UPPER AIRWAYS DISEASES IN GENERAL MEDICINE:
Rhinitis and Epistaxis
Rhinitis is the presence of one or more of the following nasal symptoms:
- Sneezing
- Rhinorrhea (anterior and/or posterior)
- Nasal congestion (stuffiness)
- Nasal itching

Symptoms of sinus involvement may include nasal congestion, posterior nasal drainage (which is often purulent), facial pressure and/or pain, headache, and in some cases, reduced sense of smell.
### Major causes of rhinitis

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
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</thead>
<tbody>
<tr>
<td><strong>Allergic rhinitis</strong></td>
<td>Seasonal</td>
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<tr>
<td></td>
<td>Perennial</td>
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<tr>
<td><strong>Nonallergic rhinitis</strong></td>
<td>Vasomotor</td>
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<td></td>
<td>Gustatory</td>
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<td></td>
<td>Nonallergic rhinitis with eosinophilia syndrome</td>
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<td><strong>Mixed rhinitis</strong></td>
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<td></td>
<td>CPAP-associated rhinitis</td>
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<td></td>
<td>Occupational rhinitis</td>
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<td>Rhinitis medicamentosa</td>
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<td></td>
<td>Nasal decongestant sprays</td>
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<td>Intranasal cocaine</td>
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<td><strong>Systemic medication-induced rhinitis</strong></td>
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<td></td>
<td>Oral contraceptives</td>
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<td></td>
<td>Erectile dysfunction drugs</td>
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<td>Some antihypertensives</td>
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<td></td>
<td>Aspirin and other NSAIDs (more prevalent among patients with asthma and/or chronic rhinosinusitis with nasal polyposis)</td>
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<td>Some antidepressants</td>
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<td>Some benzodiazepines</td>
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<td><strong>Pregnancy</strong></td>
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<td><strong>Atrophic rhinitis</strong></td>
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<td><strong>Systemic diseases</strong></td>
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<td></td>
<td>Hypothyroidism</td>
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<td></td>
<td>Granulomatosis with polyangiitis ( Wegener’s)</td>
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<td></td>
<td>Midline granuloma</td>
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<td></td>
<td>Sarcoidosis</td>
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<td>Cystic fibrosis</td>
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<td></td>
<td>Immune ollie syndromes</td>
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</tbody>
</table>

CPAP: continuous positive airway pressure; NSAIDs: nonsteroidal anti-inflammatory drugs.

Nasal cavity: allergic rhinitis
ALLERGIC RHINITIS

Comorbidities:
- Asthma
- Eczema
The prevalence of allergic rhinitis increased in Westernized countries from the 1870s through the 1950s. The rate of asthma subsequently increased in these countries beginning in the 1960s. Asthma and allergic rhinitis prevalence began increasing in many developing countries in the late 1980s to early 1990s. Changes in genetic factors are unlikely to be the underlying cause of the rise in allergic diseases since the increases in allergic rhinitis and asthma occurred relatively rapidly. Instead, multiple environmental factors may have played a role.

More than 100 genes have been associated with the development of asthma, and we assume that each gene product interacts with multiple environmental factors. Environmental factors such as tobacco smoke and pollution alter expression of DNA methyltransferases, which could potentially impact the immune response to allergen(s).
What changes occurred in Westernized countries during the 20th century, when the rise in prevalence of allergic rhinitis and then asthma were seen, that are now occurring in developing countries?

- Complete separation of drinking water from sewage
- Decline in growing of wheat, which was gradually replaced by Italian rye grass that pollinated much more heavily than the traditional field grasses
- A final decline both in the number of farm animals living in towns and in the use of horses for transportation
- Universal wearing of shoes
- Chlorination of water
- Eradication of helminths and malaria
As a result, the various theories focus on causes of the supposed increase in T helper cell type 2 (Th2) response with associated increase in immunoglobulin E (IgE):
Mechanism of antigen presentation
Child with allergies

- Dennie Morgan lines
- Allergic shiner
- Nasal crease

- Inflammation
- Sticky Secretions

Open mouth with recessed lower jaw
NOSE EXAMINATION INSTRUMENTS
1806
Bozzini was the first author describing an ante litteram light source: he used his physics notions to create a light conductor which allows to explore the external auditory canal, the nasal cavities and the oropharynx. He also used this instrument to examined the female bladder, the cervix and the rectum.

1867
Notice of first somatoscope with electric light
1900 → 1980
Several versions of endoscopes have followed

Several physicians preferred binocular microscope other than endoscopy, but not all the rhinosinusal sites were controllable through this procedure.
The evolution of endoscopy led to the development of increasingly advanced tools and better light sources

- Introduction of flexible optical fibers in pre- and post-operative diagnosis
- Rigid angled optics providing significant benefits for the display of the sinuses
- Introduction of an endoscope equipped with irrigator-aspirator and angled optics, rotatable and inter-changeable
Risk factors for allergic rhinitis:
- Family history of atopy
- Male sex
- Birth during the pollen season
- Firstborn status
- Early use of antibiotics
- Maternal smoking exposure in the first year of life
- Exposure to indoor allergens, such as dust mite allergen
- Serum immunoglobulin E (IgE) >100 international units/mL before age 6
- Presence of allergen-specific IgE
## Allergic Rhinitis

### Major causes of allergic rhinitis according to timing of symptoms

<table>
<thead>
<tr>
<th>Season</th>
<th>Antigens</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early spring</td>
<td>Tree pollens</td>
<td>Oaks, maples, elms, birches, etc (trees without showy flowers)</td>
</tr>
<tr>
<td>Spring/summer</td>
<td>Grass pollens</td>
<td>Ryegrass, bluegrass, Bermuda grass</td>
</tr>
<tr>
<td>Late summer</td>
<td>Weed pollens</td>
<td>Ragweed</td>
</tr>
<tr>
<td>Throughout the growing season</td>
<td>Fungi</td>
<td></td>
</tr>
<tr>
<td>Throughout the year</td>
<td>Household allergens</td>
<td>House dust mites, cockroaches, animal dander, molds</td>
</tr>
<tr>
<td>Occupational</td>
<td></td>
<td>Seed dusts, woods, furs, latex, flour, psyllium, and many others</td>
</tr>
</tbody>
</table>

Adapted from Naclerio R, Solomon W, JAMA 1997; 278:1842.
Increasing sensitivity over time

When a patient is continually exposed to an allergen, persistent nasal mucosal inflammation develops. In such patients, symptoms of rhinitis occur on exposure to lower doses of allergen and to nonspecific irritants (hyper-reactivity).
• Allergic rhinitis typically requires a few years of allergen exposure to develop. Accordingly, it is uncommon in children under two years of age. If a very young child appears to have persistent nasal symptoms, other disorders should be considered.

• After the age of two, the prevalence of allergic rhinitis steadily increases, demonstrating a bimodal peak in the early school and early adult years.
ALLERGIC RHINITIS

Classification:
- Intermittent
- Persistent
- Mild: none of the items listed below for "moderate-severe" are present
- Moderate-severe – One or more of the following items is present:
  - Sleep disturbance
  - Impairment of school or work performance
  - Impairment of daily activities, leisure, and/or sport activities
  - Troublesome symptoms
Sequelae (in particular if not treated):
• Sleep-disturbed breathing
• Fatigue and generalized malaise
• Cognitive and psychiatric issues in children and adolescents, including attention deficit hyperactivity disorder, lower exam scores during peak pollen seasons, poor concentration, impaired athletic performance, and low self-esteem
• In adults, allergic rhinitis is associated with anxiety, depression, reduced academic performance and work productivity, impaired sexual performance, and lower quality of life scores
ALLERGIC RHINITIS

Diagnosis:
- Routine laboratories are usually normal
- Peripheral blood eosinophil counts nor total serum immunoglobulin E (IgE) levels are elevated in only 30 to 40 percent of patients
- Imaging is not usually performed in the diagnosis of allergic rhinitis (unless concomitant condition suspected)
- A positive response to a therapeutic trial of either topical nasal glucocorticoids or topical antihistamines does not conclusively establish a diagnosis of allergic rhinitis, because these therapies are also effective in the treatment of nonallergic rhinitis
- Some forms of allergic rhinitis can be readily diagnosed by history alone
Primary care clinicians treat the majority of patients with allergic rhinitis and often initiate therapy empirically, identifying possible triggers only through the clinical history. This approach is adequate for many patients.
Identifying the allergens that are important to an individual facilitates avoidance of the allergen and identifies candidates for allergen immunotherapy, which can eventually reduce reliance on chronic medications.

Skin testing is particularly useful among patients with:

- An unclear diagnosis based upon the history and physical examination
- Poorly controlled symptoms, such as persistent nasal symptoms and/or an inadequate clinical response to nasal glucocorticoids
- Coexisting persistent asthma and/or recurrent sinusitis/otitis
- A high pretest probability of allergic rhinitis and negative in vitro test results
- A patient's expressed desire to try to avoid the allergen rather than take medications to control symptoms
Skin Testing

- Skin prick test: pricking the skin with a needle or pin containing a small amount of the allergen
- Skin scratch test: a deep dermic scratch is performed
- Intradermic test: a tiny quantity of allergen is injected under the dermis with a hypodermic syringe
- Skin scrape Test: a superficial scrape is performed to remove the superficial layer of the epidermis
- Patch test: applying a patch to the skin, where the patch contains the allergen
SERUM TESTING

• IgE immunoassays provide similar information as that obtained with allergen skin tests, although they are more expensive and less sensitive for the diagnosis of allergy to inhalant allergens compared with skin tests.

• They can be useful when skin testing is not available or cannot be performed:
  • extensive skin disease
  • pts cannot discontinue antihistamines or other interfering medications
  • dermatographic pts
SERUM TESTING

Immunoads are available for:

- Foods
- Insect venoms
- Environmental allergens
- Natural rubber latex
- A small number of beta-lactam drugs
- Some occupational allergens such as isocyanates and phthalic anhydride
Cromolyn sodium nasal spray: mast-cell stabilizer
Such second-generation antihistamines in liquid formulations
Glucocorticoid nasal spray

Same therapies for children > 2yo and adults with mild symptoms + antihistamines nasal spray
ALLERGIC RHINITIS
Pharmacotherapy

- Combination sprays – Sprays containing both a glucocorticoid and an antihistamine
- Addition of a second-generation oral antihistamine
- Addition of a second-generation oral antihistamine/decongestant combination

Glucocorticoid nasal spray
ALLERGIC RHINITIS
Immunotherapy

Involves the administration of allergen to which the patient is sensitive, for the purpose of modulating the untoward immune response to that allergen and alleviating allergic symptoms.

When an antigen enters the organism, APC (Antigen Presenting Cells) can expose on their membrane the antigen by Major Histocompatibility Complex I stimulating CD4+-T helper cells.

Subcutaneous immunotherapy (SCIT) is the best studied form of AIT and is effective for allergic rhinitis and rhinoconjunctivitis, allergic asthma, and Hymenoptera venom allergy.
Despite extensive experience with this therapy and decades of research, the mechanisms responsible for clinical improvement have not been fully revealed. The immunologic changes involve multiple cell types in the blood and affected organs; these cells show changes and contribute to the development of allergen-specific immune tolerance.

It is a long-term process; noticeable improvement is often not observed for 6-12 months and, of helpful, should be continued for 3-5 years. This therapy is not free from risk, because sometimes severe systemic allergic reactions occur.
NONALLERGIC RHINITIS

Nonallergic rhinitis is a common condition characterized by the chronic presence of one or more of the following:

• nasal congestion
• rhinorrhea
• postnasal drainage. It is a diagnosis of exclusion, and thus, specific etiologies must be excluded (such as allergic, infectious, pharmacologic, structural, hormonal, vasculitic, metabolic, and atrophic causes).
Typical triggers in nonallergic rhinitis include irritant odors and strong fragrances, such as tobacco smoke, perfumes, diesel and car exhaust (ie, patients become congested when sitting in traffic), cleaning products, newsprint, changes in temperature, and alcoholic beverages.
Clinically, it is distinguished from allergic rhinitis by the following:

- Onset at a later age
- Absence of nasal and ocular itching and prominent sneezing
- Nasal congestion and postnasal drainage are prominent symptoms
- Symptoms are perennial

Subtypes of nonallergic rhinitis include:

- Vasomotor rhinitis, which is characterized by intermittent symptoms of congestion (stuffiness) and/or watery nasal discharge, and an exaggerated reaction to nonspecific irritants
- Gustatory rhinitis, which is an episodic condition with prominent watery rhinorrhea triggered most often by hot or spicy foods and is caused by a vagally-mediated reflex
Symptoms include:
- nasal dryness
- Crusting
- nasal obstruction

Physical examination shows a dry, erythematous, nasal mucosa. This probably results from damage to the nasal mucosa by cold, dry air under pressure.

CPAP-rhinitis usually responds to nasal irrigation with saline, combined with warming and humidification of the pressurized air using distilled water in a reservoir-hot plate device available for most machines. Small amounts of petroleum jelly applied to the anterior nose may be helpful.
Rhinitis associated with pregnancy has been defined as:
- nasal congestion in the last one to two months of pregnancy without other signs of respiratory tract infection
- no known allergic cause
- disappearing completely within two weeks after delivery
ATROPHIC RHINITIS

It occurs in older adults who have undergone repeated sinus and nasal surgeries. Although mild thinning of the nasal mucosa is seen with normal aging, atrophic rhinitis refers to exaggerated and progressive atrophy of the nasal lining, leading to colonization with bacteria.

Symptoms include nasal congestion, crusting, and a persistent bad smell.

Treatment consists of daily nasal lavage and lubrication combined with topical antibiotics.

Classification:
• The primary form is seen primarily in young people in the developing world. It is associated with mucosal colonization, predominantly with Klebsiella ozaenae, as well as other organisms.
• Secondary atrophic rhinosinusitis is seen with some regularity in the developed world and occurs in patients who underwent prior sinonasal trauma, surgery, radiation therapy, or have certain inflammatory conditions (granulomatous diseases).
Acute rhinosinusitis (ARS) is defined as symptomatic inflammation of the nasal cavity and paranasal sinuses lasting less than four weeks.

- Treatment for acute viral rhinosinusitis (AVRS) focuses on symptomatic management as it typically resolves within 7 to 10 days.
- Bacterial infection occurs in only 0.5 to 2 percent of episodes of ARS. Acute bacterial rhinosinusitis (ABRS) may also be a self-limited disease. Patients may be treated symptomatically and observed or treated with antibiotics. Rarely, patients with ABRS develop serious complications.
A fundamental role in the pathogenesis of rhinosinusitis is played by the ostiomeatal complex: the key element is maintenance of optimal sinus ventilation and clearance. Mucociliary impairment can contribute (infection, allergy, swelling of the mucosa for other reason)
**Symptomatic therapies** — Symptomatic management of acute rhinosinusitis (ARS), both viral and bacterial in etiology, aims to relieve symptoms of nasal obstruction and rhinorrhea as well as the systemic signs and symptoms such as fever and fatigue.

- **Analgesics and antipyretics** — OTC analgesics and antipyretics such as nonsteroidal anti-inflammatory drugs and acetaminophen can be used for pain and fever relief as needed.
- **Saline irrigation** — Mechanical irrigation with buffered, physiologic, or hypertonic saline may reduce the need for pain medication and improve overall patient comfort, particularly in patients with frequent sinus infections.
- **Intranasal glucocorticoids** — Studies have shown small symptomatic benefits and minimal adverse effects with short-term use of intranasal glucocorticoids for patients with both viral and bacterial ARS. Intranasal glucocorticoids are likely to be most beneficial for patients with underlying allergic rhinitis. The theoretic mechanism of action is a decrease in mucosal inflammation that allows improved sinus drainage.
Complications
• Orbital cellulitis
• Preseptal (periorbital) cellulitis
• Intracranial abscess
• Meningitis
• Polyposis
NASAL POLYPOSIS

The earliest record of nasal polyps is found in Egyptian literature of approximately 2,000 years BC

Non-neoplastic masses of oedematous nasal or sinus mucosa
Hippocrates (460-370 BC) referred to the “nasal growths” as “polypus” due to their resemblance to sea-polyp, and the name has persisted. Boerhaave in 1744 was the first to surmise that these growths resulted from elongation of the linings of the sinus.
Various diseases are associated with the formation of nasal polyps:
- Chronic rhinosinusitis
- Kartagener syndrome
- Cystic fibrosis
- Asthma
- Aspirin tolerance
- Allergic fungal sinusitis
- Young syndrome
- Churg-Strauss syndrome
- Nasal mastocytosis
- Nonallergic rhinitis with eosinophilia syndrome (NARES)
Epistaxis is a common problem, occurring in up to 60 percent of the general population.

**Epidemiology**

Although 60 percent of adults experience an epistaxis episode, but only 10 percent or fewer seek medical attention and surgical intervention is rarely needed.

Epistaxis appears to have a bimodal age distribution, with most cases occurring before age 10 or between 45 and 65 years of age. Hospital admission for epistaxis increases progressively with age, but these data often do not control for aspirin or anticoagulant use.
Classification

- Anterior (more common)
- Posterior
EPISTAXIS

Etiology
- Low moisture content in the ambient air can result in mucosal dryness and irritation
- The mucosal hyperemia that accompanies allergic or viral rhinitis makes bleeding from local trauma
- The presence of a foreign body should be considered when bleeding is accompanied by purulent discharge; sinusitis is also in the differential diagnosis in these circumstances
- Chronic excoriation can lead to small septal perforations that may bleed from surrounding friable granulation tissue; chronic intranasal drug use (eg, cocaine) may present similarly
- Patients who suffer facial trauma from a motor vehicle crash or other blunt facial impact often bleed from the nose, usually from an anterior source
- Anticoagulation/bleeding disorders/aspirin
- Vascular condition (aneurysm)
- Neoplasm
The initial evaluation of epistaxis should focus on airway assessment and cardiovascular stability. Airway intervention, fluid resuscitation, and emergent otolaryngologic consultation can be necessary in severe epistaxis. Normal appearance, vital signs, and respiratory function are evidence that the examiner can safely attend to the presenting complaint.
EPISTAXIS
Treatment

- Patient blows their nose to remove blood and clots
- Clinician sprays the nares with oxymetazoline
- Patient pinches the alae tightly against the septum and holds continuously for 10 minutes
If an anterior bleeding source is visualized, first-line treatment consists of chemical or electrical cauterity.

Chemical cauterity is usually performed with silver nitrate sticks: after determining that topical anesthesia is adequate, apply the applicator tip to a small area surrounding the bleeding site. Begin at the periphery of this small area and move towards the center, starting proximally. Avoid cauterizing large areas and remove excess silver nitrate with a cotton swab.
Cautery is applied for a few seconds (no longer than 10 seconds), until a white precipitate forms; cautery may cause rhinorrhea and crusting. Avoid overzealous cautery of the septum, which can lead to ulceration and perforation.

Silver nitrate will work only on a relatively bloodless surface; the bleeding point itself cannot be cauterized until hemostasis is achieved either by vasoconstrictive agents such as oxymetazoline drops or tamponade from manual pressure.
Electrical cauter y works equally well, but is also not effective on bloody surfaces. Cautery can be extremely painful if the patient is inadequately anesthetized.
If cautery is unsuccessful, the next step in the management of suspected anterior epistaxis is nasal packing to tamponade local bleeding. Several packing options are available.
Gel and foam products that promote thrombogenesis are being developed and tested for treatment of epistaxis. Quixil, a fibrin glue, is safe, and probably as effective as cautery and packing.

Evidence regarding the use of tranexamic acid (TXA) for epistaxis is limited. Nevertheless, for refractory cases, our approach is to use a Merocel tampon saturated with 500 mg of the IV formulation of TXA, in lieu of saline.
POSTERIOR EPISTAXIS
Treatment
Hereditary hemorrhagic telangiectasia (HHT; also called Osler-Weber-Rendu syndrome) is an autosomal dominant vascular disorder with a variety of clinical manifestations. Among the most common are epistaxis, gastrointestinal bleeding, and iron deficiency anemia, along with characteristic mucocutaneous telangiectasia.

Epidemiologic studies suggest prevalence rates between 1:5000 and 1:8000, with approximately 85,000 individuals affected in Europe.
A telangiectasia is a small, dilated blood vessel (arteriole, venule, or capillary) that is apparent near the surface of skin or mucous membranes and can easily bleeding.
The majority of patients with HHT experience only epistaxis, mucocutaneous telangiectasia, and usually a tendency to develop iron deficiency anemia secondary to the blood losses. However, some patients can have substantial symptoms, particularly attributable to severe recurrent nosebleeds and/or gastrointestinal bleeding, resulting in transfusion dependence.
Some patients experience no or minimal occasional episodes, but for the majority, recurrent and frequent epistaxis is a feature, with many patients experiencing daily bleeds. In this patients is important to suspect that epistaxis is only a signal of an underline systemic disease.