Sinusitis: Acute and Chronic

Theresa Lowry Lehnen, RGN, GPN, RNP, BSc, MSc, M. Ed, PhD
Clinical Nurse Specialist and Associate Lecturer South East Technological University

Sinusitis is an inflammation of the nasal cavity and paranasal sinuses, due to viral, bacterial and fungal infections or an allergic reaction. Symptoms include congestion, nasal obstruction purulent rhinorrhoea and facial pain. Malaise, headache and fever can also be present. Sinusitis may be classified as acute (resolved in < 30 days); subacute (resolved in 30 to 90 days); recurrent (≥ 4 acute episodes per year, each resolved in < 30 days but recurring in cycles, with at least 10 days between resolution of symptoms and initiation of a new episode); and chronic lasting > 90 days. [1,3] Prevalence is slightly higher in females compared with males, and there is no clear ethnic predominance. [7]

Acute sinusitis or acute rhinosinusitis (ARS), is among the most common medical conditions encountered in primary care, and accounts for 1 in 5 antibiotic prescriptions for adults. Approximately 6% to 7% of children with respiratory symptoms have acute rhinosinusitis, and an estimated 16% of adults are diagnosed with acute bacterial rhinosinusitis (ABRS) annually. [1, 2] Viruses are the most common cause of acute rhinosinusitis. VRS pathogens include rhinovirus, adenovirus, influenza virus, and parainfluenza virus. The most common causes of acute bacterial rhinosinusitis are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. Fungal infections can also cause acute rhinosinusitis; however, this is rare and is usually only seen in the immunosuppressed. Fungal species include *Mucor*, *Rhizopus*, *Rhizomucor*, and *Aspergillus*. [1, 2] An estimated 0.5% to 2.0% of viral rhinosinusitis (VRS) develop into bacterial infections in adults and 5 to 10% in children. [2, 4]

Chronic sinusitis or chronic rhinosinusitis (CRS) is one of the most common chronic medical conditions worldwide, affecting all age groups and leading to a significant decrease in patients' quality of life. Its estimated incidence is 12.3% in the USA, 10.9% in Europe and 13% in China.[12] CRS is multifactorial in nature. Chronic allergies, structural abnormalities such as nasal polyps, environmental irritants such as airborne pollution, tobacco smoke, mucociliary dysfunction, and other factors interact with infectious organisms to cause chronic sinusitis. The organisms are usually bacterial but may be fungal. Many bacteria are implicated, including gram-negative bacilli and oropharyngeal anaerobic microorganisms, and polymicrobial infection is common. Fungal infections may be chronic and tend to affect older and immunocompromised patients. In a few cases, chronic maxillary sinusitis is secondary to dental infection.[3] Many patients with chronic rhinosinusitis have allergies, asthma, and other less common comorbidities such as vasculitides, granulomatous diseases, cystic fibrosis, and immunodeficiency that directly contribute to CRS. There is increasing evidence that chronic rhinosinusitis is an inflammatory disease and not an infectious process. Consistent with its underlying inflammatory aetiologies, chronic rhinosinusitis is associated with other inflammatory diseases such as allergic rhinitis and asthma.[11]

Allergic fungal sinusitis characterised by diffuse nasal congestion, marked viscid nasal secretions, and, often, nasal polyps, is a form of chronic sinusitis. It is an allergic response to the presence of topical fungi, usually *Aspergillus,* and is not caused by an invasive infection. **Invasive fungal sinusitis,** associated with a high mortality rate, is an aggressive, sometimes fatal, infection in immunocompromised patients, usually caused by *Aspergillus* or *Mucor* species.[3] Management consists of surgical debridement, systemic antifungal therapy, and correction of predisposing conditions. [8]

Pathophysiology: In upper respiratory tract infections (URTIs), the swollen nasal mucous membrane obstructs the ostium of a paranasal sinus, and the oxygen in the sinus is absorbed into the blood vessels of the mucous membrane. The resulting relative negative pressure in the sinus (vacuum sinusitis) is painful. If the vacuum is maintained, a transudate from the mucous membrane develops and fills the sinus; the transudate serves as a medium for bacteria that enter the sinus through the ostium or through a spreading cellulitis or thrombophlebitis in the lamina propria of the mucous membrane. An outpouring of serum and leukocytes results, and painful positive pressure develops in the obstructed sinus. The mucous membrane becomes hyperaemic and oedematous.[3]

Presentation: Acute and chronic rhinosinusitis can cause similar signs and symptoms, including nasal congestion and obstruction, purulent rhinorrhoea, facial pressure and pain, hyposmia, halitosis, and a productive cough especially at night. The pain is often more severe in acute rhinosinusitis. The area over the affected sinus may be tender, swollen, and erythematous.[3] Maxillary sinusitis causes pain in the maxillary area, toothache, and frontal headache. Frontal sinusitis causes pain in the frontal area and a frontal headache. Ethmoid sinusitis causes pain behind and between the eyes, a frontal headache, periorbital cellulitis, and tearing. Sphenoid sinusitis causes less localised pain referred to the frontal or occipital area. Malaise may be present and fever suggest an extension of the infection beyond the sinuses.[3] The nasal mucous membrane appears red and swollen, and yellow or green purulent rhinorrhoea may be present. Seropurulent or mucopurulent exudate may be seen in the middle meatus with maxillary, anterior ethmoid, or frontal sinusitis and in the area medial to the middle turbinate with posterior ethmoid or sphenoid sinusitis.

Complications: The main complication of sinusitis is local spread of bacterial infection, causing periorbital or orbital cellulitis, cavernous sinus thrombosis, or epidural or brain abscess. Other complications include, proptosis, ophthalmoplegia, confusion or decreased level of consciousness, and severe headache. [3]

Diagnosis: A diagnosis of sinusitis is based on history and physical examination. Important factors in differentiating viral from bacterial sinusitis are the overall symptom duration and the symptom trajectory. Symptoms that are present for less than 10 days, which peak early and resolve gradually are suggestive of acute viral sinusitis. Symptoms that present for more than 10 days without improvement may indicate a bacterial infection, although these patients

are less likely to benefit from antibiotic therapy compared with those with severe symptoms at the onset or those with symptoms that worsen after initial improvement. Symptoms that worsen after an initial improvement suggest secondary bacterial infection. This is usually seen in a patient who experiences symptoms of viral sinusitis that improves after 5 days, only to worsen again 2 to 3 days later. [4]

Specific symptoms may help distinguish between viral and bacterial sinusitis. Purulent nasal discharge, nasal obstruction, dental pain, facial pain, pressure, or headache are more common with acute bacterial sinusitis. Fever, sore throat, myalgia, or a clear nasal discharge usually indicates viral sinusitis. The colour of the mucus, as a sole indicator, however, does not distinguish bacterial from viral aetiology. A cough is a common symptom in both acute viral and bacterial sinusitis, and may also occur secondary to postnasal drainage or asthma exacerbation. [4]

The physical exam should include a thorough head and neck examination, with attention paid to the presence of facial tenderness to gentle palpation, postnasal pharyngeal secretions or exudate, tender maxillary dentition and middle ear effusion. The nasal cavity should be examined for the presence of mucosal erythema or purulent discharge. Optimal nasal cavity exam is performed following a topical decongestant. [6] Unilateral purulent secretions, mucosal oedema or erythema, and facial tenderness are suggestive of bacterial sinusitis. Non-purulent secretions are suggestive of viral or allergic inflammation. Nasal endoscopy is recommended in selected patients, including patient's refractory to empiric antibiotic therapy or where there is concern for antibiotic resistance, or in immunocompromised patients.[6]

Laboratory tests and imaging studies are not usually indicated for evaluation of routine, uncomplicated acute sinusitis. Plain film X-rays are inadequate for viewing sinuses. Imaging (CT, MRI) may be warranted however, in the case of complications, recurrent episodes of sinusitis, suspected anatomical abnormalities, rapidly progressing or suspected acute invasive fungal sinusitis, or if an alternative diagnosis is suspected such as migraine or malignancy. [5]

Treatment

Treatment and management aim to relieve symptoms, eradicate infection, and prevent complications. Management varies depending on whether the aetiology is viral or bacterial.

Acute viral sinusitis is usually self-limiting, and treatment is primarily symptomatic. The disease course is usually less than 10 days, but symptoms tend to improve after approximately 5 days. Adequate rest and hydration, warm facial packs and over-the-counter analgesia such as paracetamol or ibuprofen is recommended.[8] Treatment with intranasal glucocorticoids, particularly for patients with underlying allergic rhinitis may be useful. Nasal saline irrigation as well as decongestants, may be useful, although there is little evidence of their benefit. Mechanical irrigation with saline may reduce the need for pain medication and improve overall patient comfort, particularly in patients with frequent sinus infections. The evidence

supporting the use of saline irrigation is limited but indicates possible benefits for symptom relief with minor adverse effects, such as nasal irritation. [10] Treatments should be tried for 5 to 10 days before reassessing the patient. Antibiotics should not be given to patients with suspected acute viral sinusitis.[8, 9]

Bacterial sinusitis is usually self-limiting and does not routinely need antibiotics. 80% resolve in 14 days without antibiotics, and antibiotics only offer marginal benefit after 7 days. [9] High dose intranasal steroids may be considered, self-care measures used, and a no antibiotic strategy applied for patients with symptoms < 10 days unless systemically very unwell. A no antibiotic or delayed antibiotic prescription for symptoms > 10 days without clinical improvement should be considered, however, an immediate antibiotic prescription should be provided for patients who are systemically very unwell, with signs of severe infection or high risk of complications. The patient should be referred to hospital if they have symptoms of sinusitis with a severe systemic infection, intra-orbital or periorbital complications. [9]

ACUTE SINUSITIS

ANTIBIOTIC TREATMENT TABLE

- **Consider no antibiotic strategy if symptoms <10 days**
- **Consider a no or delayed antibiotic strategy if symptoms > 10 days if not systemically very unwell, no signs of severe infection or not at high risk of complications**
- **Offer immediate antibiotic prescription if systemically very unwell, signs of severe infection or high risk of complications.**

If antibiotics deemed clinically indicated:

Drug	Dose	Duration	Notes
1st choice options:			
Amoxicillin	500mg every 8 hours	5 days	Avoid in penicillin allergy
OR Doxycycline *(First line in penicillin allergy)*	200mg every 24 hours*	5 days	Avoid in pregnancy. Advise to take with a glass of water and sit upright for 30 minutes after taking. Can take with food or milk if gastritis is an issue. Absorption of doxycycline significantly impaired by antacids, iron/calcium/magnesium/zinc-containing products.
OR Clarithromycin *(Second line in penicillin allergy)*	500mg every 12 hours	5 days	Macrolides should be used with caution in pregnancy. Clarithromycin suitable only in 2nd and 3rd trimester in pregnancy. Alternative macrolide for all trimesters of pregnancy: Azithromycin 500mg stat then 250mg every 24 hours from Day 2 to Day 5.
For severe / worsening infection:			
Co-amoxiclav	500/125mg every 8 hours	5 days	Avoid in penicillin allergy. See alternatives above.

* Alternative doxycycline dose: 100mg every 12 hours.
In non-severe infection, 200mg stat then 100mg every 24 hours can be considered.

https://www.hse.ie/eng/services/list/2/gp/antibiotic-prescribing/conditions-and-treatments/upper-respiratory/acute-sinusitis/acute-sinusitis.html

Referral to an ear, nose, and throat specialist may be indicated when the patient is immunocompromised; a complication of sinusitis is suspected such as facial cellulitis, orbital cellulitis, abscess or intracranial infection; cranial nerve deficits such as facial nerve paralysis or ophthalmoplegia are present, suggesting possible invasive fungal or orbital sinusitis; the condition is refractory to antibiotic treatment; the condition is recurrent with 4 or more episodes per year; significantly affects quality of life; or there is a suspected allergic or immunological basis for the condition, or comorbidities. [8]

The treatment of chronic sinusitis should focus on modulating triggers, reducing inflammation, and eradicating infection. Allergy testing can help identify environmental triggers that patients should avoid. Nasal steroids should be used with or without nasal saline irrigation. Decongestants can be used for symptomatic relief, but evidence for supporting their use in chronic sinusitis is lacking. Antihistamines should only be used if an allergic component is suspected. Chronic sinusitis with polyps should be treated with topical nasal steroids. If severe or unresponsive to therapy after 12 weeks, a short course of oral steroids can be considered. Leukotriene antagonists may also be considered. Antibiotics can be given for an extended period of three weeks, however, there is no consensus on their routine use in chronic sinusitis. If an underlying medical condition is found, then therapy should target the underlying condition. This could include surgical and medical approaches to fungal sinusitis or intravenous immunoglobulin for immunodeficiencies. [14]

Endoscopic sinus surgery is an effective treatment of chronic rhinosinusitis when appropriate medical therapy is ineffective. The most common procedure is functional endoscopic sinus surgery (FESS), and a more recently developed procedure is balloon catheter dilation of paranasal sinus ostia.[15, 16] The goals of endoscopic sinus surgery for CRS are to provide ventilation and drainage of the paranasal sinuses and to enlarge the paranasal sinuses to create greater access for topical medications. Although endoscopic sinus surgery improves symptoms and quality of life, it does not cure the condition, and patients require medical therapy postoperatively to maintain the improvements.[11, 13]

It is important to educate the patient about their condition, avoidance of smoking and getting the flu vaccine annually, as this may help lower the risk of viral rhinosinusitis. Patients should be involved and comply with treatment, and understand that the routine use of antibiotics for acute sinusitis is not necessary, as most cases resolve spontaneously.[15]

The social and economic impact of sinusitis is significant for the patient and health care systems. Chronic sinusitis is associated with increased morbidity and if untreated, the quality of life is poor. The effects of acute and chronic rhinosinusitis can result in substantial loss of income to patients due to reduced work capacity and work absences, increased doctor visits, medication prescriptions and over-the-counter drugs, and social and personal costs are high, due to restricted activity, and a poor quality of life.

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