patient data to recommend the most appropriate medications and dosages based on individual needs and responses.

3. IMPROVED PATIENT CARE:

Real-time Monitoring:

AI-powered mobile apps can monitor patient symptoms, lung function, and other relevant data, providing early warnings of worsening conditions or acute attacks.

Virtual Health Assistants:
AI-powered virtual assistants can answer patient questions, provide motivational support, and offer feedback on self-management practices.

Allergen Mapping:
AI can be used to create detailed allergen maps, helping individuals identify and avoid potential triggers in their environment.

4. RESEARCH AND DRUG DEVELOPMENT:

Understanding Disease Mechanisms:

AI can help researchers better understand the complex mechanisms underlying allergic diseases by analysing vast datasets and identifying new targets for drug development.

Accelerated Drug Discovery:
AI can accelerate the process of drug discovery by identifying potential drug candidates and predicting their effectiveness.

5. CHALLENGES AND FUTURE DIRECTIONS:

Data Quality and Availability: AI modelsrelyonhigh-quality data, and challenges remaininobtainingandintegrating datafromvarious sources.

Model Interpretability:
It's important to understand how AI models make decisions, especially in healthcare, to ensure trust and transparency.

Ethical Considerations:
AI in healthcare raises ethical considerations related to data privacy, bias, and the potential for misuse.

Despite these challenges, AI holds great promise for revolutionizing allergy management, leading to more accurate diagnoses, personalized treatments, and improved outcomes for individuals with allergies.

PRACTICAL GUIDE LINES FOR BETTER MANAGEMENT OF ALLERGIC RHINITIS

1. Forecasting & Early Warning Systems

LSTM models

combining meteorologicaland air pollution data can predict daily outpatient visitsfor allergic rhinitis,enabling hospitals and public health officials to prepare in advance. In one study from Eastern China, an LSTM model outperformed traditional ARIMA forecasting in accuracy and stability.

How this helps you: Anticipate high-risk days based on predicted pollen and pollution levels—plan outdoor activities and optimize medication usage accordingly.

2. mHealth Apps: Symptom Tracking, Alerts & Personalized Insights

Appslike **MASK-air,AllergyMonitor,** and **Hostable** combine symptom diaries with geolocated pollenand airqu̓alitydatato provide:

- Symptom-medication correlations
- Digital diaries aiding diagnosis and care decisions
- Real-time alerts and personalized advice

Studies show these tools improve treatment adherence, patient education, and quality of life (e.g., German study — 90% reported no adverse effects; 28% felt better prepared for medical consults). The applications will be soon available in our country.

How this helps you: Daily logging and alerts help understand triggers, assess treatment response, and empower proactive management.[88,89]

3. AI-Enabled Medication Adherence Monitoring

Wearable AI devices, such as InHandPlus, use video analysis to track medication usage: distinguishing antihistamines vs. nasal sprays, alerting physicians when doses are missed. [90]

Benefits: Enhancedadherenceleadstofewersymptomsduring peak allergy seasons.

4. Improved Diagnosis & Clinical Decision Support

- **Clinical Decision Support Systems (CDSS)**

It integrates component-resolved diagnosis(CRD), skin prick tests, and symptom diaries. They've improved consistency in prescribing allergen immunotherapy (AIT) among general practitioners and specialists.

Nasal cytology image datasets support AI models (like YOLO, DETR) for automating cell detection—making precise diagnostic techniques more scalable.

Outcome: More accurate diagnosis, reduced misprescription, and easier identification of true allergen triggers.

5. Environment-Aware AI: Forecasting Air Quality & Pollen

AI-driven systems (e.g., PolRam) integrate weather, pollen, and pollutant data, achieving 90–95% accuracy in forecasting allergen counts.

Practical use: Helps AR patients avoid high-exposure zones—choose travel routes, adjust indoor air filters, or pre-medicate.[91]

6. Integrated Care Pathways & Real-World Evidence

MASK and **POLLAR**

These app combines data with AI to stratify patients and guide therapy decisions—empowering shared decision-making and optimizing AIT outcomes[88]

Impact: Bridges day-to-day patient behavior with structured care plans, improving efficiency and cost-effectiveness of immunotherapy.

7. AI Reliability & Transparency Challenges

- Complex models (e.g., LSTM, deep neural nets) may lack interpretability—**Explainable AI (XAI)** is crucial for clinical adoption.[88]
- ChatGPT-like systems show moderate accuracy (~81% guideline agreement) but unreliable citations, with ~48% errors in references.

SUMMARY TABLE

AI Tool	Function	Benefit
LSTM forecasting models	Predict AR outpatient spikes	Proactive resource planning
Symptom-tracker apps	Log + correlate environmental triggers	Personalized guidance
Wearable medication monitors	Detect missed doses	Improved adherence
CDSS & NLP	Diagnose using CRD + diaries	Accurate therapy selection
AI pollen/pollution forecasters	Predict allergen exposure	Behaviour& environment management

PRACTICAL ADVICE FOR YOU

1. **Track your daily symptoms** with apps like MASK-air or Allergy Monitor to detectpersonalized patterns.
2. **Leverage local forecasts** (e.g., PolRam-based tools) and pre-plan on high- exposuredays.As of nowyou can check for pollen calendar of your area, till these applications are available in our country.
3. **Consider AI-assisted check-ups** if you're starting allergen immunotherapy—your physician might optimize dosing with a CDSS.
4. **Use tools with clear data handling policies**—verify info sources and ensure any chatbot claims align with validated medical evidence.

Referral to a specialist

Referral to a specialist is indicated in the following cases – • Nasal blockage unrelieved by pharmacotherapy or structural abnormalities, such as septal deviation, sufficient to render nasal therapy difficult should be seen by a surgeon [11]

- Patients with unilateral symptoms, heavily blood stained discharge or pain, new onset nasal polyps, pressure effects on orbit or orbital cellulitis [5]
- Persistent symptoms despite aggressive medical therapy in order to confirm the diagnosis of AR versus mixed or non-AR and/or for consideration of allergen immunotherapy, if appropriate[19]

Prevention of allergic rhinitis

The primary prevention measure in AR is total allergen avoidance. Secondary prevention halts the progression of disease in individuals who are at high risk for the development of allergy, for example, the prevention of asthma in individuals with rhinitis, or evidence of allergen sensitization. The objective of tertiary prevention is to prevent exacerbations and improve disease control and reduce medication.[92]

Probiotics in allergic disorder Although health benefits of taking probiotics have been reported in allergic disorders, it is still early to draw any conclusions. In 2015, the World Allergy Organization (WAO) applied Grading of Recommendations, Assessment, Development and Evaluation approach to develop evidence-based recommendations for using probiotics in the prevention of allergic diseases. Findings were reported in a systemic review of 29 RCTs by Cuello-Garcia *et al*. The panel observed that there is insufficient evidence to support recommendation to use probiotics in primary prevention of allergic diseases. However, they suggested the use of probiotics in pregnant/lactating women and infants with a family history of allergic disease. Although strain-specific activity of different bacterial species is recognized, no recommendations were made by the WAO regarding strain or dose of probiotics in light of insufficient evidence.[93]

Discuss with your patient, pregnant females with family histories of atopy about the potential benefit of probiotics before initiating its use as primary preventive measure.

Recommendations: Prevention of AR

- Breast-feeding for 6 months for all infants irrespective of their family history of atopy
- No antigen avoidance diet in pregnant or breast-feeding women for prevention of development of allergy in children
- Total avoidance of environmental tobacco smoke or passive smoking in children and pregnant women
- Reduction of early life exposure to house dust mite in infants and preschool children
- Specific prevention measure for eliminating or reducing occupational allergen exposure for individuals exposed to occupational agents
- Physical and chemical preventative measures to reduce exposure to house dust mites in patients with AR and/or asthma sensitive to house dust mite allergens
- Avoid exposure to indoor molds in patients with allergy to molds
- Avoid exposure to animal dander in patients with AR caused by animal dander
- Immediate and total cessation of exposure to occupational allergen in patients with occupational asthma

Comorbid conditions in AR

Allergic rhinitis is a long-lasting condition, which has a significant impact on the quality of life of the patients[2]. It usually goes undetected in the primary care setting, which further complicates the condition. Moreover, patients themselves are unable to recognize the impact of the condition on their daily functioning.[2] Besides nasal and extra nasal symptoms, patients may often complain of experiencing generalized symptoms such as fatigue, mood changes, depression, anxiety, etc. Severe cases of allergic rhinitis have been associated with significant impairment of school performance in children and work productivity in adults.[94]

Quality of life (QOL) is defined as 'the subjective value a person places on satisfaction with his or her life'.[95] According to World Health Organization, QOL includes 'psychological and social functioning as well as physical functioning. It also comprises positive aspects of well-being as well as negative aspects of disease or infirmity'.[94] Health-related QOL (HRQOL), on the other hand, focuses on a part of QOL which is influenced by the disease. HRQOL focuses on the patient's perception about the functional effects of a disease and the treatment and it measures impairments which significantly impact the patient's life. Overall, HRQOL can be described as a patients' subjective perception of the impact of the disease and its treatment on their physical, psychological and social functioning and overall well-being.[94,95]

It is a patient's perception of the burden of the disease on his/her life that forms the basic motivation to seek medical assistance and undergo appropriate therapy. This

disease burden is usually described by patients in terms of symptoms and impact on QOL.[95]

In patients with allergic rhinitis, adverse effects of the condition on the QOL include impairment of physical and social functioning, disturbed sleep, daytime somnolence and fatigue, irritability, depression; and attention, learning, and memory deficits. [95]

a) AR and the physical domain of QOL

In patients with AR, sleep disturbances including difficulty falling asleep, staying asleep, and awakening refreshed, are one of the significantly impaired component, mediated via nasal obstruction.[95]

b) AR and the emotional domain of QOL

There have been multiple reports of associations of nasal allergies with mood and anxiety syndromes. Several proposed mechanisms have suggested allergic reactions to trigger the immune system and cytokines and then exacerbate psychiatric symptoms.[95,96]

c) AR and the mental domain of QOL

Allergic rhinitis significantly impairs attention and learning, thus negatively affecting cognitive functioning and decreased day-time school performance.[95]

d) AR and other domains of QOL

In patients with AR, impaired QOL can also be linked to reduced sense of smell. It may affect a patient's ability to taste, and loss of pleasures of eating. It may also risk a person's health as a result of inability to estimate quantity of sugar and salt in food, and ending up adding larger quantities, or inability to identify spoiled food or recognize gas leakage.[95]

Lastly, allergic rhinitis can interfere with family and social relationships and also increase health-care associated medical costs.[95]

Comorbidities of allergic rhinitis

1) Asthma

Allergic rhinitis and asthma frequently coexist. Their association is clinically significant as indicated by common epidemiologic, physiologic, and pathologic mechanisms.97,98 Both these conditions are systemically linked by common and interrelated inflammatory processes of the upper and lower airways.99 In addition, treatment for one entity results in beneficial effect against the other. According to the survey reports, 38% of patients with allergic rhinitis have asthma; and up to 78% of asthma patients have allergic rhinitis.[97]

Concomitant allergic rhinitis in patients with asthma has been associated with poor asthma control, including higher rate of asthma attacks, increased asthma

exacerbations, more emergency room visits, higher medical costs compared with asthma patients without AR.[99]

Therefore, it is suggested that patients with persistent allergic rhinitis should be evaluated for asthma on the basis of history and chest examination and pulmonary function tests?[98]

2) Associated rhinosinusitis Studies have demonstrated a strong correlation between nasal allergies and sinus issues, indicating nasal allergies to be a common contributing factor to acute or chronic sinus problems. It has been reported that 50% of adults and 43% of children (4- 17 years) diagnosed with AR had sinus problems.[100]

3) Allergic conjunctivitis Observational studies have demonstrated that 52% of allergic rhinitis patients (women more often than men) report ocular symptoms, including troublesome symptoms such as itchy eyes (51%), watery eyes (39%), red eyes (7%) and swollen eyelids (4%).[101] In patients with allergic rhinitis, ocular symptoms may result from allergen contact with the eye and nasal ocular reflexes; both the mechanisms trigger a significant inflammatory response.[102]

4) Associated skin rashes Atopic dermatitis and allergic rhinitis are atopic disorders sharing common pathogenesis i.e. IgE sensitization in response to environmental triggers.[103]Atopic dermatitis is an important risk factor in the development of other allergic reactions.[104]The combined frequency of atopic disorders including AR, dermatitis, skin rashes, etc. is estimated to be 20%. [104]

5) Otitis media Otologic symptoms such as ear fullness and pressure, otalgia or ear pain, etc. are commonly experienced by patients with AR.[90] Epidemiological studies have reported prevalence of AR in patients with chronic or recurrent otitis media with effusion to be 24% to 89%. Moreover, AR and otitis media are associated by the involvement of type 1 IgE-mediated inflammation in the middle ear space, epidemiological associations, and the beneficial effect of AR treatment on clinical outcomes of otitis media.[105,106]

6) Chronic upper airway cough syndrome (also referred to as postnasal drip syndrome)

Persistent allergic stimulation can cause direct mucosal effects in the larynx; leading to mucus production in both the upper and lower respiratory systems and mucus trafficking, which results in a range of laryngeal symptoms, including cough.[107]
Cough sensitivity in patients with allergic rhinitis may result from subclinical inflammatory changes within the lower airways.[108]

7) Associated gastroesophageal reflux The impact of AR on GERD has been evaluated by a few studies. AR on nasal mucosa can cause similar effects on laryngeal mucosa including congestion, oedema and excessive mucous secretion, which leads to symptoms of laryngopharyngeal reflux (LPR), a subgroup of GERD. In patients with AR, throat itching and posterior nasal dripping lead to increased frequency of swallowing, which exacerbate the reflux. However, more conclusive research is required.[109]

8) Associated headaches Headaches are one of the most common bothersome symptoms associated with nasal allergy attacks.100 Although, headache is not a typical symptom of allergic rhinitis, however, it may cause sinus headache.[110]

9) Sleep disturbances Sleep-related symptoms are commonly observed in patients with allergic rhinitis.[111] Nasal obstruction is an independent risk factor for obstructive sleep apnoea. Rhinitis alone is associated with mild obstructive sleep apnoea, but commonly causes micro- arousals and sleep fragmentation.[112]
Sleep disturbances majorly contribute to the overall disease morbidity and the loss of work productivity associated with allergic rhinitis. [111]

10) Associated sexual dysfunction Decrease or loss of sexual function in many chronic diseases, including allergic disorders, have significant impact on the quality of life. Clinical studies demonstrate significantly lower scores of the Female Sexual Function Index in women with symptomatic allergic rhinoconjunctivitis; and higher scores of International Index of Erectile Function in men with treated allergic rhinoconjunctivitis and controls compared to symptomatic patients.[101]

Recommendations: Comorbid condition

- Allergic rhinitis frequently coexists with comorbid conditions like asthma, rhinosinusitis, conjunctivitis, atopic dermatitis, sleep problems, etc.
- A step-wise diagnostic and treatment approach for each suspected comorbid condition is recommended.[114]

Clinical questions and answers

Question 1: Are antihistamines effective in alleviating symptoms of allergic rhinitis, suchas sneezing, rhinorrhea, and nasalcongestion.

Answer: It is effective in mitigating sneezing and rhinorrhea. Some second generation antihistamines may also address nasal congestion. It is weakly recommended for nasal congestion.

Question 2: Is the use of a nasal vasoconstrictor in conjunction with INS effective for allergic rhinitis.

Answer: Nasal vasoconstrictors should be used for a limited duration of 5-7 days. When combined with INS, they effectively prevent rebound nasal symptoms. It is weakly recommended to administer nasal vasoconstrictors alongside INS.[115]

Question 3: Does anti-IgE antibody treatment effectively reduce the symptoms of severe seasonal allergic rhinitis.

Answer: The administration of anti-IgE antibody is strongly recommended when the optimal use guideline is satisfied.

Question 4: Role of histoglob injection.

Answer: Histoglob is a sterile preparation of Histamine dihydrochloride coupled to active protein fraction extracted from human blood (gammaglobulin) in strictly defined proportions. This conjugate is capable of eliciting an immunological response in the human body with the production of highly potent antihistaminic antibodies. Gammaglobulin used in histoglob is tested negative for HBsAg. HIV 1-2, antibodies and HCV-RNA by PCR. It does not have a disease modifier effect therefore not recommended for regular use.

Question 5: Is the combination of multiple medications effective in treating allergic rhinitis.

Answer: Combining an antihistamine with pseudoephedrine hydrochloride is more effective in alleviating nasal congestion in patients but carries the risk of systemic side effects so should be used with caution. LTRAs with antihistamines should be preferably be used separately especially when associated lower airway involvement is there.

Question 6: Does the effect of allergen immunotherapy for allergic rhinitis sustain over time.

Answer: SLITor SCITadministered over3to5 yearsremainseffectivefor10to15 yearsas hasbeen reportedbyliterature published.

Question 7: Is SLIT effective in treating allergic rhinitis in children.

Answer: The effectiveness of SLIT for pediatric allergic rhinitis(>5 years) has been demonstrated in a meta-analysis of randomized, placebo-controlled, double-blind comparative studies, and its use in strongly recommended.

Question 8: Is allergen immunotherapy safe for pregnant women.

Answer: Although initiation of both SCIT and SLIT are generally contraindicated during pregnancy, evidence suggests that continuing allergen immunotherapy during pregnancy may be safe. Therefore, its use is weakly recommended during pregnancy.

Question 9: Is serum-specific IgE testing beneficial for diagnosing occupational allergic rhinitis.

Answer: Immunological tests for low molecular weight antigens exhibit a low positive rate and prove to be of limited utility. We cautiously advise against their use.

Question 10: Diethylcarbamazine to be added in treatment for allergic rhinitis for eosinophilia.

Answer: 21 days of Diethylcarbamazine treatment should be given only in proven cases of Tropical pulmonary eosinophilia and has no role in Allergic rhinitis alone

Question 11: Should a combination of an INAH + INCS vs no treatment used for the treatment of Allergic rhinitis.

Answer: Strong recommendation for intervention using nasal sprays for AR

Question 12: Should a combination of nasal spray go INAH and INC vs an INCS alone be used for treatment of AR

Answer: INAH and INC combination can be used as an initiation therapy for 2-4 weeks followed by step down therapy with INCS alone. Conditional recommendation for the intervention.

Question 13: Should a intranasal decongestant vs no treatment be used for the treatment of AR

Answer: Asasole therapy for AR , intranasal decongestants are not recommended

Question 14: Should a combination of an INCS vs no treatment be used for treatment ofAT

Answer: Strong recommendation for use of INCS for treatment of AR

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Patient Instruction / Consent Form for Allergy Skin Testing

Skin Test: Skin prick tests are methods of testing for allergic antibodies. A test consists of introducing small amounts of the suspected substance, or allergen, into the skin of the arm and/or back and noting the development of a positive reaction. The skin testing generally takes 45 minutes. Positive tests indicate the presence of allergic antibodies and are not necessarily correlated with clinical symptoms. Your test results will guide your therapy.

You will be tested for airborne allergens like trees, grasses, weeds, moulds, dust mites, animal dander and possibly some foods.

If you have a specific allergic sensitivity to one of the allergens, a red, raised, itchy bump will appear on your skin within 15 to 20 minutes. The results are read at 15 to 20 minutes after the application of the allergen. These positive reactions will gradually disappear over a period of 30 to 60 minutes, and, typically, no treatment is necessary for this itchiness. Occasionally local swelling at a test site will begin 4-8 hours after the skin tests are applied, particularly at sites of Intradermal testing.

These reactions are not serious and will disappear over the next week or so. They should be measured and reported to your physician at your next visit.

The skin test methods are:

Prick Method: The skin is pricked with a needle or a lancet where a drop of allergen has already been placed.

Intradermal Method: This method consists of injecting small amounts of an allergen into the superficial layers of the skin.

PLEASE INFORM THE DOCTOR IF YOU ARE PREGNANT. SKIN TESTS CANNOT BE DONE DURING PREGNANCY

CERTAIN MEDICATIONS ARE NOT ALLOWED:

1. No oral antihistamines should be used 3-5 days prior to scheduled skin testing.

These include cold tablets, sinus tablets or oral treatments for itchy skin.

2. You should not be taking Beta-blockers at the time of the skin prick test.
3. Some medications require a longer duration of avoidance before the skin test.

Medications such as sleeping medications and other prescribed drugs, such as amitriptyline hydrochloride, hydroxyzine, doxepin and Imipramine should be discontinued at least 2 weeks prior to receiving skin test after consultation with your physician.

YOU MAY:

1. You may continue to use your intranasal allergy sprays.
2. Asthma inhalers (inhaled steroids and bronchodilators), Leukotriene antagonists and oral theophylline do not interfere with skin testing and should be used as prescribed.
3. Most drugs do not interfere with skin testing but please inform the doctor or nurse of the fact that you are taking ANY medications so that you may be advised as to how long prior to testing you should stop taking them. (Bring a list if necessary).

Skin testing will be administered at this medical facility with a medical physician or other trained health care professional. Skin prick tests are extremely safe but sometimes mild reactions can rarely occur. These reactions may consist of any or all of the following symptoms: itchy eyes, nose, or throat; nasal congestion; runny nose; tightness in the throat or chest; increased wheezing; light headedness; faintness; nausea and vomiting; hives; generalized itching; and shock, the latter under extreme circumstances.

By signing below I confirm that I have read the patient information sheet on allergy skin testingandunderstand it.Theopportunityhas beenprovided for metoask questions regarding potential side effects of allergy skin testing and these questions have been answered to my satisfaction. I understand that every precaution consistent with the best medical practice will be carried out to protect me against such reactions.

SUBLINGUAL ALLERGEN IMMUNOTHERAPY PATIENT CONSENT FORM

Immunotherapy is the only intervention that has been shown to reduce allergy in patients. Sublingual immunotherapy (SLIT) is a solution containing allergen extract given under the tongue. The first dose is given at the medical office and, as long as this initial dosing is well tolerated, subsequent daily doses are taken at home. For the initial dosing, you are required to wait in the prescribing doctor's office for at least 30 minutes after using the SLIT. If you are 18 years of age or younger, a parent or legal guardian must be present during the waiting period. The vast majority of patients do not experience any side effects. **Rarely you may expect some reactions. If you have moderate or severe reactions you must contact the clinic and stop the treatment until you have met and discussed these reactions with your allergy provider.**

Expected reactions: For the first week or so, occasionally you may experience some local reactions in your mouth consisting of minor itchiness or discomfort. These symptoms, should they occur, are typically brief and go away without any special treatment.

Rarely serious reactions have been reported that may require immediate treatment. These reactions may consist of any or all of the following symptoms: itchy eyes, nose, ears or throat; stuffy nose; sneezing; runny nose; coughing; swelling of the lips, tongue or throat; difficulty breathing; nausea and vomiting; hives; itching all over your body; and very rarely, a life-threatening systemic reaction known as anaphylaxis. There have been no reported deaths with sublingual immunotherapy.

Treatment of allergic rhinitis with allergy drops is safer than allergy shots.

I have read the patient information sheet on sublingual immunotherapy and understand it. The opportunity has been provided for me to ask questions

regarding the potential side effects of sublingual immunotherapy and these questions have been answered to my satisfaction.

I understand that this treatment is to be continued for 3 years for maximum benefit and I agree to follow the Doctors advise.

I do understand that there is NO GUARANTEE for a cure and it is successful in 70% of patients.

I understand that if I discontinue treatment early, my symptoms will recur.

I understand that every precaution consistent with the best medical practice will be carried out to protect me against possible reactions associated with this treatment.

I also agree that if I have an allergic reaction to the sublingual medication, I will follow the action plan I was given.

I acknowledge that I am aware of the risks/benefits/alternatives to sublingual immunotherapy and consent/agree to starting this treatment.

PATIENT _____ **DATE** _____

PARENT or LEGAL GUARDIAN _____ **DATE** _____

WITNESS _____ **DATE** _____

CONSENT FORM FOR BIOLOGICAL TREATMENT

Humanized monoclonal antibody treatment has shown great promise in the treatment of TH2 high allergic upper airway disease and is being adopted rapidly in the physicians' armamentarium in the treatment of chronic upper airway allergies. However, this treatment is not without adverse effects, and hence it is prudent for the physician to take informed consent of the patient before initiation of therapy.
Sample consent:
I understand that Biologics are humanized monoclonal antibodies. They reduce upper airway allergy, Chronic Urticaria and severe asthma attacks.

I understand that Omalizumab is used along with other medicines for the treatment of allergic polyposis, asthma and/or Chronic idiopathic urticaria in patients age 12 years and older.

I understand that Omalizumab needs to be administered once every four weeks by subcutaneous injection by a health care professional into the upper arm, thigh, or abdomen.

General Warnings: IT HAS BEEN EXPLAINED TO ME AND I UNDERSTAND THAT:

I should not change or stop taking any of my other medications unless otherwise instructed to do so by a healthcare provider; and

I may not see immediate improvement in my asthma, nasal polyps or CIU after beginning Mab therapy.

I understand that there can be side effects. The most common side effects of Omalizumab include headache, injection site reactions (pain, redness, swelling, itching, or a burning feeling at the injection site), back pain, and weakness (fatigue). I am aware that 0.2% of patients experienced anaphylaxis, which is swelling of the face, mouth, and tongue; fainting, dizziness, or light-headedness; hives; breathing problems and rash.

Dr. has explained to me other treatment options available for my condition, and their risks, including continuation of my current treatment plan (without Omalizumab).

My signature below indicates that this form has been fully explained to me and I have had opportunities to ask questions. My questions have been answered and it is my wish to be treated with Omalizumab for my moderately- severe or severe allergic bronchial asthma or chronic idiopathic urticaria or severe resistant nasal polyposis.

I hereby request that Dr. _____

, as my physician, treat my condition -

explained to me as moderate to severe persistent bronchial asthma related to allergies or intractable nasal polyposis or chronic idiopathic urticaria (CIU) - with a drug called omalizumab.

Name of patient _____

Signature of patient or legal guardian if minor

Date_____

Health Care Provider Signature

AOI Allergic Rhinitis Guidelines Meeting

at Kolkata 14th December 2025

Medical initiative supported by:

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OF INDIA

Indian Guidelines on Allergic Rhinitis

Formulated by

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