**Sinusitis**

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**Sinusitis** is [inflammation](http://en.wikipedia.org/wiki/Inflammation) of the [paranasal sinuses](http://en.wikipedia.org/wiki/Paranasal_sinuses), which may be due to [infection](http://en.wikipedia.org/wiki/Infection), [allergy](http://en.wikipedia.org/wiki/Allergy), or [autoimmune](http://en.wikipedia.org/wiki/Autoimmunity) issues

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Sinusiti (or rhinosinusitis) is defined as an inflammation of the mucous membrane that lines the paranasal sinuses and is classified chronologically into several categories

**Classification:**

**According to duration**

1. [acute](http://en.wikipedia.org/wiki/Acute) rhinosinusitis — a new infection that may last up to four weeks and can be subdivided symptomatically into severe and non-severe;
2. recurrent acute rhinosinusitis — four or more separate episodes of acute sinusitis that occur within one year;
3. [subacute](http://en.wikipedia.org/wiki/Subacute) rhinosinusitis — an infection that lasts between four and 12 weeks, and represents a transition between acute and chronic infection;
4. [chronic](http://en.wikipedia.org/wiki/Chronic_%28medicine%29) rhinosinusitis — when the signs and symptoms last for more than 12 weeks; and
5. acute exacerbation of chronic rhinosinusitis — when the signs and symptoms of chronic rhinosinusitis exacerbate, but return to baseline after treatment.

All these types of sinusitis have similar [symptoms](http://en.wikipedia.org/wiki/Symptom), and are thus often difficult to distinguish. Acute sinusitis is very common. Roughly ninety percent of adults have had sinusitis at some point in their life.[[3]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-3)

**] Acute**

[Acute](http://en.wikipedia.org/wiki/Acute_%28medical%29) sinusitis is usually precipitated by an earlier [upper respiratory tract infection](http://en.wikipedia.org/wiki/Upper_respiratory_tract_infection), generally of [viral](http://en.wikipedia.org/wiki/Virus) origin. If the infection is of bacterial origin, the most common three causative agents are [*Streptococcus pneumoniae*](http://en.wikipedia.org/wiki/Streptococcus_pneumoniae), [*Haemophilus influenzae*](http://en.wikipedia.org/wiki/Haemophilus_influenzae), and [*Moraxella catarrhalis*](http://en.wikipedia.org/wiki/Moraxella_catarrhalis).[[4]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-Leung2008-4) Until recently, [*Haemophilus influenzae*](http://en.wikipedia.org/wiki/Haemophilus_influenzae) was the most common bacterial agent to cause sinus infections. Other sinusitis-causing [bacterial](http://en.wikipedia.org/wiki/Bacterial) [pathogens](http://en.wikipedia.org/wiki/Pathogen) include [*Staphylococcus aureus*](http://en.wikipedia.org/wiki/Staphylococcus_aureus) and other [streptococci](http://en.wikipedia.org/wiki/Streptococci) [species](http://en.wikipedia.org/wiki/Species), [anaerobic bacteria](http://en.wikipedia.org/wiki/Anaerobic_organism) and, less commonly, [gram negative](http://en.wikipedia.org/wiki/Gram_negative) bacteria

[Acute](http://en.wikipedia.org/wiki/Acute_%28medical%29) episodes of sinusitis can also result from [fungal](http://en.wikipedia.org/wiki/Fungus) invasion. These [infections](http://en.wikipedia.org/wiki/Infection) are typically seen in [patients](http://en.wikipedia.org/wiki/Patient) with [diabetes](http://en.wikipedia.org/wiki/Diabetes) or other [immune deficiencies](http://en.wikipedia.org/wiki/Immunodeficiency) (such as [AIDS](http://en.wikipedia.org/wiki/AIDS) or [transplant](http://en.wikipedia.org/wiki/Organ_transplant) [patients](http://en.wikipedia.org/wiki/Patient) on immunosuppressive anti-rejection medications) and can be life threatening. In type I diabetics, ketoacidosis can be associated with sinusitis due to [mucormycosis](http://en.wikipedia.org/wiki/Mucormycosis).[[6]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-6)

**Chronic**

Chronic sinusitis, by definition, lasts longer than three months and can be caused by many different diseases that share chronic inflammation of the sinuses as a common symptom. Symptoms of chronic sinusitis may include any combination of the following: [nasal congestion](http://en.wikipedia.org/wiki/Nasal_congestion), facial pain, [headache](http://en.wikipedia.org/wiki/Headache), night-time coughing, an increase in previously minor or controlled asthma symptoms, general [malaise](http://en.wikipedia.org/wiki/Malaise), thick green or yellow [discharge](http://en.wikipedia.org/wiki/Rhinorrhea), feeling of facial 'fullness' or 'tightness' that may worsen when bending over, dizziness, aching teeth, and/or [halitosis](http://en.wikipedia.org/wiki/Halitosis)..

Causative organism :

Chronic rhinosinusitis represents a multifactorial inflammatory disorder, rather than simply a persistent bacterial infection.[[4]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-Leung2008-4) The medical management of chronic rhinosinusitis is now A combination of [anaerobic and aerobic bacteria](http://en.wikipedia.org/wiki/Anaerobic_infections),[[8]](http://en.wikipedia.org/wiki/Sinusitis" \l "cite_note-8)[[9]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-9) are detected in conjunction with chronic sinusitis. Also isolated are [*Staphylococcus aureus*](http://en.wikipedia.org/wiki/Staphylococcus_aureus) (and coagulase-negative [*Staphylococci*](http://en.wikipedia.org/wiki/Staphylococci) and Gram negative enteric organisms can be isolated.

A more recent, and still debated, development in chronic sinusitis is the role that [fungus](http://en.wikipedia.org/wiki/Fungus) plays in this disease..

**According to location its location :**

* [Maxillary](http://en.wikipedia.org/wiki/Maxillary_sinus) – can cause [pain](http://en.wikipedia.org/wiki/Pain) or pressure in the maxillary ([cheek](http://en.wikipedia.org/wiki/Cheek)) area (*e.g.,* [toothache](http://en.wikipedia.org/wiki/Toothache), [headache](http://en.wikipedia.org/wiki/Headache))
* [Frontal](http://en.wikipedia.org/wiki/Frontal_sinus) – can cause pain or pressure in the [frontal sinus](http://en.wikipedia.org/wiki/Frontal_sinus) cavity (located above eyes), [headache](http://en.wikipedia.org/wiki/Headache))
* [Ethmoid](http://en.wikipedia.org/wiki/Ethmoid_sinus) – can cause pain or pressure pain between/behind the [eyes](http://en.wikipedia.org/wiki/Human_eye) and [headaches](http://en.wikipedia.org/wiki/Headache)
* [Sphenoid](http://en.wikipedia.org/wiki/Sphenoid_sinus) – can cause pain or pressure behind the [eyes](http://en.wikipedia.org/wiki/Human_eye), but often refers to the [vertex](http://en.wikipedia.org/wiki/Vertex_%28anatomy%29), or top of the [head](http://en.wikipedia.org/wiki/Head)

**Signs and symptoms**

Headache/facial pain or pressure of a dull, constant, or aching sort over the affected sinuses is common with both acute and chronic stages of sinusitis. This pain is typically localized to the involved sinus and may worsen when the affected person bends over or when [lying down](http://en.wikipedia.org/wiki/Supine_position). Pain often starts on one side of the head and progresses to both sides.[]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-umm.edu-14) Acute and chronic sinusitis may be accompanied by thick nasal discharge that is usually green in color and may contain pus (purulent) and/or blood.[ Often a localized headache or [toothache](http://en.wikipedia.org/wiki/Toothache) is present, and it is these symptoms that distinguish a sinus-related headache from other types of headaches, such as tension and migraine headaches. Infection of the eye socket is possible, which may result in the loss of sight and is accompanied by fever and severe illness. Another possible complication is the infection of the bones ([osteomyelitis](http://en.wikipedia.org/wiki/Osteomyelitis" \o "Osteomyelitis)) of the forehead and other facial bones – [Pott's puffy tumor](http://en.wikipedia.org/wiki/Pott%27s_puffy_tumor).[[14]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-umm.edu-14)

Sinus infections can also cause inner ear problems due to the congestion of the nasal passages. This can be demonstrated by dizziness, "a pressurized or heavy head", or vibrating sensations in the head.

Recent studies suggest that up to 90% of "sinus headaches" are actually [migraines](http://en.wikipedia.org/wiki/Migraines). The confusion occurs in part because migraine involves activation of the [trigeminal nerves](http://en.wikipedia.org/wiki/Trigeminal_nerves), which innervate both the sinus region and the meninges surrounding the brain. As a result, it is difficult to accurately determine the site from which the pain originates. Additionally, nasal congestion can be a common result of migraine headaches, due to the autonomic nerve stimulation that can also cause tearing ([lacrimation](http://en.wikipedia.org/wiki/Lacrimation" \o "Lacrimation)) and a runny nose ([rhinorrhea](http://en.wikipedia.org/wiki/Rhinorrhea" \o "Rhinorrhea)). A study found that patients with "sinus headaches" responded to triptan migraine medications, but stated dissatisfaction with their treatment when they are treated with decongestants or antibiotics. People with migraines do not typically have the thick nasal discharge that is a common symptom of a sinus infection.

**Complications**

The close proximity of the brain to the sinuses makes the most dangerous complication of sinusitis, particularly involving the frontal and sphenoid sinuses, infection of the brain by the invasion of [anaerobic bacteria](http://en.wikipedia.org/wiki/Anaerobic_organisms) through the bones or blood vessels. [Abscesses](http://en.wikipedia.org/wiki/Abscesses), [meningitis](http://en.wikipedia.org/wiki/Meningitis), and other life-threatening conditions may result. In extreme cases the patient may experience mild personality changes, headache, altered consciousness, visual problems, seizures, coma, and possibly death.

Sinus infection can spread through anastomosing veins or by direct extension to close structures.

Orbital complications were categorized by Chandler et al.[[22]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-Chandler70-22) into five stages according to their severity. Contiguous spread to the orbit may result in periorbital cellulitis, subperiosteal abscess, orbital cellulitis, and abscess. Orbital cellulitis can complicate acute ethmoiditis if anterior and posterior ethmoidal veins thrombophlebitis enables the spread of the infection to the lateral or orbital side of the ethmoid labyrinth. Sinusitis may extend to the central nervous system, where it may cause cavernous sinus thrombosis, retrograde meningitis, and epidural, subdural, and brain abscesses. Orbital symptoms frequently precede intracranial spread of the infection . Other complications include sinobronchitis, maxillary osteomyelitis, and frontal bone osteomyelitis .Osteomyelitis of the frontal bone often originates from a spreading thrombo-phlebitis. A periostitis of the frontal sinus causes an osteitis and a periostitis of the outer membrane, which produces a tender, puffy swelling of the forehead.

The diagnosis of these complication can be assisted by noting local tenderness and dull pain, and can be confirmed by CT and nuclear isotope scanning. The most common microbial causes are [anaerobic bacteria](http://en.wikipedia.org/wiki/Anaerobic_bacteria) and [*S. aureus*](http://en.wikipedia.org/wiki/Staphylococcus_aureus). Treatment includes performing surgical drainage and administration of antimicrobial therapy. Surgical debridement is rarely required after an extended course of parenteral antimicrobial therapy.[[31]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-31) Antibiotics should be administered for at least 6 weeks. Continuous monitoring of patients for possible intracranial complication is advised.

Factors which may [predispose](http://en.wiktionary.org/wiki/predisposition) someone to developing sinusitis include: [allergies](http://en.wikipedia.org/wiki/Allergy); structural abnormalities, such as a [deviated septum](http://en.wikipedia.org/wiki/Deviated_septum), small [sinus ostia](http://en.wikipedia.org/wiki/Sinus_ostia) or a [concha bullosa](http://en.wikipedia.org/wiki/Concha_bullosa); [nasal polyps](http://en.wikipedia.org/wiki/Nasal_polyp)

Another cause of chronic sinusitis can be from the maxillary sinuses that are situated *within* the cheekbones. Infections and inflammation are more common here than in any of the other paranasal sinuses. This is because the drainage of mucous secretions from the maxillary sinus to the nasal cavity is not very efficient.

Maxillary sinusitis may also be of dental origin[[33]](http://en.wikipedia.org/wiki/Sinusitis" \l "cite_note-33) and constitutes a significant percentage, given the close proximity of the teeth and the sinus floor

**Diagnosis**

**Acute**

Bacterial and viral [acute](http://en.wikipedia.org/wiki/Acute_%28medicine%29) sinusitis are difficult to distinguish. However, if symptoms last less than 10 days, it is generally considered viral sinusitis. When symptoms last more than 10 days, it is considered bacterial sinusitis. Usually 30% to 50% of cases are bacterial.[*[citation needed](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*] [Hospital acquired](http://en.wikipedia.org/wiki/Nosocomial) acute sinusitis can be confirmed by performing a [CT scan](http://en.wikipedia.org/wiki/CT_scan) of the sinuses.

**Chronic**

For sinusitis lasting more than eight weeks,[[2]](http://en.wikipedia.org/wiki/Sinusitis" \l "cite_note-clevelandclinicmeded.com-2) diagnostic criteria are lacking. A [CT scan](http://en.wikipedia.org/wiki/Computed_tomography) is recommended, but this alone is insufficient to confirm the diagnosis. Nasal endoscopy, a [CT scan](http://en.wikipedia.org/wiki/CT_scan), and clinical symptoms are all used to make a positive diagnosis.[[4]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-Leung2008-4) A tissue sample for [histology](http://en.wikipedia.org/wiki/Histology) and [cultures](http://en.wikipedia.org/wiki/Cultures) can also be collected and tested. Allergic [fungal](http://en.wikipedia.org/wiki/Fungal) sinusitis (AFS) is often seen in people with asthma and [nasal polyps](http://en.wikipedia.org/wiki/Nasal_polyp). Examining multiple [biopsy](http://en.wikipedia.org/wiki/Biopsy) samples can be helpful to confirm the diagnosis. Nasal endoscopy involves inserting a flexible fiber-optic tube with a light and camera at its tip into the nose to examine the nasal passages and sinuses.

MRI image showing sinusitis. Edema and mucosal thickening appears in both maxillary sinuses.

* [](http://en.wikipedia.org/wiki/File:Ethmoidinfection.png)[](http://en.wikipedia.org/wiki/File:RtmaxobitinfectteethCT.png)

A [computed tomograph](http://en.wikipedia.org/wiki/Computed_tomograph) showing infection of the ethmoid sinus

**Treatment**

**Conservative**

[Nasal irrigation](http://en.wikipedia.org/wiki/Nasal_irrigation) may help with symptoms of chronic sinusitis.[[42]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-42) Decongestant [nasal sprays](http://en.wikipedia.org/wiki/Nasal_spray) containing for example [oxymetazoline](http://en.wikipedia.org/wiki/Oxymetazoline) may provide relief, but these medications should not be used for more than the recommended period. Longer use may cause [rebound sinusitis](http://en.wikipedia.org/wiki/Rhinitis_medicamentosa).; drinking sufficient fluids in order to thin the mucus; and inhaling steam two to four times a day.[[44]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-44)

**Antibiotics**

The vast majority of cases of sinusitis are caused by viruses and will therefore resolve without antibiotics.[[4]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-Leung2008-4) However, if symptoms do not resolve within 10 days, [amoxicillin](http://en.wikipedia.org/wiki/Amoxicillin) is a reasonable antibiotic to use first for treatment[[4]](http://en.wikipedia.org/wiki/Sinusitis" \l "cite_note-Leung2008-4) with [amoxicillin/clavulanate](http://en.wikipedia.org/wiki/Amoxicillin/clavulanate) (Augmentin) being indicated when the person's symptoms do not improve on amoxicillin alone. The presence of aerobic and anaerobic [beta-lactamase](http://en.wikipedia.org/wiki/Beta-lactamase) producing organisms may account for failure. These organisms can "protect" even non beta lactamase producing bacteria from penicillins antibiotic such as [clarithromycin](http://en.wikipedia.org/wiki/Clarithromycin) or a tetracycline like [doxycycline](http://en.wikipedia.org/wiki/Doxycycline), are used in patients who are allergic to penicillins.

A short-course (3–7 days) of antibiotics seems to be just as effective as the typical longer-course (10–14 days) of antibiotics for patients who present with clinically diagnosed acute-bacterial sinusitis without any other severe disease or complicating factors.

**Corticosteroids**

treatment with corticosteroids alone or in combination with antibiotics is supported.[[53]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-53) The benefit however is small.[[54]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-54)

There is only limited evidence to support short treatment with oral corticosteroids for chronic rhinosinusitis with nasal polyps.[[55]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-55)[[56]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-56)

**Surgery**

For chronic or recurring sinusitis, referral to an [otolaryngologist](http://en.wikipedia.org/wiki/Otolaryngology) specialist may be indicated, and treatment options may include nasal surgery. Surgery should only be considered for those patients who do not experience sufficient relief from optimal medication.[[57]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-57)[[58]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-58)

Maxilliary antral washout involves puncturing the sinus and flushing with [saline](http://en.wikipedia.org/wiki/Saline_%28medicine%29) to clear the mucus.

A relatively recent advance in the treatment of sinusitis is a type of surgery called functional [endoscopic](http://en.wikipedia.org/wiki/Endoscope) sinus surgery ([FESS](http://en.wikipedia.org/wiki/Functional_Endoscopic_Sinus_Surgery)). This surgery removes anatomical and pathological obstructions associated with sinusitis in order to restore normal clearance of the sinusesA number of surgical approaches can be used to access the sinuses and these have generally shifted from external/extranasal approaches to intranasal [endoscopic](http://en.wikipedia.org/wiki/Endoscopic) ones. The benefit of [FESS](http://en.wikipedia.org/wiki/Functional_Endoscopic_Sinus_Surgery) is its ability to allow for a more targeted approach to the affected sinuses, reducing tissue disruption, and minimizing post-operative complications.[[61]](http://en.wikipedia.org/wiki/Sinusitis#cite_note-61)

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For persistent symptoms and disease in patients who have failed medical and the functional endoscopic approaches, older techniques can be used to address the inflammation of the maxillary sinus, such as the [Caldwell-Luc radical antrostomy](http://en.wikipedia.org/w/index.php?title=Caldwell-Luc_radical_antrostomy&action=edit&redlink=1). This surgery involves an incision in the upper gum, opening in the anterior wall of the antrum, removal of the entire diseased maxillary sinus mucosa and drainage is allowed into [inferior](http://en.wikipedia.org/wiki/Inferior_nasal_meatus) or [middle meatus](http://en.wikipedia.org/wiki/Middle_nasal_meatus) by creating a large window in the lateral nasal wall.