



# Acute sinusitis and rhinosinusitis in adults: Clinical manifestations and diagnosis

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## INTRODUCTION

Sinusitis and rhinosinusitis refer to inflammation in the nasal cavity and paranasal sinuses. Acute rhinosinusitis (ARS) lasts less than four weeks. The most common etiology of ARS is a viral infection associated with the common cold. Distinguishing acute viral rhinosinusitis (AVRS) related to colds and influenza-like illnesses from bacterial infection is a frequent challenge to the primary care clinician. This topic will address the clinical manifestations and diagnosis of acute viral and bacterial rhinosinusitis. The treatment of acute viral and bacterial rhinosinusitis is discussed separately. (See "[Uncomplicated acute sinusitis and rhinosinusitis in adults: Treatment](#)".)

Acute invasive fungal sinusitis, nosocomial bacterial sinusitis, and chronic rhinosinusitis are discussed separately. (See "[Fungal rhinosinusitis](#)", section on 'Invasive fungal sinusitis' and "[Chronic rhinosinusitis: Clinical manifestations, pathophysiology, and diagnosis](#)" and "[Complications of the endotracheal tube following initial placement: Prevention and management in adult intensive care unit patients](#)", section on 'Sinusitis'.)

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## DEFINITION AND CLASSIFICATION

Acute rhinosinusitis (ARS) is defined as symptomatic inflammation of the nasal cavity and paranasal sinuses ( [figure 1](#)) lasting less than four weeks. The term "rhinosinusitis" is preferred to "sinusitis" since inflammation of the sinuses rarely occurs without concurrent inflammation of the nasal mucosa [1].

Classification of rhinosinusitis is based upon symptom duration ( [figure 2](#)) [2]:

- Acute rhinosinusitis – Symptoms for less than 4 weeks
- Subacute rhinosinusitis – Symptoms for 4 to 12 weeks
- Chronic rhinosinusitis – Symptoms persist greater than 12 weeks
- Recurrent acute rhinosinusitis – Four or more episodes of ARS per year, with interim symptom resolution

ARS is further classified based on etiology and clinical manifestations [2]:

- Acute viral rhinosinusitis (AVRS) – ARS with viral etiology
- Uncomplicated acute bacterial rhinosinusitis (ABRS) – ARS with bacterial etiology without clinical evidence of extension outside the paranasal sinuses and nasal cavity (eg, without neurologic, ophthalmologic, or soft tissue involvement)
- Complicated ABRS – ARS with bacterial etiology with clinical evidence of extension outside the paranasal sinuses and nasal cavity

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## EPIDEMIOLOGY

Acute rhinosinusitis (ARS) is a common problem. Each year, approximately one in seven or eight persons in the United States and other Western countries will have an episode of rhinosinusitis [3,4]. Incidence is higher in women than men, and among all adults, incidence is highest among those aged 45 to 64 years [4].

Risk factors for ARS include older age, smoking, air travel, exposure to changes in atmospheric pressure (eg, deep sea diving), swimming, asthma and allergies, dental disease, and immunodeficiency [5].

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## PATHOPHYSIOLOGY AND MICROBIOLOGY

**Acute viral rhinosinusitis** — The vast majority of cases of acute rhinosinusitis (ARS) is due to viral infection [6]. Acute viral rhinosinusitis (AVRS) begins with viral inoculation via direct contact

with the conjunctiva or nasal mucosa. Viral replication in a nonimmune individual leads to detectable viral levels in nasal secretions within 8 to 10 hours. Symptoms, if they develop, usually present in the first day after inoculation. The most common viruses that cause AVRS are rhinovirus, influenza virus, and parainfluenza virus [7,8].

Viral rhinitis spreads to the paranasal sinuses ( [figure 1](#)) by systemic or direct routes. Nose blowing may be an important mechanism; positive intranasal pressures generated during nose blowing may propel contaminated fluid from the nasal cavity into the paranasal sinuses. Inflammation follows, resulting in sinonasal hypersecretion and increased vascular permeability leading to transudation of fluid into the nasal cavity and sinuses. Viruses also can exert a direct toxic effect on nasal cilia, impairing mucociliary clearance. A combination of mucosal edema, copious thickened secretions, and ciliary dyskinesia results in sinus obstruction and perpetuates the disease process [8].

**Acute bacterial rhinosinusitis** — Acute bacterial infection occurs in only 0.5 to 2 percent of episodes of ARS [9]. Acute bacterial rhinosinusitis (ABRS) occurs when bacteria secondarily infect an inflamed sinus cavity.

ABRS most commonly occurs as a complication of viral infection but can also be associated with rhinitis or other conditions that obstruct the nose or impair local or systemic immune function. These include allergic or nonallergic rhinitis, mechanical obstruction of the nose, dental infection, impaired mucociliary clearance (eg, cystic fibrosis, ciliary dysfunction), immunodeficiency, and other factors that impair sinus drainage [10].

The most common bacteria associated with ABRS (culture-derived data) are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*, with the first two comprising approximately 75 percent of cases of ABRS ( [table 1](#)). When ABRS is due to extension of dental root infection into the sinus cavity, microaerophilic and anaerobic bacteria may be identified. ABRS is typically caused by a single pathogen in high concentration, although two distinct pathogens in high concentrations are isolated in approximately 25 percent of patients [11].

Culture results do not correlate well with polymerase chain reaction (PCR)-based analysis of the sinus microbiome. Different bacteria grow variably in culture media, and the balance between the different organisms in our sinuses may be more important than the dominant, cultured organism [12,13]. This has been investigated in chronic rhinosinusitis, and more data are needed to understand if the difference between culture results and the sinus microbiome should affect treatment in acute rhinosinusitis.

Nosocomial bacterial sinusitis may develop in patients in the intensive care unit, particularly in those with prolonged intubation. This is discussed separately. (See "[Complications of the](#)

## CLINICAL FEATURES

**Symptoms** — Symptoms of acute rhinosinusitis (ARS) include nasal congestion and obstruction, purulent nasal discharge, maxillary tooth discomfort, and facial pain or pressure that is worse or localized to the sinuses when bending forward ( [table 2](#)) [6,14]. Other signs and symptoms include fever, fatigue, cough, hyposmia or anosmia, ear pressure or fullness, headache, and halitosis. Patients may also have signs and symptoms of eustachian tube dysfunction (eg, ear pain, fullness or pressure, hearing loss, or tinnitus). (See "[Eustachian tube dysfunction](#)", section on 'History'.)

The symptoms of acute viral rhinosinusitis (AVRS) and acute bacterial rhinosinusitis (ABRS) overlap. There are no clinical criteria that have been validated to distinguish between them [15,16]. However, AVRS and ABRS have different clinical courses:

- **AVRS** – AVRS has a similar clinical course to other viral upper respiratory infections (URIs) with patients having partial or complete resolution of symptoms within 7 to 10 days [2,17-21]. Although symptoms may persist for more than 10 days, there is typically some improvement by day 10 [22]. In most cases of viral URI, symptoms peak in severity between days 3 and 6, after which symptoms improve.

If fever is present, it is generally present early in the illness and disappears within the first 24 to 48 hours, with respiratory symptoms becoming more prominent after the fever has resolved ( [figure 3](#)) [16]. Patients with viral infection may have purulent nasal discharge during the course of their illness; discolored, purulent nasal discharge is a sign of inflammation of the nasal and sinus mucosa. Most often, the discharge starts clear, becomes purulent, and then becomes clear again.

- **ABRS** – Patients with ABRS tend to have symptoms that last longer (>10 days) [2,16]. A biphasic pattern illness ("double worsening"), characterized by worsening symptoms after an initial period of improvement, also suggests a bacterial cause [2,23-25]. Individual symptoms such as purulent nasal discharge or facial pain cannot be used to accurately distinguish ABRS from AVRS [17,26,27]. The full constellation of symptoms and its temporal pattern should be taken into account when making the diagnosis [2,24].

**Physical findings** — Physical examination findings may include erythema or edema over the involved cheekbone or periorbital area, cheek tenderness or tenderness with percussion of the

upper teeth, and purulent drainage within the nose or in the posterior pharynx [2]. Patients may have exacerbation of facial pain or pressure with percussion of the sinuses, but the sensitivity and specificity of this physical finding has not been established and this is not diagnostic in isolation [28]. Transillumination of the sinuses may show opacity, but this is useful only for examining the maxillary and frontal sinuses and does not have a high enough sensitivity or specificity to warrant its use in diagnosis [29].

Anterior rhinoscopy (performed with a handheld otoscope or nasal speculum) may show diffuse mucosal edema, narrowing of the middle meatus, inferior turbinate hypertrophy, and copious rhinorrhea or purulent discharge. Polyps or septal deviation may be noted incidentally and may indicate pre-existing anatomic risk factors for the development of ABRS.

Patients with symptoms of ear pain, fullness or pressure, hearing loss, or tinnitus should have ear examination with an otoscope to evaluate for associated eustachian tube dysfunction and middle ear pathology. (See "[Eustachian tube dysfunction](#)", section on '[Physical examination](#)'.)

**Complications** — Complications of ABRS, which are rare, occur in patients with bacterial infection when the infection spreads beyond the paranasal sinuses and nasal cavity into the central nervous system, orbit, or surrounding tissues. Clinical manifestations vary based on complication ( [table 3](#)):

- Preseptal (periorbital) cellulitis – Patients present with ocular pain and eyelid swelling and erythema ( [picture 1](#)) without proptosis, diplopia, or pain with eye movements, which distinguishes preseptal from orbital cellulitis. (See "[Preseptal cellulitis](#)".)
- Orbital cellulitis – Distinguishing preseptal cellulitis from orbital cellulitis, a severe infection involving the soft tissue behind the orbital septum ( [figure 4](#)) that requires urgent evaluation and treatment, is important. Patients with orbital cellulitis have ocular pain and eyelid swelling and erythema but may also have pain with eye movements, proptosis, and diplopia suggesting involvement of the orbital tissue ( [table 4](#)). Orbital cellulitis is reviewed in detail elsewhere. (See "[Orbital cellulitis](#)".)
- Subperiosteal abscess – Subperiosteal abscess is a complication of orbital cellulitis. Symptoms of subperiosteal abscess are similar to orbital cellulitis, but marked displacement of the globe is suggestive of abscess ( [figure 4](#)). (See "[Acute bacterial rhinosinusitis in children: Clinical features and diagnosis](#)", section on '[Postseptal orbital complications](#)' and "[Orbital cellulitis](#)", section on '[Clinical manifestations](#)'.)
- Osteomyelitis of the sinus bones – Acute osteomyelitis typically presents with gradual onset of symptoms over several days. Patients usually present with dull pain at the

involved site, with or without movement. Local findings (tenderness, warmth, erythema, and swelling), and systemic symptoms (fever, rigors) may also be present. (See ["Nonvertebral osteomyelitis in adults: Clinical manifestations and diagnosis"](#).)

- Meningitis – Patients present with fevers, nuchal rigidity, and change in mental status. (See ["Clinical features and diagnosis of acute bacterial meningitis in adults"](#).)
- Intracranial abscess – Headache is the most common symptom of intracranial abscess. The headache tends not to be relieved by over-the-counter pain medications. Patients may also have fever, neck stiffness, change in mental status, and vomiting (from increased intracranial pressure). (See ["Pathogenesis, clinical manifestations, and diagnosis of brain abscess"](#) and ["Intracranial epidural abscess", section on 'Clinical manifestations'](#).)
- Septic cavernous sinus thrombosis – Patients often have nonspecific symptoms, but the presence of cranial nerve palsies should raise concern. (See ["Septic dural sinus thrombosis", section on 'Clinical manifestations'](#).)

**Radiologic features** — Imaging is **not** indicated in patients with clinically diagnosed uncomplicated rhinosinusitis [2,16,30]. If obtained, findings consistent with acute rhinosinusitis on computed tomography (CT) include air-fluid levels, mucosal edema, and air bubbles within the sinuses ( [image 1](#)). However, these findings are nonspecific. Mucosal abnormalities are common among asymptomatic adults [31,32], and mucosal edema, air bubbles, and air-fluid levels have also been observed in patients with the common cold [33]. Plain radiographs are also unhelpful due to poor sensitivity and specificity [34,35].

By contrast, imaging is indicated in the evaluation of patients with signs or symptoms suggesting spread of infection beyond the paranasal sinuses and nasal cavity (ie, complicated rhinosinusitis). (See ["Complicated acute bacterial rhinosinusitis"](#) below.)

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## DIAGNOSIS AND EVALUATION

**Uncomplicated acute rhinosinusitis** — The diagnosis of acute rhinosinusitis (ARS) is based upon clinical signs and symptoms ( [algorithm 1](#)).

It is diagnosed when patients present with [2]:

- <4 weeks of **purulent** nasal drainage **and**
- Severe nasal obstruction, facial pain/pressure/fullness, or both

The diagnosis is further supported by the presence of secondary symptoms, including anosmia, ear fullness, cough, and headache. Patients are diagnosed with either viral or bacterial ARS depending on the quality, duration, and progression of symptoms [36].

**Acute viral rhinosinusitis** — Acute viral rhinosinusitis (AVRS) is diagnosed clinically when patients have <10 days of symptoms consistent with ARS that are not worsening [2]. (See 'Uncomplicated acute rhinosinusitis' above and 'Symptoms' above.)

**Acute bacterial rhinosinusitis** — We use the following criteria to diagnose acute bacterial rhinosinusitis (ABRS), which are derived from the American Academy of Otolaryngology-Head and Neck Surgery guidelines and the Infectious Diseases Society of America guidelines [2,16]:

- **Persistent** symptoms or signs of ARS lasting 10 or more days without evidence of clinical improvement **or**
- A biphasic pattern of illness, typically extending over a 10-day period, characterized by signs and symptoms of ARS that initially start to improve but then **worsen** approximately five to six days later ("double worsening"). (See 'Symptoms' above.)

The onset of severe symptoms or signs of severe illness (eg, high fever [ $>39^{\circ}\text{C}$  or  $102^{\circ}\text{F}$ ], purulent nasal discharge, facial pain) for at least three to four consecutive days at the beginning of illness supports the diagnosis of ABRS. However, severity of illness alone is not sufficient criteria for starting antibiotics.

Imaging, nasal cultures, sinus aspirates, and other microbiologic testing are not indicated for patients with clinically diagnosed uncomplicated AVRS or ABRS [2,16]. These tests are reserved for patients with suspected complications. (See 'Complicated acute bacterial rhinosinusitis' below.)

Other guidelines use varying criteria to diagnose ABRS. These criteria may be based on specific symptoms or duration of illness [37,38].

**Complicated acute bacterial rhinosinusitis** — Patients with ABRS who have signs or symptoms indicating spread beyond the paranasal sinuses and nasal cavity (into the central nervous system, orbit, or surrounding tissues) require urgent evaluation and management. These include patients with the following signs or symptoms:

- Severe and persistent headache
- Periorbital edema, inflammation, or erythema
- Vision changes (double vision or impaired vision)
- Abnormal extraocular movements



- Proptosis
- Pain with eye movement
- Cranial nerve palsies
- Altered mental status
- Neck stiffness or other meningeal signs
- Papilledema or other sign of increased intracranial pressure

Typically, the evaluation is performed in the emergency department where imaging and otolaryngology consultation can be obtained quickly. The specific approach to evaluation and management varies based on the suspected complication, although most patients require imaging and microbiologic testing ( [table 3](#)).

- **Imaging** – We select an imaging approach based on the suspected complication [30], severity of illness, patient contraindications, and available imaging modalities and expertise. When intraocular or intracranial infection is suspected clinically, we generally obtain a computed tomography (CT; with contrast) or a magnetic resonance imaging (MRI; without and with contrast) of the head including the paranasal sinuses. CT is preferred for the evaluation of bone erosion, while MRI can better differentiate abscesses from inflamed tissue ( [table 3](#)). CT without contrast is rarely used if complications are suspected but can be used to exclude a diagnosis of sinusitis if the diagnosis of ARS is uncertain based on clinical criteria.
- **Microbiologic testing** – It is reasonable to obtain sinus aspirate or endoscopic cultures ( [picture 2](#)) in patients in whom there is suspicion of intracranial extension of the infection or other serious complications. These cultures are generally obtained by an otolaryngologist. Endoscopic cultures of the middle meatus are better tolerated than maxillary sinus aspiration with minimal morbidity and correlate with maxillary sinus cultures [39-43]. Nasal cultures from blind swabs or purulent nasal secretions are not reliable and are not useful in the diagnosis of ABRS [16].

Additional evaluation, such as the need for a lumbar puncture for patients with suspected meningitis or infectious disease consultation, should be individualized.

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## DIFFERENTIAL DIAGNOSIS

**Acute invasive fungal rhinosinusitis** — Symptoms of acute invasive fungal rhinosinusitis are similar to acute rhinosinusitis (ARS), but acute invasive fungal rhinosinusitis is often rapidly progressive and many patients have extension of the infection outside the sinuses at



presentation. The majority of patients with acute invasive fungal rhinosinusitis are immunosuppressed or have poorly controlled diabetes. Early diagnosis is of paramount importance. Patients with suspected acute invasive fungal sinusitis require immediate evaluation by an otolaryngologist. (See ["Fungal rhinosinusitis", section on 'Invasive fungal sinusitis'](#).)

**The common cold** — Symptoms of the common cold and ARS often overlap. However, patients with the common cold generally do not have facial pain. They typically primarily have symptoms of rhinitis (sneezing and anterior or posterior rhinorrhea), often with a sore throat or cough. (See ["The common cold in adults: Diagnosis and clinical features"](#).)

**Others** — Other conditions to consider include those that can cause symptoms of rhinitis, facial pain, headache, or dental pain:

- Noninfectious rhinitis – Allergic rhinitis and nonallergic vasomotor rhinitis are common causes of rhinorrhea and nasal congestion. These can be distinguished from ARS as symptoms of sneezing, rhinorrhea, nasal congestion, and nasal itching predominate. These patients generally do not have facial pain/pressure, headache, or purulent nasal drainage. (See ["An overview of rhinitis"](#).)
- Facial pain – Multiple conditions may cause facial pain, including neuralgias, temporomandibular joint disorder, cancer pain, or carotidynia. These patients do not have the other symptoms of ARS. (See ["Overview of craniofacial pain"](#).)
- Headache – Frontal sinus pain may result from a variety of headache etiologies, including migraine headaches, tension headaches, and cluster headaches. The differentiation of headache secondary to sinus symptoms and other etiologies is discussed separately. (See ["Evaluation of headache in adults", section on 'Sinus symptoms'](#).)
- Dental pain – While dental infection may be a direct source of bacterial involvement of the maxillary sinuses, patients with dental infection or inflammation may have referred pain to the sinuses without actual infection within the sinuses. Patients should be asked about prior dental procedures or heat or cold sensitivity in the teeth. These patients do not have the other symptoms of ARS (purulent nasal drainage, nasal congestion/obstruction).

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## SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See ["Society guideline links: Acute rhinosinusitis"](#).)

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## INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5<sup>th</sup> to 6<sup>th</sup> grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10<sup>th</sup> to 12<sup>th</sup> grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or email these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "[Patient education: Sinusitis in adults \(The Basics\)](#)" and "[Patient education: What you should know about antibiotics \(The Basics\)](#)")
- Beyond the Basics topic (see "[Patient education: Acute sinusitis \(sinus infection\) \(Beyond the Basics\)](#)")

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## SUMMARY AND RECOMMENDATIONS

- **Definition and classification of ARS** – Acute rhinosinusitis (ARS), inflammation of the nasal cavity and paranasal sinuses, lasts less than four weeks ( [figure 2](#)). ARS may have a viral or bacterial etiology. (See '[Definition and classification](#)' above and '[Pathophysiology and microbiology](#)' above.)
- **Microbiology** – The vast majority of cases are due to viral infection; acute bacterial rhinosinusitis (ABRS) accounts for 0.5 to 2 percent of cases. The most common bacteria associated with ABRS are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*, with the first two comprising approximately 75 percent of cases of ABRS ( [table 1](#)). ABRS may be complicated by extension of inflammation outside the paranasal sinuses and nasal cavity into the central nervous system, orbit, or surrounding tissues. (See '[Acute bacterial rhinosinusitis](#)' above and '[Complications](#)' above.)
- **Clinical features and diagnosis** – The diagnosis of ARS (viral or bacterial) is based on the presence of compatible clinical features: purulent nasal drainage **and** severe nasal

obstruction and/or facial pain/pressure/fullness ( [algorithm 1](#)). Other signs and symptoms include maxillary tooth discomfort, fever, fatigue, cough, hyposmia or anosmia, ear pressure or fullness, headache, and halitosis. (See '[Symptoms](#)' above and '[Physical findings](#)' above and '[Diagnosis and evaluation](#)' above.)

- **Distinguishing viral from bacterial infection** – Symptoms do not accurately distinguish viral from bacterial infection. ABRS is suggested by persistent symptoms or signs of ARS lasting  $\geq 10$  days without clinical improvement or signs and symptoms of ARS that initially improve but then worsen, typically over a 10-day time period ("double worsening"). (See '[Acute viral rhinosinusitis](#)' above and '[Acute bacterial rhinosinusitis](#)' above.)
- **Imaging not needed in uncomplicated ARS** – Patients diagnosed with acute viral rhinosinusitis (AVRS) or ABRS who lack signs or symptoms of complications do not need imaging or other testing. (See '[Uncomplicated acute rhinosinusitis](#)' above.)
- **Complications of ABRS** – Complications of ABRS are rare and occur when ABRS infection spreads beyond the paranasal sinuses and nasal cavity into the central nervous system, orbit, or surrounding tissues. They include preseptal and orbital cellulitis, osteomyelitis, meningitis, subperiosteal and intracranial abscesses, and septic cavernous sinus thrombosis. Clinical manifestations vary based on complication ( [table 3](#)). (See '[Complications](#)' above.)
- **Urgent evaluation, imaging, and referral for suspected complicated ABRS** – Patients with ABRS who have signs or symptoms indicating spread beyond the paranasal sinuses and nasal cavity should be urgently referred for evaluation and diagnosis, including imaging and referral to an otolaryngologist. (See '[Complicated acute bacterial rhinosinusitis](#)' above.)

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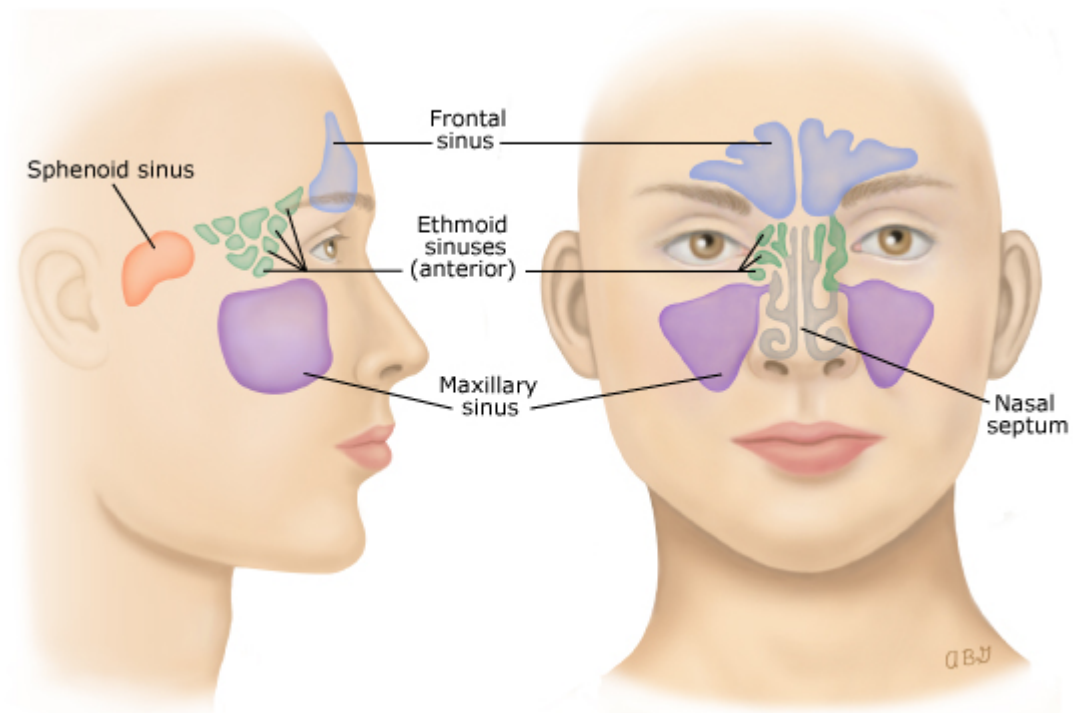
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## GRAPHICS

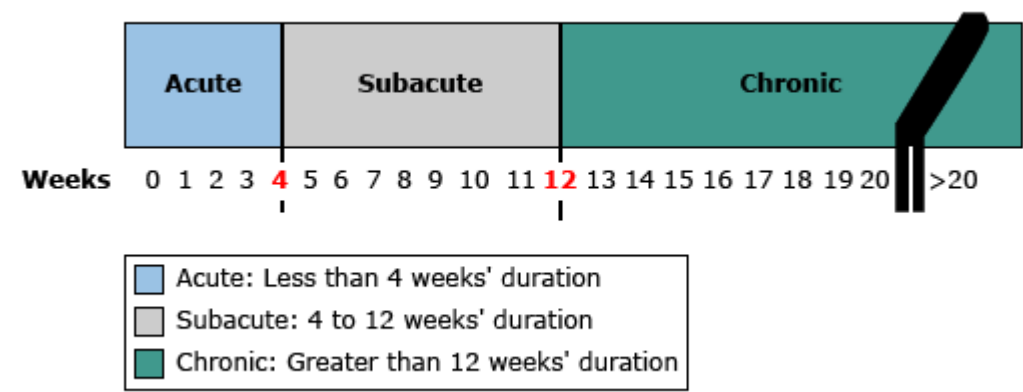
### Paranasal sinus anatomy



Schematic drawing showing location of the frontal, ethmoid, maxillary, and sphenoid sinuses.



# Classification of rhinosinusitis by duration of disease



Graphic 75972 Version 3.0

## Distribution of pathogens in acute bacterial rhinosinusitis in adults

Pathogen	Incidence (%)
<i>Streptococcus pneumoniae</i>	20 to 43
<i>Haemophilus influenzae</i>	22 to 36
<i>Moraxella catarrhalis</i>	2 to 16
<i>Staphylococcus aureus</i>	10 to 13
<i>Streptococcus pyogenes</i>	3

Distribution of pathogens in acute bacterial rhinosinusitis based upon culture results.

Data from:

1. Hadley JA, Mosges R, Desrosiers M, et al. Moxifloxacin five-day therapy versus placebo in acute bacterial rhinosinusitis. *Laryngoscope* 2010; 120:1057.
2. Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, et al. Clinical practice guideline (update): Adult sinusitis. *Otolaryngol Head Neck Surg* 2015; 152:S1.

## Symptoms of acute rhinosinusitis

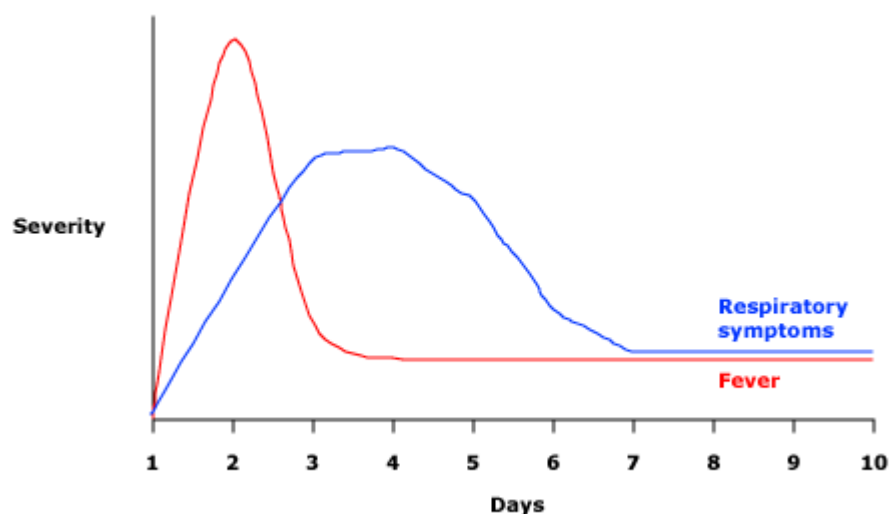
Purulent anterior nasal discharge
Purulent or discolored posterior nasal discharge
Nasal congestion or obstruction
Facial congestion or fullness
Hyposmia or anosmia
Fever
Headache
Ear pain, pressure, or fullness
Halitosis
Dental pain
Fatigue

### *Reference:*

1. Chow AW, Benninger MS, Brook I, et al. IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults. *Clin Infect Dis* 2012; 54:e72.

Original figure modified for this publication. Meltzer EO, Hamilos DL, Hadley JA, et al. Rhinosinusitis: establishing definitions for clinical research and patient care. *J Allergy Clin Immunol* 2004; 114:155. Table used with the permission of Elsevier Inc. All rights reserved.

## Course of uncomplicated viral upper respiratory infection (URI)



The course of most uncomplicated viral URIs is 5 to 10 days. Most patients with viral URIs are afebrile. If fever is present, it tends to occur on the first 2 days of illness, in concert with constitutional symptoms (eg, headache, myalgia). As fever and/or constitutional symptoms resolve, respiratory symptoms become more prominent, peaking in severity on days 3 to 6 of illness. Respiratory symptoms may continue to be present on day 10 of illness but are less severe than earlier in the course.

## Complications of acute bacterial rhinosinusitis

Complication	Clinical features	Imaging evaluation*
Preseptal cellulitis	Ocular pain, eyelid swelling, and erythema	Clinical diagnosis (imaging usually not needed unless there is concern for orbital cellulitis)
Orbital cellulitis	Ocular pain, eyelid swelling, and erythema plus pain with eye movements, proptosis, or visual changes suggesting involvement of the orbital tissue	CT with contrast or MRI without and with contrast of the head, including the orbit and paranasal sinuses
Subperiosteal abscess	Displacement of the globe, in addition to symptoms of orbital cellulitis	MRI without and with contrast of the head, orbit, and paranasal sinuses
Intracranial abscess	Headache with or without altered mental status, fever, or nausea/vomiting	CT with contrast or MRI without and with contrast of the head and paranasal sinuses
Meningitis	Fever, neck stiffness, and/or altered mental status	CT of the head without contrast may be indicated prior to lumbar puncture¶
Septic cavernous sinus thrombosis	Cranial nerve palsies (CN III, IV, VI) with or without headache and fever	MRI without and with contrast of the head and paranasal sinuses. MR venography either without or with contrast.
Osteomyelitis	Dull pain at involved site often with overlying tenderness, erythema, or swelling	CT with contrast or MRI without and with contrast of the head and paranasal sinuses

CT: computed tomography; MRI: magnetic resonance imaging.

\* Patient contraindications, severity of illness, available imaging modalities, and local expertise should also be taken into account when selecting an imaging approach.

¶ Refer to UpToDate content on clinical features and diagnosis of acute bacterial meningitis.

## Preseptal edema and erythema



This young girl has erythema and edema in the preseptal area, which could be caused by either orbital or preseptal infection.

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*Reproduced with permission from: Fleisher GR, Ludwig W, Baskin MN. Atlas of Pediatric Emergency Medicine. Philadelphia: Lippincott Williams & Wilkins, 2004. Copyright © 2004 Lippincott Williams & Wilkins.*

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## The orbital septum

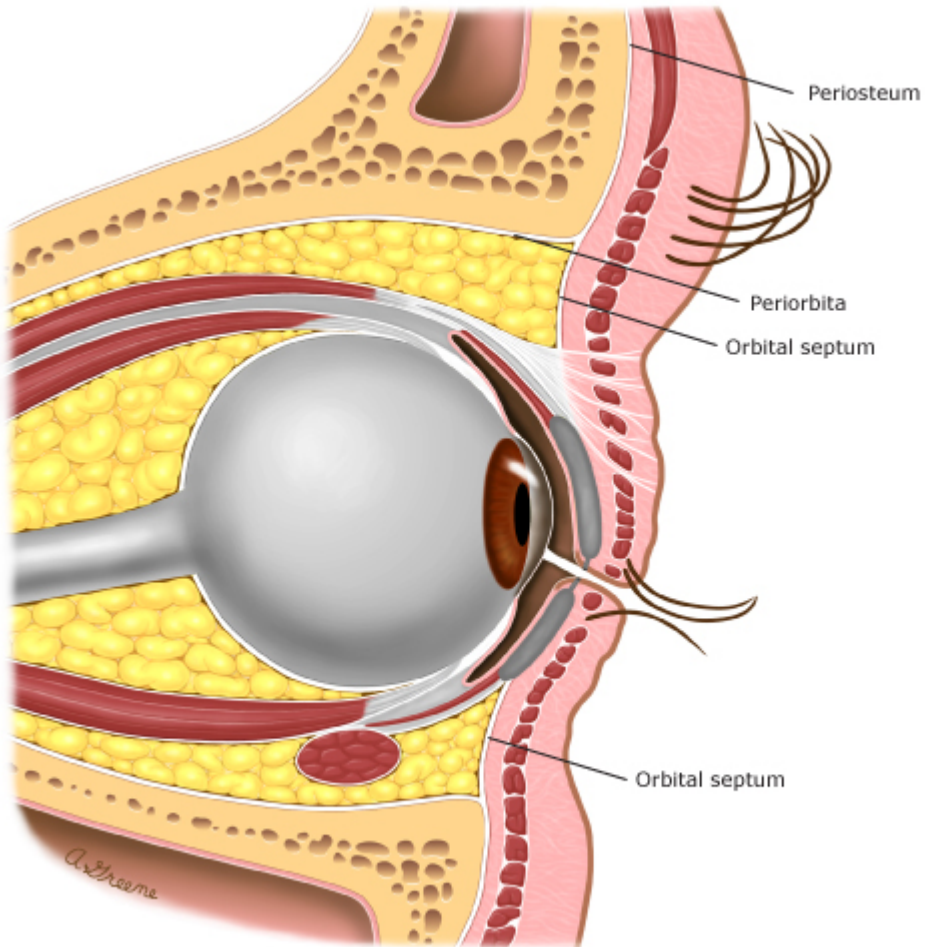


Diagram showing the proximity of the periosteum in relation to the orbital septum. Orbital cellulitis arises posterior to the orbital septum.



## Clinical features of preseptal and orbital cellulitis

Clinical feature	Preseptal cellulitis	Orbital cellulitis
Eyelid swelling with or without erythema	Yes	Yes
Eye pain/tenderness	May be present	Yes; may cause deep eye pain
Pain with eye movements	No	Yes
Proptosis	No	Usually, but may be subtle
Ophthalmoplegia +/- diplopia	No	May be present
Vision impairment	No	May be present*
Chemosis	Rarely present	May be present
Fever	May be present	Usually present
Leukocytosis	May be present	May be present

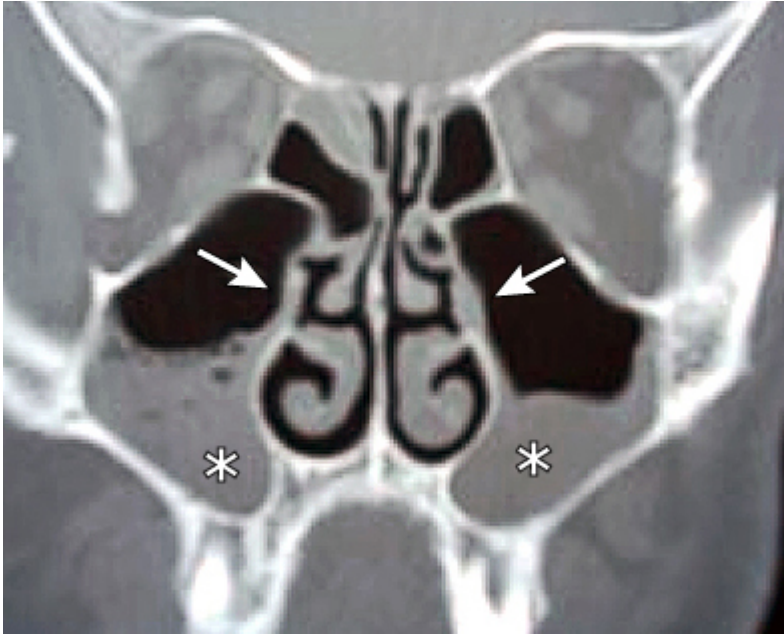
\* An afferent pupillary defect may signal impending visual loss.

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### References:

1. Seltz LB, Smith J, Durairaj VD, et al. Microbiology and antibiotic management of orbital cellulitis. *Pediatrics* 2011; 127:e566.
2. Durand ML. Periocular infections. In: *Principles and Practice of Infectious Diseases*, 7th ed, Mandell GL, Bennett, et al. (Eds), Churchill Livingstone Elsevier, Philadelphia 2010. p.1569.
3. Chaudhry IA, Shamsi FA, Elzaridi E, et al. Inpatient preseptal cellulitis: experience from a tertiary eye care centre. *Br J Ophthalmol* 2008; 92:1337.
4. Botting AM, McIntosh D, Mahadevan M. Paediatric pre- and post-septal peri-orbital infections are different diseases. A retrospective review of 262 cases. *Int J Pediatr Otorhinolaryngol* 2008; 72:377.
5. Nageswaran S, Woods CR, Benjamin DK Jr, et al. Orbital cellulitis in children. *Pediatr Infect Dis J* 2006; 25:695.
6. Sobol SE, Marchand J, Tewfik TL, et al. Orbital complications of sinusitis in children. *J Otolaryngol* 2002; 31:131.
7. Givner LB. Periorbital versus orbital cellulitis. *Pediatr Infect Dis J* 2002; 21:1157.

## CT of acute bacterial rhinosinusitis



Acute bacterial rhinosinusitis. Coronal image from a CT of the paranasal sinuses showing mucosal edema (arrows) and thick secretions (asterisks).

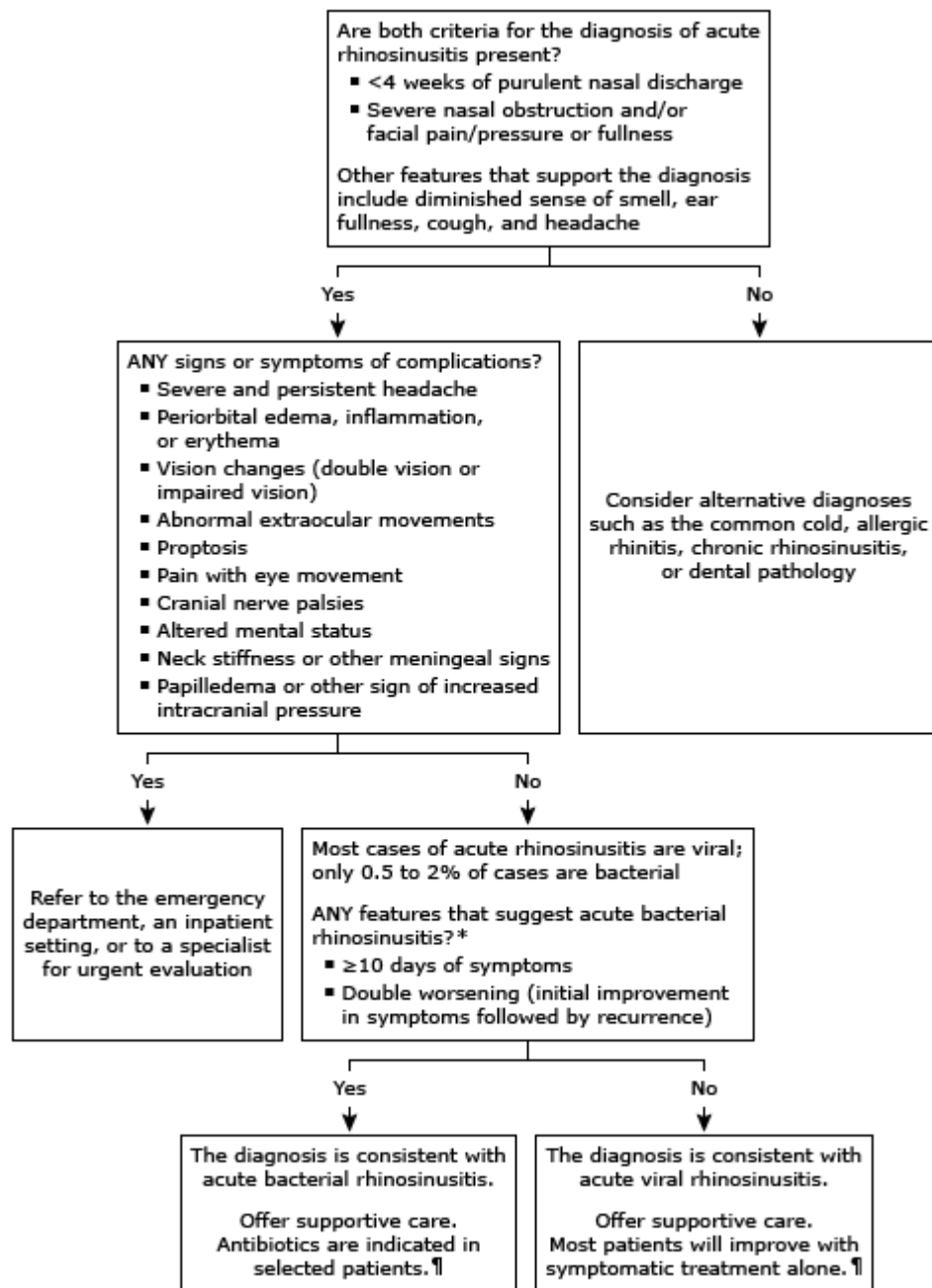
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CT: computed tomography.

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Graphic 68163 Version 4.0

## Initial evaluation of the adult with suspected acute rhinosinusitis



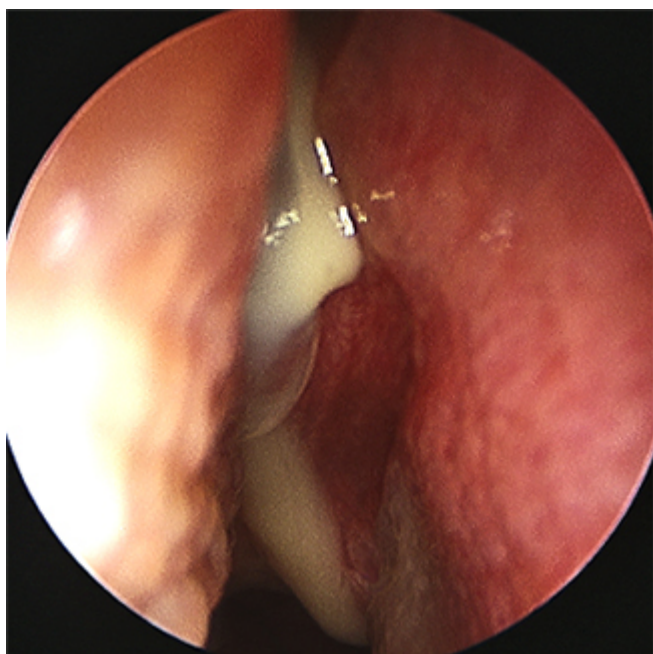
This algorithm will help differentiate patients with acute viral rhinosinusitis from those with acute bacterial rhinosinusitis and identify patients who have signs or symptoms of complications that require urgent evaluation and treatment.

\* The onset of severe symptoms or signs of severe illness (eg, high fever [ $>39^{\circ}\text{C}$  or  $102^{\circ}\text{F}$ ], purulent nasal discharge, facial pain) for at least 3 to 4 consecutive days at the beginning of illness supports the diagnosis of acute bacterial rhinosinusitis. However, severity of illness alone is not sufficient criteria for starting antibiotics. Refer to the UpToDate text for additional detail.

¶ Refer to UpToDate content on treatment of uncomplicated acute rhinosinusitis in adults.



**Endoscopic image of purulent drainage from the middle meatus in a patient with acute bacterial rhinosinusitis**



Graphic 54181 Version 2.0

