Algorithm for the Management of Allergic Rhinitis in Children

1. Nasal obstruction &/or rhinorrhea &/or sneezing &/or nasal pruritus?

2. History of exposure to an allergen &/or personal or family history of atopy?
   - Y: Consider allergic rhinitis
   - N: Consider non-allergic rhinitis

3. Consider allergic rhinitis

4. Therapeutic trial with antihistamines, steroids, chromones, antileukotrienes ± decongestants singly or in combination based on patient’s classification

5. Probable allergic rhinitis

6. Patient responds?
   - Y: Further ff-up meets allergy consultation criteria?
   - N: Consider severe AR & other rhinitides, otitis media, LPR, adenoidal hypertrophy

7. Refer to Otorhino-laryngologist

8. Refer to Allergologist-Immunologist

9. Patient-family-multidisciplinary health care provider follow-up
Allergic Rhinitis

**Diagnosis of allergic rhinitis**

Check for asthma especially in patients with moderate-severe and/or persistent rhinitis

**Intermittent symptoms**

**Persistent symptoms**

**Mild**

**Moderate-Severe**

**Mild**

**Moderate-Severe**

Not in preferred order
Oral H1-antihistamine or intranasal H1-antihistamine and/or decongestant or LTRA*

Not in preferred order
Oral H1-antihistamine or intranasal H1-antihistamine and/or decongestant or intranasal CS or LTRA* (or cromone)

In preferred order
Intranasal CS H1-antihistamine or LTRA*

Review the patient after 2-4 weeks

If persistent rhinitis

Review the patient after 2-4 weeks

If persistent rhinitis

Review the patient after 2-4 weeks

**Improved?**

Y

Continue for 1 month

N

Failure: Step-up

Increase intranasal CS dose

Itch/sneeze add H1-antihistamine

Rhinorrhea add ipratropium

Blockage add decongestant or oral CS (short-term)

Failure

Specialist referral

Y

Step-down and continue for 1 month

N

Failure: Review diagnosis, review compliance, query infections or other causes

* In particular, in patients with asthma.

**FIGURE 2**
Guideline for the Management of Allergic Rhinitis

Nasal Obstruction and/or Rhinorrhea and/or Sneezing and/or Nasal Pruritus

See #1, 2, 4, 6 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

Rhinitis means inflammation of the nasal mucous membrane. The term rhinitis is used for a disease of the nasal mucosa, which results in nasal itching, sneezing, rhinorrhea and nasal blockage. Diagnosis relies on recognition of a symptom complex which may vary in severity.

Consider Allergic Rhinitis

See #3 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

Allergic rhinitis is defined as a symptomatic disorder of the nose induced by an IgE-mediated inflammation after allergen exposure of the membranes lining the nose. Allergic rhinitis can occur at any age, including infancy. Most patients develop their symptoms before age 20 years old. The diagnosis of allergic rhinitis include: Positive identification of the allergen, establishment of a causal relationship between exposure to the antigen and occurrence of the symptoms, and positive identification of the immunologic mechanism involved in the illness. A personal or family history of atopy makes it more likely that the patient has allergic rhinitis.

Symptoms of rhinitis include rhinorrhea, nasal obstruction, nasal itching and sneezing which are reversible spontaneously or under treatment. Symptoms of nasal congestion include post-nasal drainage, chronic cough, frequent sore throats, dry mouth and oropharynx, nasal twang, and snoring or sleep disturbance. Symptoms may likewise result from complications or co-morbid conditions like asthma, which can also present with cough plus wheezing, sinusitis, otitis media, conjunctivitis, tonsillitis, and nasal polyps.

Typical physical examination findings in a patient with allergic rhinitis:

- Facial pallor and mouth breathing
- Pale bluish gray edematous nasal mucosa
- Watery nasal secretions (may be thick due to nasal obstruction and poor mucociliary clearance)
- Cobblestoning of posterior pharyngeal wall lymphoid tissue
- Clear to mucoid post-nasal drip
- Occasionally may have concomitant injection of palpebral conjunctivae, watery eye discharge and puffy eyelids

Irritants such as tobacco smoke, pollutants or strong odors potentiate symptoms of allergic rhinitis. An upper respiratory infection may mimic allergies, worsen or prolong the effects of allergies or other non-specific irritants.

Allergic rhinitis is subdivided into “intermittent” or “persistent” disease. The severity can be classified as “mild” or “moderate-severe” see Figure 1. Previously, allergic rhinitis was subdivided, based on the time of exposure, into seasonal, perennial, and occupational diseases. In this document the term seasonal and perennial are retained to enable interpretation of published studies.

![Figure 1: Classification of Allergic Rhinitis](image)

### Therapeutic Trial Based on Patient’s Classification

See #5 of Algorithm for the Management of Allergic Rhinitis

The therapeutic approach to allergic rhinitis in children is based on principles used in adults, generally differing only in dosages, expected adverse effects and availability of clinical trials specifically for children.

The initial treatment for uncomplicated allergic rhinitis may include single or combined pharmacologic therapy as necessary for those with intermittent symptoms and for 2 to 4 weeks for those with persistent symptoms (See Figure 2).

The following drugs have been shown in well-designed randomized controlled trials (RCTs) and meta-analyses on children and/or adolescents, to be better than placebo for the treatment of allergic rhinitis (See Table 3).

#### 1. Oral antihistamines
These drugs decrease symptoms of allergy, but have less effect on nasal congestion. They provide the mainstay of allergy therapy in children.

Three generations of antihistamines may be used in allergic rhinitis. First generation antihistamines may produce significant sedation, impair performance, and may have anticholinergic effects. However, among smaller children, sedation may help calm an agitated child. Second and third generation antihistamines have a greater benefit: risk ratio, with less sedation and side effects, and some have been shown to have anti-inflammatory effects as well. However, not all have been approved for use among children.

One systematic review done on second generation oral antihistamines showed them to be effective for allergic rhinitis with notably less sedative and anticholinergic adverse effects.
Allergic Rhinitis

2. Nasal antihistamines
Nasal antihistamines are also used as first-line therapy for allergic rhinitis. They may decrease nasal congestion but cause sedation in some. Several RCTs have shown them to be better than placebo, comparable with oral antihistamines, but inferior to nasal corticosteroids in the treatment of seasonal and perennial allergic rhinitis. One limitation of this drug is its bitter taste. This drug has been used in children as young as 5 years of age.

3. Nasal corticosteroids
Nasal corticosteroids are anti-inflammatory agents with effects on sneezing, pruritus, rhinorrhea, nasal blockage, except on ocular symptoms.

There are four systematic reviews that have been done for inhaled corticosteroids. One meta-analysis showed intranasal corticosteroids to be superior to oral antihistamines; another, to be superior to nasal antihistamines. Some may be given to as young as 3 years of age. One was shown to have therapeutic effect as early as 2 to 4 hours after the first dose.

4. Nasal chromones
These drugs are mast cell stabilizers, which include sodium cromoglycate and nedocromil sodium. They are effective and safe for use among children. Some RCTs have shown them to be inferior to topical corticosteroids in allergic rhinitis. However, a major limitation of their use is the QID dosing. In addition, their effects are best observed when used before the onset of symptoms. One meta-analysis showed nedocromil to be better than placebo.

5. Oral decongestants ± antihistamines
These drugs are effective in decreasing nasal congestion. When decongestants are used alone, they may cause insomnia, anorexia and nervousness. When used in combination with second generation antihistamines, they may significantly improve symptoms of allergic rhinitis, mostly among adolescents and adults. However, one RCT done on a classical antihistamine-decongestant combination among children 4 to 14 years old and another RCT on a second-generation antihistamine-decongestant combination among children 3 to 15 years old showed these combinations to be better than placebo.

6. Antileukotrienes
Antileukotrienes are anti-inflammatory agents acting on the lipo-oxygenase pathway. These include montelukast and zafirlukast. These drugs may be of value in the therapy of allergic rhinitis, but their role among younger children needs further studies. Among adolescents (>15 years old), at least 2 randomized trials have been done demonstrating significant relief of symptoms when montelukast was compared to placebo for seasonal allergic rhinitis. However, 1 RCT showed zafirlukast to be no better than placebo. Another RCT demonstrated better effect when montelukast was combined with loratadine rather than either drug alone.

Did the Patient Respond?
See #7 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

In response to therapy, a variety of parameters should be evaluated:
- Nasal symptoms (e.g. congestion, rhinorrhea, itching)
- Physical signs of rhinitis
- Quality of life (e.g. affect, sleeplessness, ability to function in daily activities)
- Concomitant medical conditions (e.g. asthma, sinusitis)
- Side effects of treatment (e.g. nasal mucosal erosion in patients on intranasal steroids)

Consider Severe Allergic Rhinitis, Other Rhinitis or Co-Morbid Conditions
See #9 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

When there is partial or no response to the therapeutic trial, severe allergic rhinitis should be considered. The patient may be referred to an allergist/immunologist for possible immunotherapy. Other considerations would include co-morbid conditions such as non-allergic rhinitis, chronic sinusitis, asthma, otitis media or laryngopharyngeal reflux (GERD with extra esophageal manifestations e.g. Non Erosive Reflux Disease [NERD]). The patient may be referred to an asthma or an infectious disease specialist, an otolarhynogologist or a gastroenterologist for further work-up.

Persistence of allergic rhinitis symptoms may cause or exacerbate medical conditions that may have significant consequences (see Table 1).

Further Follow-Up, Meets Consultation Criteria?
See #10 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

With response to initial treatment of rhinitis, patient follow-up is necessary to assure the following:
- Continued control of symptoms
- Maintenance of improved quality of life
- No impairment of activities, work or school performance
- Absence of medication side effects

When these conditions are not met, consultation with an allergist/immunologist should be considered.

Consultation with an Allergist/Immunologist
See #11 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

Consultation with an allergist/immunologist should also be considered for:
- Prolonged duration of rhinitis symptoms
- Identification of allergic or other triggers and subsequent implementation of avoidance measures
- Possible immunotherapy
- Decreasing cost of multiple medications required for control
- Addressing complications of rhinitis or co-morbid conditions
- Patients requiring systemic corticosteroids
- Patients whose quality of life is significantly affected

264
Table 1. Complications of Allergic Rhinitis

<table>
<thead>
<tr>
<th>Short-Term Complications</th>
<th>Long-Term Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asthma exacerbations</td>
<td>• Asthma</td>
</tr>
<tr>
<td>• Acute sinusitis</td>
<td>• Chronic sinusitis</td>
</tr>
<tr>
<td>• Eustachian tube dysfunction</td>
<td>• Acute &amp; chronic otitis media</td>
</tr>
<tr>
<td>• Serous otitis media with effusion</td>
<td>• Hearing &amp; speech impairment</td>
</tr>
<tr>
<td>• Sleep-disordered breathing</td>
<td>• Sleep apnea</td>
</tr>
<tr>
<td>• Chronic mouth breathing</td>
<td>• Craniofacial abnormalities</td>
</tr>
<tr>
<td>• Decreased cognitive functioning</td>
<td>• Decreased in long-term productivity</td>
</tr>
<tr>
<td>• Neuropsychiatric concerns</td>
<td>• Allergic irritability syndrome</td>
</tr>
<tr>
<td>• Ageusia</td>
<td>• Anosmia</td>
</tr>
<tr>
<td>• decreased long-term productivity</td>
<td>• Ageusia</td>
</tr>
<tr>
<td>• Chronic mouth breathing</td>
<td>• Craniofacial abnormalities</td>
</tr>
<tr>
<td>• Sleep-disordered breathing</td>
<td>• Decreased in long-term productivity</td>
</tr>
<tr>
<td>• Chronic mouth breathing</td>
<td>• Allergic irritability syndrome</td>
</tr>
<tr>
<td>• Decreased cognitive functioning</td>
<td>• Anosmia</td>
</tr>
<tr>
<td>• Neuropsychiatric concerns</td>
<td>• Ageusia</td>
</tr>
</tbody>
</table>

Patient-Family-Multidisciplinary Health Care Provider Follow-Up

See #13 of Algorithm for the Management of Allergic Rhinitis in Children (Figure 1)

Follow-up is essential for all patients with allergic rhinitis and should include the patient, family and health care providers. Goals include reduction of symptoms and improvement in the patient’s quality of life.

Periodic assessment of the patient’s quality of life is essential. Tapering of medications should always be considered in order to lessen the risk of adverse reactions.

Referral to an otorhinolaryngologist may be indicated in the management of co-morbid conditions and when surgical intervention might be necessary.

Consider Non-Allergic Rhinitis

See #4 of Algorithm for the Management of Allergic Rhinitis

Non-allergic rhinitis is conditions with prominent nasal congestion but lack the criteria for the diagnosis of allergic rhinitis (See #3 of Algorithm for the Management of Allergic Rhinitis). The following are some of the non-allergic rhinitis in children.  

- Infectious rhinitis
- Idiopathic rhinitis (vasomotor rhinitis)
- Idiopathic neonatal rhinitis (attributed to either autonomic prematurity or an association with gastroesophageal reflux)
- Non-allergic rhinitis with eosinophilia syndrome (NARES)
- Food-induced rhinitis (consequence of stimulation of the nose by hot and spicy food; also called gustatory rhinitis)
- Mucosal abnormalities (may be caused by ciliary dysfunction, exocrine gland abnormalities, or immunodeficiency)
- Hormonal rhinitis
- Drug-induced rhinitis
- Intranasal foreign bodies
- Structural abnormalities (e.g. nasal septal deviation or adenoidal hypertrophy)
- Benign and malignant tumors

See Tables 2 and 3

References:

24. Guil M, Buckley RH, Rocha W, Jr., Kemp JP, Segal AT, Shirley LR,
### Table 2. Level of Evidences

<table>
<thead>
<tr>
<th>Classification Schemes of Statement of Evidence*</th>
<th>Ia</th>
<th>Ib</th>
<th>Ila</th>
<th>IIb</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence for meta-analysis of randomized controlled trials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence from at least one randomized controlled trial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence from at least one controlled trial study without randomization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence from at least one other type of quasi-experimental study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies and case-control studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence from expert committee reports or opinions or clinical experience of respected authorities or both</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Table 3. Level of Evidence of Treatment Options in Allergic Rhinitis

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Level of Evidence</th>
<th>Seasonal AR</th>
<th>Perennial AR</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral antihistamines</td>
<td>Ia</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Ib</td>
<td>22-40</td>
<td>41-42, 26-29, 43-45</td>
<td>41-42, 26-29, 43-45</td>
</tr>
<tr>
<td>Intranasal antihistamines</td>
<td>Ib</td>
<td>46-50</td>
<td>51-52</td>
<td>46-50</td>
</tr>
<tr>
<td>Intranasal corticosteroids</td>
<td>Ia</td>
<td>53-56</td>
<td>53-56</td>
<td>53-56</td>
</tr>
<tr>
<td></td>
<td>Ib</td>
<td>57-77</td>
<td>77-88</td>
<td>57-77</td>
</tr>
<tr>
<td>Intranasal chromones</td>
<td>Ia</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Ib</td>
<td>90-102</td>
<td>103</td>
<td>90-102</td>
</tr>
<tr>
<td>Antihistamine ± Oral decongestant</td>
<td>Ib</td>
<td>104-110</td>
<td>111</td>
<td>104-110</td>
</tr>
<tr>
<td>Antileukotrienes</td>
<td>Ib</td>
<td>112-115</td>
<td>112-115</td>
<td>112-115</td>
</tr>
</tbody>
</table>

### Table 3. Strength of Evidence for Efficacy of Rhinitis Treatment

<table>
<thead>
<tr>
<th>Intervention</th>
<th>SAR</th>
<th>PAR</th>
<th>PER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral H1-antihistamines</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Intranasal H1-antihistamines</td>
<td>A</td>
<td>A</td>
<td>A **</td>
</tr>
<tr>
<td>Intranasal corticosteroids</td>
<td>A</td>
<td>A</td>
<td>A **</td>
</tr>
<tr>
<td>Intranasal chromones</td>
<td>A</td>
<td>A (&gt;12 yrs)</td>
<td>A</td>
</tr>
<tr>
<td>LRTAs</td>
<td>A</td>
<td>A</td>
<td>A **</td>
</tr>
<tr>
<td>Subcutaneous SIT</td>
<td>A</td>
<td>A</td>
<td>A **</td>
</tr>
<tr>
<td>Sublingual / Nasal SIT</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Allergen avoidance</td>
<td>D</td>
<td>D</td>
<td>A*</td>
</tr>
</tbody>
</table>

** S - Seasonal Allergic Rhinitis  
** A - Adult  
** P - Perennial Allergic Rhinitis  
** C - Child  
** PER - Persistent Allergic Rhinitis  
** A - category I evidence  
** B - category II evidence or extrapolated recommendation from category I evidence  
** C - category III evidence or extrapolated recommendation from category I or II evidence  
** D - category IV evidence or extrapolated recommendation from category I, II, or III evidence  

* not effective in the general population  
** extrapolated from studies in SAR/PAR


33. Meltzer EO, Riordan KA, Westlund RE, Cook CK. Onset of thera


Allergic Rhinitis


119. Primer on Allergic and Immunologic Diseases. Supplement to JACI, American Academy of Allergy, Asthma & Immunology, 2003; 111: S522.


121. ARIA, 2007.


123. ARIA, 2007.


# Recommended Therapeutics
(Drugs Mentioned in the Treatment Guideline)

The following index lists therapeutic classifications as recommended by the treatment guideline. For the prescriber's reference, available drugs are listed under each therapeutic class.

## Anti-leukotrienes
- Montelukast sodium
  - Singulair
  - Kastair
  - Kastair EZ Tab
  - Montair
  - Montemax

## Zafirlukast
- Accolate

## Anticholinergics
- Ipratropium bromide
  - Atrovent
  - Ipratropium bromide/Fenoterol
  - Berodual
  - Ipratropium bromide/Salbutamol
  - Combivent
  - Duavent
  - Tiotropium
  - Spiriva

## Antihistamines
- Acrivastine
  - Semprex
- Azelastine HCl
  - Azelone
  - Azip
- Cetirizine
  - Allerkid
  - Alinix
  - Cetiriz
  - Drugmaker's Biotech
    - Cetirizine HCl
  - Histamed
  - Pri xlae
  - Virlix
  - Zinex
  - Zyrtic
- Chlorphenamine maleate
  - Antamin
  - Barominic
  - Chlor-Trimeton
  - Drugmaker's Biotech
    - Chlorphenamine
  - Synestal
- Chlorphenoxamine HCl
  - Systral
- Clemastine hydrogen fumarate
  - Tavegyl
  - Tavist
- Desloratadine
  - Aerius
- Dimethindene maleate
  - Fenistil
- Diphenhydramine HCl
  - Allerin AH
  - Am-Europharma
  - Diphenhydramine HCl
  - Benadryl
  - Dramelin
  - Drugmaker's Biotech
    - Diphenhydramine
  - Hizon
    - Diphenhydramine Inj
    - Nebrecon
    - Pharex Diphenhydramine
- Diphenhydramine/
  - Phenylpropanolamine
  - Allerin Reformulated
- Disodium cromoglycate
  - Vividrin Nasal Spray
- Fexofenadine
  - Fenafex
  - Telfast
- Hydroxyzine diHCl
  - Drugmaker's Biotech
    - Hydroxyzine
  - Iterax
- Levocetirizine diHCl
  - Xyzal
- Loratadine
  - Allerta
  - Lergicyl
  - Loradex
  - Lorano
  - Loratyne
  - Lordam
  - Onemin
  - Zantih
  - Zylohist
- Loratadine/Bethamethasone
  - Claricort
  - Claritin
- Mebhydrolin napadisylate
  - Fabahistin
- Mequitazine
  - Primalan
- Olopatadine HCl
  - Patanol
  - Promethazine HCl
  - Phenergan

## Corticosteroids
- Betamethasone/
- Chlorphenamine maleate
  - Benetron
- Betamethasone/
  - Dextromethorphan/Guaifenesin/
  - Celestamine
- Prednisolone/
- Chlorphenamine maleate
  - Histacort Tablet

## Decongestants
- Brompheniramine maleate/
- Phenylephrine HCl
  - Dimetapp Reformulated
  - Profaril
  - Snizee
- Bromphenamine maleate/
  - Phenylpropanolamine
  - Nasatapp
  - Nostero
- Camphor/Menthol/Eucalyptol
  - Broncho Rub White
- Chlorphenamine maleate/
  - Dextromethorphan/Guaifenesin/
    - Myracof-AF
- Chlorphenamine maleate/
  - Phenylpropanolamine HCl
- Paracetamol
  - Bioflu
  - Coldezent
  - Decolgen forte
  - Nafarin-A
  - Nagelin
  - Neozez/Noezez Forte
  - Rinovent
  - Sinutab Extra-Strength
- Diphenhydramine HCl/
  - Phenylpropanolamine HCl
    - Allerin Reformulated
  - Guaifenesin/Chlorphenamine maleate/Phenylpropanolamine
Guaperem
Guaifenesin/Chlorphenamine maleate/Sodium citrate/
Phenylpropanolamine
Langex
Altussan
Loratadine/
Pseudoephedrine sulfate
Clarinase
Rhinase
Phenylpropanolamine
Decolgen Syrup (Oral drops)
Decolgen Syrup (Reformulated)
Disudrin
Nasathera P
Propadrin
Sinurex
Phenylpropanolamine/
Paracetamol
A-P-Histallin
Nasathera
Nasathera Syrup
No-Drowse Decolgen
Phenylpropanolamine/
Paracetamol/Guaifenesin/
Dextromethorphan/
Chlorphenamine maleate
Colvan
Myracof-T
Phenylpropanolamine/
Paracetamol/Phenyltoloxamine
Sinutab
Phenylpropanolamine/
Phenylephrine/Brompheniramine maleate
Drugmaker's Biotech
Phenylpropanolamine + Phenylephrine + Brompheniramine
PPB
Rhinotapp
Sodium chloride
Salinase
Snif
Nasal Preparations
Budesonide
Budecort Nasal
Cetirizine
Prixlae
Zyrtec
Disodium cromoglycate/Benzalkonium chloride
Vividrin Nasal Spray
Fluticasone propionate
Flixotide Aqueous
Nasal Spray
Fusafungine
Locabiotal 1%
Mometasone furoate monohydrate
Nasonex AQ Nasal Spray
Rinelon
Oxymetazoline HCl
Drixine Nasal Spray/Ped Drops
Nasivin
Salinase
Snif
Tetrahydrozoline
Sinutab NS
Xylometazoline HCl
Otrivin