

# Sinusitis

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## Bacterial infections

Bacteria are tiny single-celled micro-organisms which are found everywhere in nature. They can cause infection even when a person's immune system is unaffected by HIV.

In an uninfected person, various parts of the immune system play different roles in protecting against bacteria. People with HIV may have abnormalities in their immune system which make them more vulnerable to bacterial infections: immunoglobulins (antibodies) are not secreted properly; monocytes do not work properly; the bone marrow may be damaged by drugs such as AZT (zidovudine, Retrovir), ganciclovir (Cymevene) or anti-cancer chemotherapy; and HIV itself may prevent the release of neutrophils.

Bacteria can cause a range of different problems in different parts of the body; the commonest among people with advanced HIV infection are sinusitis, pneumonia, diarrhoea, bronchitis and skin and soft tissue infections. Co-trimoxazole (Septrin) as Pneumocystis pneumonia (PCP) prophylaxis offers a good level of protection against bacterial infections.

## Sinusitis

Infection or inflammation of the sinuses is a relatively common problem among people with HIV. The sinuses are hollow cavities in the front of the skull, whose main purpose is to warm the air we breathe. They are lined with membranes that use a constant flow of mucus to capture bacteria and other foreign matter that we breathe in through the nasal passages, and drain out into the nose or lungs.

People with HIV are at increased risk of sinusitis, and its severity increases in people with lower CD4 cell counts. Sinusitis can be short-lived and time-limited (acute), or an ongoing long-term problem (chronic). Acute sinusitis is caused by infections, while chronic sinusitis is usually caused by a low-level inflammatory process and related to an allergy.

Symptoms of acute sinusitis can be similar to those of the common cold, including nasal congestion, headache, fever, runny nose, facial pressure, tenderness and pain in the cheeks and forehead, and discharges of thick mucus with a strong taste.

The most common bacterial infections that cause HIV-related sinusitis are *Staphylococcus epidermis*, *S. aureus*, *S. pneumoniae*, *H. influenzae* and *Pseudomonas* species. It can also be related to *Mycobacterium avium intracellulare* (MAI) infection. However, in many cases of sinusitis no infection can be identified.

A three-pronged attack is necessary in order to treat and prevent further sinus attacks. The first line of attack is to treat with an appropriate antibiotic for the organism. This often has to be guessed as it is difficult to isolate the bacteria. Amoxicillin is often used, sometimes with the addition of clavulanic acid or an antibiotic of the cephalosporin family. Antibiotics of the quinolone group have little effect on *Staphylococcus* bacteria which predominate in sinus infections, but are very useful for treating *Pseudomonas*, which can dominate in HIV infection. Treatment should be continued for several weeks to reduce the chances of recurrence.

The second prong of attack is to shrink the swollen sinus tissues with the daily application of a nasal corticosteroid spray such as beclomethasone (Beconase) or budesonide (Rhinocort). Pseudo-

ephedrine (Galpseud / Sudafed) tablets are useful in an acute attack to help shrink the tissue. It is important to avoid using topical decongestant sprays as these can cause problems with rebound congestion. It is important to continue to use the steroid spray as the tissue will invariably swell if this is stopped.

The third prong is to remove the pooled secretions by nasal washouts using salt water. This is

a rather unsavoury practice whereby warm salt water is sniffed up into the nose from a cup and then sneezed out into a basin. This washes out the accumulated mucus and should be carried out on a regular basis.

In severe cases surgery to clear the sinuses may be offered.

## a note about this publication

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# Sinusitis

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## Overview

You're coughing and sneezing and tired and achy. You think that you might be getting a cold. Later, when the medicines you've been taking to relieve the symptoms of the common cold are not working and you've now got a terrible headache, you finally drag yourself to the doctor. After listening to your history of symptoms, examining your face and forehead, and perhaps doing a sinus X-ray, the doctor says you have sinusitis.

Sinusitis simply means your sinuses are infected or inflamed, but this gives little indication of the misery and pain this condition can cause. Health experts usually divide sinusitis cases into

- **Acute**, which last for 4 weeks or less
- **Subacute**, which lasts 4 to 8 weeks
- **Chronic**, which usually last up to 8 weeks but can continue for months or even years
- **Recurrent, which are several acute attacks within a year, and may be caused by different organisms**

Health experts estimate that 37 million Americans are affected by sinusitis every year. Health care providers report nearly 32 million cases of chronic sinusitis to the Centers for Disease Control and Prevention annually. Americans spend \$5.8 billion each year on health care costs related to sinusitis.

## What are sinuses?

Sinuses are hollow air spaces in the human body. When people say, "I'm having a sinus attack," they usually are referring to symptoms in one or more of four pairs of cavities, or sinuses, known as *paranasal sinuses*. These cavities, located

within the skull or bones of the head surrounding the nose, include

- *Frontal sinuses* over the eyes in the brow area
- *Maxillary sinuses* inside each cheekbone
- *Ethmoid sinuses* just behind the bridge of the nose and between the eyes
- *Sphenoid sinuses* behind the ethmoids in the upper region of the nose and behind the eyes

Each sinus has an opening into the nose for the free exchange of air and mucus, and each is joined with the nasal passages by a continuous mucous membrane lining. Therefore, anything that causes a swelling in the nose—an infection, an allergic reaction, or another type of immune reaction—also can affect the sinuses. Air trapped within a blocked sinus, along with pus or other secretions, may cause pressure on the sinus wall. The result is the sometimes intense pain of a sinus attack. Similarly, when air is prevented from entering a paranasal sinus by a swollen membrane at the opening, a vacuum can be created that also causes pain.

## Some causes of acute sinusitis

Most cases of acute sinusitis start with a common cold, which is caused by a virus. These viral colds do not cause symptoms of sinusitis, but they do inflame the sinuses. Both the cold and the sinus inflammation usually go away without treatment in 2 weeks. The inflammation, however, might explain why having a cold increases your likelihood of developing acute sinusitis. For example, your nose reacts to an invasion by viruses that cause infections such as the common cold or flu by producing mucus and sending white blood cells to the lining of the nose, which congest and swell the nasal passages.

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When this swelling involves the adjacent mucous membranes of your sinuses, air and mucus are trapped behind the narrowed openings of the sinuses. When your sinus openings become too narrow, mucus cannot drain properly. This increase in mucus sets up prime conditions for bacteria to multiply.

Most healthy people harbor bacteria, such as *Streptococcus pneumoniae* and *Haemophilus influenzae*, in their upper respiratory tracts with no problems until the body's defenses are weakened or drainage from the sinuses is blocked by a cold or other viral infection. Thus, bacteria that may have been living harmlessly in your nose or throat can multiply and invade your sinuses, causing an acute sinus infection.

Sometimes, fungal infections can cause acute sinusitis. Although fungi are abundant in the environment, they usually are harmless to healthy people because the human body has a natural resistance to fungi. Fungi, such as *Aspergillus*, can cause serious illness in people whose immune systems are not functioning properly. Some people with fungal sinusitis have an allergic-type reaction to the fungi.

Chronic inflammation of the nasal passages also can lead to sinusitis. If you have allergic rhinitis, also called hay fever, you can develop episodes of acute sinusitis. Vasomotor rhinitis, caused by humidity, cold air, alcohol, perfumes, and other environmental conditions, also may be complicated by sinus infections. (*Rhinitis* means runny nose.)

Acute sinusitis is much more common in some people than in the general population. For example, sinusitis occurs more often in people who have reduced immune function (such as those with primary immune deficiency diseases or HIV infection) and with abnormality of mucus secretion or mucus movement (such as those with cystic fibrosis).

### Causes of chronic sinusitis

It can be difficult to determine the cause of chronic sinusitis. Some health experts think it is an infectious disease, but others are not certain. It is an inflammatory disease that often occurs in people with asthma. If you have asthma, which is an allergic disease, you may have chronic sinusitis which may make it worse.

If you are allergic to airborne allergens, such as house dust mites, mold, and pollen, which trigger allergic rhinitis, you may develop chronic sinusitis. An allergic reaction to certain fungi may be responsible for at least some cases of chronic sinusitis. In addition, people who are allergic to fungi can develop a condition called "allergic fungal sinusitis."

If you are prone to getting chronic sinusitis, damp weather, especially in northern temperate climates, or pollutants in the air and in buildings also can affect you.

If you have an immune deficiency disorder or an abnormality in the way mucus moves through and from your respiratory system (for example, primary immune deficiency, HIV infection, or cystic fibrosis), you might develop chronic sinusitis with frequent bouts of acute sinusitis due to infections. In addition, if you have severe asthma, nasal polyps (small growths in the nose), or a severe asthma attack caused by aspirin and aspirin-like medicines such as ibuprofen, you might have chronic sinusitis.

### Symptoms

The location of your sinus pain depends on which sinus is affected.

- Headache when you wake up in the morning is typical of a sinus problem.
- Pain when your forehead over the frontal sinuses is touched may mean that your frontal sinuses are inflamed.
- Infection in the maxillary sinuses can cause your upper jaw and teeth to ache, and your cheeks to become tender to the touch.
- The ethmoid sinuses are near the tear ducts in the corner of your eyes. Therefore, inflammation of these cavities often causes swelling of the eyelids and tissues around your eyes, and pain between your eyes. Ethmoid inflammation also can cause tenderness when you touch the sides of your nose, a loss of smell, and a stuffy nose.
- Infection in the sphenoid sinuses can cause earaches, neck pain, and deep aching at the top of your head, although these sinuses are less frequently affected.

Most people with sinusitis, however, have pain or tenderness in several locations, and their symptoms usually do not clearly show which sinuses are inflamed.

Other symptoms of sinusitis can include:

- Fever
- Weakness
- Tiredness
- A cough that may be more severe at night
- Rhinitis or nasal congestion

In addition, the drainage of mucus from the sphenoid or other sinuses down the back of your throat (postnasal drip) can cause you to have a sore throat. Mucus drainage also can irritate the membranes lining your larynx (upper windpipe). Not everyone with these symptoms, however, has sinusitis.

On rare occasions, acute sinusitis can result in brain infection and other serious complications.

## Diagnosis

Because your nose can get stuffy when you have a condition like the common cold, you may confuse simple nasal congestion with sinusitis. A cold, however, usually lasts about 7 to 14 days and disappears without treatment. Acute sinusitis often lasts longer and typically causes more symptoms than just a cold.

Your health care provider can usually diagnose acute sinusitis by listening to your symptoms and doing a physical examination, which includes examining your nasal tissues. If your symptoms are vague or persist, your health care provider may order a CT (computed tomography) scan to confirm that you have sinusitis.

Laboratory tests to diagnose chronic sinusitis may include

- Blood tests to rule out other conditions associated with sinusitis like an immune deficiency disorder or cystic fibrosis
- Cultures (special blood tests) to detect bacterial or fungal infection
- Biopsy to determine the health of the cells lining the nasal cavity

## Treatment

After diagnosing sinusitis and identifying a possible cause, your health care provider can suggest treatments that will reduce your inflammation and relieve your symptoms.

### Acute sinusitis

If you have acute sinusitis, your health care provider may recommend

- Decongestants to reduce congestion
- Antibiotics to control a bacterial infection, if present
- Pain relievers to reduce any pain

You should, however, use over-the-counter or prescription decongestant nose drops and sprays for only few days. If you use these medicines for longer periods, they can lead to even more congestion and swelling of your nasal passages.

If bacteria cause your sinusitis, antibiotics used along with a nasal or oral decongestant will usually help. Your health care provider can prescribe an antibiotic that fights the type of bacteria most commonly associated with sinusitis.

Many cases of acute sinusitis will end without antibiotics. If you have allergic disease along with sinusitis, however, you may need medicine to relieve your allergy symptoms. If you already have asthma and then get sinusitis, you may experience worsening of your asthma and should be in close touch with your health care provider.

In addition, your health care provider may prescribe a steroid nasal spray, along with other treatments, to reduce your sinus congestion, swelling, and inflammation.

### Chronic sinusitis

Health care providers often find it difficult to treat chronic sinusitis successfully, realizing that symptoms persist even after taking antibiotics for a long period. As discussed below, many health care providers treat sinusitis with steroids such as steroid nasal sprays. Many health care providers treat chronic



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sinusitis as though it is an infection, by using antibiotics and decongestants. Others use both antibiotics along with steroid nasal sprays. Further research is needed to determine what the best treatment is.

Some people with severe asthma are said to have dramatic improvement of their symptoms when their chronic sinusitis is treated with antibiotics.

Health care providers commonly prescribe steroid nasal sprays to reduce inflammation in chronic sinusitis. Although they occasionally prescribe these sprays to treat people with chronic sinusitis over a long period, health experts don't fully understand the long-term safety of these medicines, especially in children. Therefore, health care providers will consider whether the benefits outweigh any risks of using steroid nasal sprays.

If you have severe chronic sinusitis, your health care provider may prescribe oral steroids, such as prednisone. Because oral steroids are powerful medicines and can have significant side effects, you should take them only when other medicines have not worked.

Although home remedies cannot cure sinus infection, they might give you some comfort.

- Inhaling steam from a vaporizer or a hot cup of water can soothe inflamed sinus cavities.
- Saline nasal spray, which you can buy in a drug store, can give relief.
- Gentle heat applied over the inflamed area is comforting.

When medical treatment fails, surgery may be the only alternative for treating chronic sinusitis. Research studies suggest that most people who undergo surgery have fewer symptoms and better quality of life.

In children, problems often are eliminated by removing adenoids obstructing their nasal-sinus passages.

Adults who have had allergies and infections over the years sometimes develop nasal polyps that interfere with proper nasal drainage. Removal of these polyps and/or repair of a deviated septum to ensure an open airway often gives them considerable relief from sinus symptoms.

The most common surgery done today is functional endoscopic sinus surgery, in which the natural openings from the sinuses are enlarged to allow

drainage. This type of surgery is less invasive than conventional sinus surgery, and serious complications are rare. Surgery should be considered only after failure of medical treatment.

## Prevention

Although you cannot prevent all sinus disorders—any more than you can avoid all colds or bacterial infections—you can do certain things to reduce the number and severity of the attacks and possibly prevent acute sinusitis from becoming chronic.

- You may get some relief from your symptoms with a humidifier, particularly if room air in your home is heated by a dry forced-air system.
- Air conditioners help to provide an even temperature.
- Electrostatic filters attached to heating and air conditioning equipment are helpful in removing allergens from the air.

If you are prone to getting sinus disorders, especially if you have allergies, you should avoid cigarette smoke and other air pollutants. If your allergies inflame your nasal passages, you are more likely to have a strong reaction to all irritants.

If you suspect that your sinus inflammation may be related to house dust mites, mold, pollen, or food—or any of the hundreds of allergens that can trigger an upper respiratory reaction—you should consult your health care provider who can use various tests to find out whether you have an allergy and if so, its cause. This will help you and your health care provider take the right steps to reduce or limit your allergy symptoms.

Other activities that can cause sinus problems include:

- Drinking alcohol which causes nasal and sinus membranes to swell
- Swimming in pools treated with chlorine, which irritates the lining of the nose and sinuses
- Diving, which forces water into the sinuses from the nasal passages

You may find that air travel poses a problem if you are suffering from acute or chronic sinusitis. As air

pressure in a plane is reduced, pressure can build up in your head blocking your sinuses or eustachian tubes in your ears. Therefore, you might feel discomfort in your sinus or middle ear during the plane's ascent or descent. Some health experts recommend using decongestant nose drops or inhalers before a flight to avoid this problem.

## Research

At least two-thirds of sinusitis cases caused by bacteria are due to two germs that can also cause otitis media (middle ear infection) in children as well as pneumonia and acute worsening of chronic bronchitis. The National Institute of Allergy and Infectious Diseases (NIAID) is supporting multiple studies to better understand the basis for infectivity of these organisms as well as identifying potential candidates for future vaccine strategies that could eliminate these diseases.

A project supported by NIAID is developing an advanced “sinuscope” that will permit improved airway evaluation during a medical examination especially when surgical intervention is contemplated.

Scientific studies have shown a close relationship between having asthma and sinusitis. As many as 75 percent of people with asthma also get sinusitis. Some studies state that up to 80 percent of adults with chronic sinusitis also had allergic rhinitis. NIAID conducts and supports research on allergic diseases as well as bacteria and fungi that can cause sinusitis. This research is focused on developing better treatments and ways to prevent these diseases.

Scientists supported by NIAID and other institutions are investigating whether chronic sinusitis has genetic causes. They have found that certain alterations in the gene that causes cystic fibrosis may also increase the likelihood of developing chronic sinusitis. This research will give scientists new insights into the cause of the disease in some people and points to new strategies for diagnosis and treatment.

Another NIAID-supported research study has recently demonstrated that blood cells from people with chronic sinusitis make chemicals that produce inflammation when exposed to fungal antigens, suggesting

that fungi may play a role in many cases of chronic sinusitis. Further research, including clinical trials of antifungal drugs, will help determine whether, and for whom, this new treatment strategy holds promise.

## More Information

### National Library of Medicine: MedlinePlus

8600 Rockville Pike  
Bethesda, MD 20894  
1-888-FIND-NLM (1-888-346-3656) or 301-594-5983  
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### American Academy of Allergy, Asthma & Immunology

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