Acute Sinusitis

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- level 2 studies, which meet at least one of the evidence criteria for that study type; or
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1. Diagnosis

Make the diagnosis.

1.1 Obtain pertinent information from history and physical exam.

Recommendations

- Ask about allergies, systemic diseases, trauma, and environmental toxins.
- Ask about similar past episodes of sinusitis.
- Examine for rhinorrhea, pus in the nasal cavity, and local pain.

Evidence

- Atopic disease occurs in about 15% of the U.S. population and may predispose patients to sinusitis (1).
- Smoking may impair ciliary function and may predispose to sinusitis (2).
- Only one study has directly compared clinical criteria with sinus puncture (3). The investigators used a four-item risk score that included purulent rhinorrhea with unilateral predominance, local pain with unilateral predominance, bilateral purulent rhinorrhea, and pus in the nasal cavity. The risk score had better discrimination than the overall clinical criteria. (See table Sensitivity and Specificity of a Four-Item Clinical Score for Diagnosing Acute Bacterial Sinusitis.) However, three of the four items for purulent discharge overlap, and the data do not allow analysis of the effect of grouping these three as a single item.
- A review of the positive and negative likelihood ratios of clinical symptoms and signs for acute sinusitis found that most have low likelihood ratios; the best were pain in the teeth (positive likelihood ratio, 2.5) and purulent nasal secretion (positive likelihood ratio, 5.5) (4).
- Signs and symptoms that have not been adequately assessed in diagnostic performance studies against sinus puncture or sinus radiography include headache, facial pain and pressure that is worse when bending forward, olfactory disturbance, fever, halitosis, maxillary toothache, and cough (5; 6; 7; 8; 9). Most of these symptoms and signs probably are nonspecific or have low sensitivity despite good specificity (e.g., maxillary toothache), and evidence is lacking.
- An oropharyngeal red streak was noted to be useful diagnostically for acute sinusitis (sensitivity, 70%; specificity, 67%) in a study of 60 patients at a Veterans Affairs urgent care center (54 men; average age, 51). The generalizability of this finding is unclear and the risk score was more sensitive and specific (10).

Rationale

- Most cases of sporadic acute sinusitis are due to viral infection; relatively few are due to bacterial infection.
- Trauma and exposure to noxious agents account for a few cases.
- Other atypical considerations include neoplasms; anatomical abnormalities of the sinuses; genetic causes, such as cystic fibrosis and the immotile cilia syndrome; endocrine and metabolic disorders, such as diabetes mellitus; and immunosuppression, including HIV infection, which may lead to infection with atypical pathogens.
- No good evidence shows that detailed medical review provides useful information in sporadic acute sinusitis. Personal and family history, however, especially the relation of seasons to recurrent sinusitis, may lead to suspicion of an underlying disease (e.g., allergy or ciliary dysfunction) that may increase risk for sinusitis or for a specific form of sinusitis and should be considered in patients with recurrent or chronic sinusitis. In patients with atopic disease, bacterial infection may complicate a given episode of allergic rhinitis.
• The exact signs and symptoms that would maximize diagnostic accuracy in acute bacterial sinusitis need further study. A risk score compiled from the clinical items listed may be used empirically to estimate the risk for bacterial sinusitis and to determine the need for treatment.

Comments
• Acute sinusitis is rare in children, who have immature sinuses.

1.2 Perform diagnostic imaging and other specialized studies only rarely in selected patients. 

Recommendations
• Avoid sinus radiography, ultrasonography, CT, and MRI in acute sinusitis.
• Consider radiologic studies and sinus puncture only in certain situations: e.g., in patients with predisposing factors for atypical microbial causes, such as *Pseudomonas aeruginosa*, or fungal infection in patients with AIDS or immunocompromised patients.
• In such patients, note that precise bacteriologic diagnosis may be needed to determine optimal therapy, especially when empirical therapy has failed to achieve a satisfactory response.
• See table Laboratory and Other Studies for Acute Sinusitis.

Evidence
• Clinical criteria vs. sinus puncture: Only one study has directly compared clinical criteria with sinus puncture (3). The investigators used a four-item risk score that included purulent rhinorrhea with unilateral predominance, local pain with unilateral predominance, bilateral purulent rhinorrhea, and pus in the nasal cavity. The risk score had better discrimination than the overall clinical criteria. (See table Sensitivity and Specificity of a Four-Item Clinical Score for Diagnosing Acute Bacterial Sinusitis.)
• Clinical features vs. radiography: Three studies evaluated concordance between clinical exam features and sinus radiography. One used the overall clinical impression (11); another used a clinical score comprising purulent nasal secretions on exam, history of URI in the 2 prior weeks, and sinus pain on tenderness (12); and the third used a clinical score comprising maxillary toothache, abnormal transillumination, poor response to decongestants, purulent secretions on exam, and colored nasal discharge on history (8). The latter study also used data for the overall clinical impression. Synthesis of the data from these three studies suggests that a set of clinical criteria is moderately accurate, but the data are difficult to interpret because the reference test, sinus radiography, is not the gold standard for diagnosis of bacterial sinusitis. Acute viral sinusitis probably causes the same radiographic changes as acute bacterial sinusitis.
• Ultrasonography vs. sinus aspiration: Five studies compared the diagnostic performance of ultrasonography with sinus aspiration (13; 14; 15; 16; 17). Diagnostic performance varied substantially; it was the poorest in the study in which ultrasonography was performed and interpreted by untrained primary care physicians (16).
• Ultrasonography vs. radiography: Three studies compared the diagnostic performance of ultrasonography with sinus radiography (18; 19; 20), but their results were not conclusive.
• CT vs. radiography: One study compared CT with sinus radiography in 29 patients (18). Sinus CT is more sensitive than radiography, but diagnosis was confirmed by clinical criteria, not sinus puncture.
• Another study found sinus x-rays to be less sensitive than sinus CT scans for demonstrating radiographic changes consistent with acute sinusitis (21).
• A decision analysis found that regardless of the prevalence of bacterial sinusitis in the patient population (or the individual's likelihood of bacterial sinusitis), sinus radiography is never optimal in the routine management of uncomplicated sinusitis (22).
Acute Sinusitis

- Several studies using CT or MRI reported sinus mucosal abnormalities in 15% to 49% of patients with no symptoms of sinusitis (23; 24; 25; 26; 27; 28). The clinical importance of these chance findings is uncertain.

- Signs and symptoms that have not been adequately assessed in diagnostic performance studies compared with sinus puncture or sinus radiography include headache, facial pain and pressure that is worse when bending forward, olfactory disturbance, fever, halitosis, maxillary toothache, and cough (5; 6; 7; 8; 9). Most of these symptoms and signs are probably nonspecific or not very sensitive, and evidence is lacking.

- One small pediatric study found a significant improvement in patients on antibiotics who were diagnosed clinically (i.e., no diagnostic tests were used) (29).

Rationale

- Cost-effectiveness considerations in plain radiography also pertain to sinus ultrasonography. Ultrasonography is rarely used in the United States to diagnose sinusitis.

- Radiographs and CT scans have high false-positive rates in acute sinusitis.

- Evidence on the role of CT in diagnosis of acute bacterial sinusitis is very limited. No studies have compared CT with sinus puncture.

- Despite fairly good diagnostic performance, at a cost of approximately $100, sinus radiography is not cost-effective compared with symptomatic treatment or use of clinical criteria to guide antibiotic therapy.

- Even if ultrasonography is less costly than radiography, no strong evidence supports its use by primary care physicians to diagnose acute bacterial sinusitis.

- Given the current evidence, CT and MRI have no role in diagnosis of acute sinusitis, except when history and physical exam findings indicate extrasinus local spread or intracranial complications.

- Asymptomatic patients with abnormalities on imaging studies do not require treatment.

- Sinus puncture and culture of aspirate is the gold standard for diagnosis of acute bacterial sinusitis in the research setting. However, it should not be performed routinely because it is painful and requires expertise.

Comments

- The occipitomental view (Waters view) is the standard radiographic view for visualizing the paranasal sinuses, especially the maxillary sinuses; however, a series of three or four radiographs is often ordered. A common criterion for positive radiography is sinus fluid or opacity. Some studies also consider mucous membrane thickening, which increases the sensitivity of radiography but decreases its specificity.

1.3 Consider atypical presentations of acute sinusitis and confounding diagnoses.

Recommendations

- Distinguish between acute sinusitis and chronic sinusitis.
  - Chronic sinusitis is defined clinically by the presence of sinus signs and symptoms for more than 12 weeks
  - The diagnosis of subacute sinusitis is reserved for patients with symptoms for 4 to 12 weeks
  - Acute exacerbations may complicate chronic sinusitis

- In children aged 1 to 5 years, consider the diagnosis of acute sinusitis when upper respiratory tract signs and symptoms, including daytime and nighttime cough and rhinorrhea independent of color, persist for more than 10 to 14 days or if symptoms worsen after 5 to 7 days.

- See table Differential Diagnosis of Sinusitis.
Evidence

- Acute sinusitis must be distinguished from chronic sinusitis because the conditions differ in histopathology, prognosis, and management potential (30; 31).
- In an observational cohort study of 1307 children aged 1 to 5 years, 121 had persistent respiratory symptoms meeting criteria for a diagnosis of sinusitis (9.3% [CI, 7.7% to 10.9%]). Patients who presented with cold and cough symptoms were significantly more likely to meet criteria for sinusitis than those who came for any other reason (17.3% vs. 4.2%, respectively; P<0.001). If the proportion of children with otitis media is excluded, 5% of children aged 1 to 5 years who are seen in primary care pediatrics might be expected to receive antibiotics exclusively for a diagnosis of sinusitis. At 24 to 48 hours and at 10 to 14 days after the clinic visit, the investigators noted a trend toward more rapid improvement among those children who were treated with antibiotics (32).

Rationale

- Acute sinusitis and chronic sinusitis differ in histopathology, prognosis, and management.
- Because chronic sinusitis responds poorly to conventional antibiotic therapy, establishing the exact duration of symptoms is important.
- Many predisposing factors may further hinder cure, such as severe allergy or structural changes arising from chronic sinusitis itself or from previous surgery for symptoms.
- Most viral upper respiratory tract infections in children aged 1 to 5 years will show clinical improvement after 7 to 10 days.

Comments

- In some patients, sinusitis recurs frequently, and it may be difficult to determine whether recurrence is relapse of previous infection or a de novo episode.

1.4 Look for the rare complications of acute bacterial sinusitis.

Recommendations

- Examine for local extensions of the infection:
  - Osteitis of the sinus bones
  - Periorbital cellulitis
  - Orbital cellulitis
- Examine for metastatic spread to the central nervous system:
  - Meningitis
  - Brain abscess
  - Infection of the intracranial venous sinuses, particularly the cavernous sinus
- Note that patients with ophthalmic or neurologic symptoms or signs should undergo more detailed clinical neurologic exam.
- Abnormalities may need to be examined further by using appropriate diagnostic imaging, such as CT.

Evidence

- Brain abscess accounts for about 1 in 10,000 hospital admissions. The proportion of cases of brain abscess attributable to bacterial sinusitis varies from 0.5% in China to 15% to 25% in Northern Europe (33).
- Physicians see about 3 million cases of acute sinusitis each year (34), and there are about 5000 brain abscess-related hospital discharges annually (35). From these figures, it can be inferred that approximately 1000 cases of brain abscesses per year are sinusitis-related, translating to an attack rate of 1 in 3000 among patients seen for acute sinusitis.
Rationale

- Serious complications of acute bacterial sinusitis are rare.
- Local complications of sinusitis are usually clinically evident. For example, orbital cellulitis is diagnosed on the basis of orbital swelling, redness of the conjunctiva, and limitation of extraocular movements.
- Periorbital and orbital cellulitis are seen mainly in children.

Comments

- The low complication rate does not justify routine use of special diagnostic tests to rule out this complication.
2. Consultation

Consider specialty consultation in selected patients with presumed sinusitis. Consider consultation for patients in whom sinusitis has a complicated course or is recurrent.  

2.1 Reserve consultation for complicated cases or patients whose symptoms fail to respond to initial therapy.  

Recommendations

- Consult an otolaryngologist only when the diagnosis is unclear.
- Consult an ophthalmologist, neurosurgeon, infectious disease expert, or neurologist as needed when serious complications such as periorbital cellulitis or venous sinus thrombosis are suspected.
- See information on complications.

Evidence

- There is no evidence that involvement of consultant experts (e.g., otolaryngologists) improves diagnostic accuracy or clinical outcomes of uncomplicated sinusitis.

Rationale

- Consultation results in increased cost without added diagnostic or clinical benefits in patients with uncomplicated sinusitis.

2.2 Consider consultation in patients with presumed acute sinusitis who do not respond to initial treatment, who have recurrent sinus infections, or who have complications.  

Recommendations

- Consult an otolaryngologist when sinusitis becomes chronic, an anatomical abnormality is suspected, or an abscess or meningeal spread of infection is suspected.
- Consult an ophthalmologist when orbital cellulitis is present.
- Consult an allergist when underlying atopic disease may be present.

Evidence

- There is no evidence that expert consultation improves outcomes in patients with uncomplicated acute sinusitis.

Rationale

- Specialist expertise may be required to treat underlying conditions or severe complications.
3. Hospitalization

Hospitalize patients for serious complications of acute bacterial sinusitis.

3.1 Hospitalize for local extensions of the infection, such as orbital involvement or metastatic spread to the central nervous system.

Recommendations

- Hospitalize for:
  - Local extension of the infection (osteitis of the sinus bones, orbital cellulitis).
  - Metastatic spread to the central nervous system (meningitis, brain abscess).
  - Infection or thrombosis of the intracranial venous sinuses, particularly the cavernous sinus.

Evidence

- Brain abscess accounts for about 1 in 10,000 hospital admissions. The proportion of cases of brain abscess attributable to bacterial sinusitis varies from 0.5% in China to 15% to 25% in Northern Europe.

- Physicians see about 3 million cases of acute sinusitis each year, and there are about 5000 brain abscess-related hospital discharges annually. From these figures, it can be inferred that approximately 1000 cases of brain abscesses per year are sinusitis-related, translating to an attack rate of 1 in 3000 among patients seen for acute sinusitis.

Rationale

- These complications require long courses of parenteral antibiotics and close observation.
4. Therapy

Choose drug therapy on the basis of the probability of bacterial sinusitis and consider non-drug therapy.

4.1 Consider nasal sprays or sinus irrigation.

Recommendations
- Consider nasal sprays or sinus irrigation to increase mucosal moisture and remove inflammatory debris and bacteria.

Evidence
- No well-designed, randomized studies have addressed the efficacy of sinus irrigation, nasal sprays, or other nondrug therapies, but these therapies are often prescribed. Their effectiveness is unknown.

Rationale
- These agents may relieve symptoms, and the cost is low compared with drug therapy. Because high-quality data are lacking, sprays and irrigation cannot be strongly recommended or discouraged.

4.2 Start nonantibiotic therapy for symptoms as an initial strategy in patients with a low probability of bacterial sinusitis.

Recommendations
- Institute symptomatic therapy:
  - Mucolytic agents to reduce viscosity of nasal secretions
  - Decongestants to reduce mucosal inflammation and improve ostial drainage by vasoconstriction
  - Antihistamines and intranasal steroids to inhibit inflammatory pathways
- Note that patients with only one of the following have a low probability (less than 25%) of bacterial sinusitis:
  - URI for more than 7 days
  - Facial pain
  - Purulent discharge

Evidence
- Several classes of medications are commonly used to try to restore normal sinus environment and function in acute sinusitis (36; 37).
- Eleven randomized studies have addressed the use of various ancillary drug therapies, including a proteolytic enzyme (bromelain), α-adrenergic agonists (xylometazoline and oxymetazoline), a mucolytic agent (bromhexine), intranasal corticosteroids (budesonide and flunisolide), and an antihistamine (loratadine) (38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48). In most patients, these agents were used in conjunction with antibiotics, and studies did not exclude patients with chronic sinusitis. Efficacy varied, but generally favorable trends were reported. One randomized, controlled trial found no benefit for nasal budesonide or oral amoxicillin use in acute sinusitis but suggested, in secondary analyses, that budesonide is beneficial in patients with less severe symptoms and detrimental when more severe symptoms are present (48).
- A decision analysis suggested that when the prevalence of acute bacterial sinusitis in a cohort of patients is less than 25%, empirical symptomatic treatment is the most effective approach compared with clinical decision rules or radiography to decide on the use of antibiotics or using antibiotics initially (22).
Rationale

- The cost of extensive use of nonantibiotic drug therapy should be considered.
- No good evidence exists on symptomatic therapy with nonantibiotic drugs in patients with acute sinusitis.

Comments

- The diversity of agents and study limitations preclude meaningful data synthesis. More data are needed to establish the efficacy of specific agents and ancillary measures.
- Common adverse effects from the use of ancillary or symptomatic treatments have not been well studied. Avoid overmedication with antihistamines and other decongestants.
- Of note, a Cochrane review of intranasal steroids in acute sinusitis found four well-designed randomized, controlled trials with 1943 participants that supported, despite limited current evidence, their use as monotherapy or as an adjuvant therapy to antibiotics (49).

4.3 Consider antibiotic therapy in patients with a high probability of bacterial sinusitis at presentation, with acute worsening, and those in whom symptomatic therapy fails after 10 days. \( ^{AB} \)

Recommendations

- Treat with antibiotics for bacterial sinusitis in patients:
  - With symptoms of rhinosinusitis for 10 days or more with no improvement
  - Who present initially with severe symptoms of fever of 39 °C (102 °F) or above, and either facial pain or purulent nasal discharge for 3 to 4 days
  - Who experience worsening fever, headache, or nasal discharge after an improving URI
  - When using antibiotics, use amoxicillin or amoxicillin/clavulanate as a first-line agent.
  - For penicillin-allergic patients or patients with persistent symptoms, consider alternative antibiotics such as doxycycline or trimethoprim-sulfamethoxazole in adults and doxycycline in older children.
  - Avoid empiric use of antibiotics as part of initial management of patients with a low likelihood of bacterial sinusitis.
  - Always consider patient expectations and discuss overall management.
  - Consider delaying prescription for antibiotics to reduce overuse.
  - See table Drug Treatment for Sinusitis.
  - See table Cost-Effective Treatment, Based on Disease Likelihood.

Evidence

- A 2012 clinical practice guideline from the Infectious Diseases Society of America recommends limiting antibiotics to patients with likely bacterial sinusitis. They also recommend beginning with amoxicillin-clavulanate when treating bacterial sinusitis, but that recommendation is weak and based on weak evidence (50).
- Randomized studies have compared antibiotics with placebo for treatment of acute sinusitis (51; 52; 53; 54; 55; 56; 57; 58). Different antibiotic agents were used in these studies, but their results did not differ significantly.
- Overall, meta-analysis of six of the studies (59) showed that antibiotics were significantly more effective than placebo, reducing treatment failures by almost half (from 31% to 16%); however, symptoms improved or were cured in 68% of patients given placebo.
- Another meta-analysis that looked at individual patient data included nine primary care trials and 2547 adults. There were limited data suggesting that antibiotics were beneficial; 15 patients (CI,
NNT[benefit] 7 to NNT[harm] 190) would have to be given antibiotics before an additional patient was cured. The most significant clinical predictor was purulent discharge in the pharynx; the NNT was 8 patients with this sign (CI, NNT[benefit] 4 to NNT[harm] 47) before 1 additional patient was cured (60).

- The highest spontaneous cure rate (85% at 10 days) was seen in one trial that enrolled patients on the basis of sinusitis-like symptoms without further diagnostic documentation. The trial showed no benefit of antibiotics, although statistical analysis could not completely exclude a moderate benefit (56).

- A decision analysis suggests that initial empirical antibiotic therapy is the most cost-effective strategy for management of acute sinusitis when the expected prevalence of bacterial sinusitis is greater than 83% (22). In primary care, where the prevalence of acute bacterial sinusitis is low, the results will be the same whether antibiotics are immediately prescribed or a ‘wait and see’ strategy is used (61).

- Although antibiotic resistance must be considered, no good data confirm that response to antibiotic treatment depends on in-vitro susceptibility of microbial isolates. On the contrary, convincing evidence from randomized, controlled trials indicates that the efficacy of amoxicillin in alleviating clinical symptoms and producing clinical cures is similar to that of broader-spectrum antibiotics. Folate inhibitors, such as trimethoprim-sulfamethoxazole, have rates of clinical cure and failures similar to those of newer, more expensive antibiotics (22). However, pneumococcal resistance rates for trimethoprim-sulfamethoxazole are as high as 18% to 20% (62). Cure rates are also similar with doxycycline (63).

- Studies done since the 1970s have shown the predominant isolates from acute bacterial sinusitis to be S. pneumoniae and H. influenzae; however, with recent vaccinations, there appears to be a relative increase in H. influenzae (29). Studies done in the 1990s have shown some contribution of M. catarrhalis, especially in children and young adults. Most isolates of M. catarrhalis and about one third of those of H. influenzae produce β-lactamases and are resistant to penicillin and amoxicillin. See 3; 36; 64; 65; 66; 67; 68; 69; 70 and 71 for the evolution of bacteriology over time.

- Most studies of the microbial flora of infected sinuses have focused on aspirates from the maxillary sinuses (15; 16).

- Data comparing microbial flora from infected maxillary and frontal sinuses in individual patients correlated well but are limited (72).

- Evidence for comparison of amoxicillin with newer, more expensive antibiotics comes from 13 randomized trials including 1553 patients (53; 69; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83). A meta-analysis synthesized this data (59). Agents being compared were diverse and included amoxicillin-clavulanic acid, cefuroxime, cefixime, azithromycin, clarithromycin, roxithromycin, cefaclor, cefpodoxime, and minocycline. The combined failure rate among patients treated with amoxicillin was low (11% [CI, 8% to 14%]), and the further decrease in clinical failure with broad-spectrum antibiotics was not significant (risk ratio, 0.86 [CI, 0.62 to 1.19]). Treating 100 patients with amoxicillin would lead to only 0.85 more failures (CI, 3.1 more to 1.4 fewer failures). Similar results were obtained when the analysis focused on clinical cures with risk ratios very close to 1.0. Several studies in the meta-analysis were done at a time when pneumococcal antibiotic resistance was significantly less common, and caution may be needed in applying the results to the current setting.

- Although nine randomized studies have compared folate inhibitors with newer, more expensive antibiotics, the cumulative evidence (summarized in the same meta-analysis) is sparse (total of 410 patients) and the overall quality of the trials is low. The risk ratio for clinical cures and clinical failures is nevertheless also close to 1.0 (59).
• One small study \((n = 56)\) in children under age 10 found that patients who received high-dose amoxicillin \((90\ mg/kg)\) plus potassium clavulanate improved at a much greater rate than those receiving placebo \((50\%\ vs.\ 14\%)\) \((29)\).

• In a randomized, placebo-controlled trial of 188 children who were diagnosed with sinusitis, 58 received amoxicillin, 48 received amoxicillin-clavulanate, and 55 received placebo. Day 14 improvement rates were 79%, 81%, and 79%, respectively. The rates of adverse events \((amoxicillin, 19%;\ amoxicillin-clavulanate, 11%;\ placebo, 10%),\ relapse \((amoxicillin, 12%;\ amoxicillin-clavulanate, 13%;\ placebo, 13%),\ and recurrence of sinus symptoms \((amoxicillin, 9%;\ amoxicillin-clavulanate, 13%;\ placebo, 13%)\) were similar among treatment groups \((57)\).

• The withdrawal rate in randomized trials averages between 4% and 6% with amoxicillin, folate inhibitors, or doxycycline \((59;\ 63)\). A larger proportion of patients, up to 10% to 20% in most reports, have more minor adverse reactions. Rates of adverse events have been as high as 50% in a few trials \(e.g.,\ see\ 54\); most events were gastrointestinal. In most cases, side effects ceased once antibiotic treatment was stopped.

• The Sinus and Allergy Health Partnership published an executive summary on antimicrobial treatment guidelines for acute bacterial rhinosinusitis \((84)\).

• A 2010 French prospective cohort study of 5640 patients with acute sinusitis in primary care found that most patients got better soon, whether or not antibiotics were prescribed \((85)\).

• A 2009 meta-analysis of 12 randomized, controlled trials comprising 4430 patients found that a 5-day course of antibiotics was as effective as a 10-day course \((86)\).

**Rationale**

• Antibiotics may be useful in patients with a high likelihood of definite bacterial sinusitis.

• In situations in which the prevalence of bacterial sinusitis is expected to be 25% to 83%, use of clinical rules based on signs and symptoms to determine the need for antibiotic treatment in selected patients is cost effective.

• In most clinical practices, the prevalence of bacterial sinusitis among patients with acute sinusitis symptoms is probably less than 83% and most often less than 25%.

• A large proportion of \(H.\ influenzae\) isolates possess \(\beta\)-lactamases.

• The data as a whole suggest that if antibiotics are to be used, amoxicillin and doxycycline are adequate agents. Trimethoprim-sulfamethoxazole is acceptable for \(\beta\)-lactam-allergic adults.

• Data are limited on the optimal duration of antibiotic treatment for acute sinusitis. Traditionally, long courses \((7\ to\ 14\ days)\) have been used in clinical practice. Nevertheless, there is no evidence that such long courses are needed to treat acute bacterial sinusitis.

• First-generation cephalosporins have minimal efficacy against \(S.\ pneumoniae\) and \(H.\ influenzae\). Second-generation cephalosporins, such as cefpodoxime, are considered to be second-line agents for acute sinusitis.

**Comments**

• Pneumococcal resistance to macrolides and other agents has increased in past years \((62)\), and trimethoprim-sulfamethoxazole is not a recommended second-line agent in children \((84;\ 88;\ 89)\). However, it continues to be an acceptable first-line agent in adults \((84;\ 88;\ 89)\).

• Newer, broad-spectrum agents are more costly, and substantial concern exists about promoting the development of widespread resistance among bacteria in the community and in the host \((90;\ 91;\ 92)\).

• The evolution of regional bacterial resistance may need to be taken into account, but evidence is lacking that this would lead to better clinical outcomes.
A variety of other recommendations for acute sinusitis exist but without evidence to support clinical superiority to amoxicillin, folate inhibitors, or doxycycline.

A 2008 Cochrane meta-analysis of 57 randomized, controlled trials (93) found a slight statistical difference between antibiotic and placebo, but also high cure rates at 7 to 15 days with either placebo (80%) or antibiotic (90%). No significant differences were found between antibiotic regimens. A meta-analysis of 9 trials with patient level data available showed similar results (60).

Doxycycline has a broader spectrum of activity than amoxicillin; it also covers β-lactamase-producing strains of H. influenzae and M. catarrhalis. Its use should satisfy concerns about antimicrobial resistance when prescribing treatment for acute sinusitis.
5. Patient Counseling

Inform the patient about sinusitis.

5.1 Inform the patient about the disease.

Recommendations

- Reassure and inform the patient about the nature of the disease, expected duration of illness, and details of therapy.
- Inform the patient about the evidence on antibiotic use.

Evidence

- No randomized or other well-designed studies have addressed the effects of patient education on the course of sinusitis.

Rationale

- Thoughtful explanation may help address the patient's expectations.
6. Follow-up

Tailor follow-up to aspects of a specific patient's illness.

6.1 Consider office follow-up in selected cases of sinusitis, but not routinely.

**Recommendations**

- Consider follow-up evaluation when symptoms persist or new symptoms develop.
- Note that routine follow-up evaluations are probably not warranted in patients whose symptoms resolve or improve substantially.
- Consider follow-up in patients whose symptoms persist after 2 to 3 weeks.
- Note that earlier follow-up may be indicated if new, worsening symptoms appear, especially symptoms suggestive of serious complications.

**Evidence**

- There is no evidence from randomized or other well-designed trials indicating whether routine follow-up evaluation improves outcomes in patients with acute uncomplicated sinusitis.

**Rationale**

- Failure to improve may suggest the presence of complications.

**Comments**

- Routine office follow-up may increase the cost of management of this generally benign condition without meaningful clinical gains.
Acute Sinusitis

References


Using the American College of Physicians

Acute Sinusitis


Glossary

**AIDS**
acquired immunodeficiency syndrome

**bid**
twice daily

**CT**
computed tomography

**HIV**
human immunodeficiency virus

**LR+**
Positive likelihood ratio

**MRI**
magnetic resonance imaging

**NNT**
number needed to treat

**qd**
one daily

**qid**
four times daily

**tid**
three times daily

**URI**
upper respiratory (tract) infection
## Tables

### Laboratory and Other Studies for Acute Sinusitis

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Likelihood Ratio Positive</th>
<th>Likelihood Ratio Negative</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus radiography</td>
<td>90</td>
<td>61</td>
<td>2.3</td>
<td>0.26</td>
<td>Not recommended in acute sinusitis. Chronic cases may show opacification, mucous thickening, or fluid</td>
</tr>
<tr>
<td>Sinus ultrasonography</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not recommended in acute sinusitis. Variable results in three studies, precluding synthesis; unlikely to have good diagnostic performance</td>
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<tr>
<td>Sinus CT and MRI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not recommended in acute sinusitis. No comparison against sinus puncture, the gold standard</td>
</tr>
<tr>
<td>Sinus puncture</td>
<td></td>
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<td></td>
<td></td>
<td>The gold standard for diagnosis but too invasive for routine use</td>
</tr>
</tbody>
</table>

CT = computed tomography; MRI = magnetic resonance imaging.
# Differential Diagnosis of Sinusitis

<table>
<thead>
<tr>
<th>Disease</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute sinusitis</td>
<td>Symptoms of headache or facial, maxillary or tooth pain with purulent nasal discharge and fever. Presentations include symptoms for 10 or more days, severe symptoms for &gt;3 days or initial improvement in upper respiratory symptoms followed by worsening</td>
</tr>
<tr>
<td>Chronic sinusitis</td>
<td>Inflammation of the nasal mucosa and paranasal sinuses lasting 12 or more weeks. Symptoms include nasal obstruction, facial pain or fullness, purulent nasal discharge and decreased sense of smell</td>
</tr>
<tr>
<td>Nasal polyps</td>
<td>Cause symptoms of nasal obstruction without infection, though they can predispose to sinusitis. Suspect in persistent nasal obstruction and anosmia and confirm with flexible rhinoscopic exam</td>
</tr>
<tr>
<td>Rhinitis, upper respiratory tract infection</td>
<td>Nasal discharge is typically non-purulent, though it may be purulent late in infection. Illness is caused by viruses. Differentiated from acute sinusitis by less severe symptoms with shorter duration</td>
</tr>
<tr>
<td>Migraine and variants</td>
<td>Can present with headache or facial pain but headache should last &lt;3 days, with no purulent nasal discharge or fever. Headache accompanied by typical migraine symptoms such as nausea and vomiting, phonophobia or photophobia</td>
</tr>
<tr>
<td>Dental abscess</td>
<td>Can be confused with maxillary sinusitis, but is generally not associated with recent upper respiratory infection or accompanied by purulent nasal discharge</td>
</tr>
</tbody>
</table>
## Drug Treatment for Sinusitis

<table>
<thead>
<tr>
<th>Drug or Drug Class</th>
<th>Dosing</th>
<th>Side Effects</th>
<th>Precautions</th>
<th>Clinical Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptomatic therapy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucolytic</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Guaifenesin (Robitussin, Mucinex)</td>
<td>200-400 mg q4hr. Extended-release: 600-1200 mg q12hr. Maximum 2400 mg total daily dose</td>
<td>GI side effects at high dose</td>
<td>All agents: Avoid with closed-angle glaucoma. Oral agents: Caution with hypertension, cardiac disease, hyperthyroidism, diabetes, urinary retention. Use low dose in elderly</td>
<td>Used to improve sinus drainage</td>
</tr>
<tr>
<td><strong>Decongestants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxymetazoline (Afrin)</td>
<td>Intranasal 0.05% solution: 1-2 drops or sprays in each nostril bid.</td>
<td>Transient burning, stinging, dryness of the nasal mucosa, sneezing, rebound congestion</td>
<td>Use for more than 3-5 days can cause rebound congestion</td>
<td>Do not use for longer than 3-5 days</td>
</tr>
<tr>
<td>Phenylephrine (Sudafed PE)</td>
<td>Oral: 10 mg q4-6hr. Maximum total daily dose 60 mg. Intranasal: 2-3 drops or sprays in each nostril q4hr prn</td>
<td>CNS stimulation, CV adverse effects, increased blood pressure. Intranasal use: nasal irritation, rebound nasal congestion, tolerance</td>
<td>Avoid with: cerebrovascular disease, sulfite hypersensitivity</td>
<td>Used to acutely improve sinus drainage</td>
</tr>
<tr>
<td>Pseudoephedrine (Sudafed)</td>
<td>60 mg q4-6hr. Maximum total daily dose 240 mg</td>
<td>CNS stimulation, CV adverse effects, increased blood pressure and heart rate, oculic hypertension, photophobia, ischemic colitis</td>
<td>Avoid with: severe hypertension, significant CAD, emphysema, chronic bronchitis, peptic ulcer disease. If CrCl&lt;30, decrease dose by 50%</td>
<td></td>
</tr>
<tr>
<td><strong>Antihistamines</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cetirizine (Zyrtec)</td>
<td>5-10 mg qd</td>
<td>Xerostomia</td>
<td>Use 5 mg qd with: hepatic disease, CrCl&lt;31, elderly</td>
<td>For improved sinus drainage</td>
</tr>
<tr>
<td>Desloratadine (Clarinex)</td>
<td>5 mg qd</td>
<td>Headache, pharyngitis, xerostomia, myalgia, nausea</td>
<td>Use 5 mg qod with: hepatic disease, CrCl&lt;50</td>
<td>Can cause more fatigue than other agents</td>
</tr>
<tr>
<td>Fexofenadine (Allegra)</td>
<td>60 mg bid or 180 mg qd</td>
<td>Headache, vomiting</td>
<td>If CrCl&lt;80, use 60 mg qd. Caution with elderly</td>
<td></td>
</tr>
<tr>
<td>Loratadine (Claritin, Alavert)</td>
<td>10 mg qd</td>
<td>Headache, xerostomia</td>
<td>Use 10 mg qod with: hepatic disease, CrCl&lt;30. Caution with potent CYP3A4 inhibitors</td>
<td></td>
</tr>
<tr>
<td><strong>Intranasal corticosteroids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beclomethasone (Beconase AQ, Qnasal)</td>
<td>Nasal spray: 1-2 sprays (42 mcg/spray) each nostril bid. Nasal aerosol: 2 sprays (80 mcg/spray) each nostril qd</td>
<td>Nasal irritation, nasal septal perforation. HPA suppression with long term use</td>
<td>Rare hypersensitivity reactions</td>
<td>Used to improve longer-term sinus drainage</td>
</tr>
<tr>
<td>Fluticasone (Flonase, Veramyst)</td>
<td>2 sprays (27.5-50 mcg/spray) per nostril qd. May reduce to 1 spray per day</td>
<td>Asthma exacerbation, cough,</td>
<td>Caution with severe hepatic disease</td>
<td></td>
</tr>
</tbody>
</table>
## Acute Sinusitis

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>dosing</th>
<th>adverse reactions</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillins</td>
<td>nostril qd</td>
<td>dysphonia, pharyngitis</td>
<td>Seizures can occur when large doses given with renal impairment</td>
</tr>
<tr>
<td>Amoxicillin (Amoxil)</td>
<td>Mild-moderate infections: 500 mg q12hr or 250 mg q8hr. Severe infections: 875 mg q12hr or 500 mg q8hr</td>
<td>Hypersensitivity reactions, hematologic adverse reactions, nausea, vomiting, diarrhea</td>
<td>If CrCl&lt;30, extend dosing interval</td>
</tr>
<tr>
<td>Amoxicillin/clavulanate (Augmentin)</td>
<td>500/125 mg q8hr or 875/125 mg q12hr</td>
<td>Caution with hepatic disease. If CrCl&lt;30, extend dosing interval and do not use 875 or 1000 mg tablets</td>
<td></td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Doxycycline (Vibramycin, Monodox, Doryx)</td>
<td>100 mg q12hr on day 1, then 100 mg qd or q12hr</td>
<td>Avoid with pregnancy</td>
</tr>
<tr>
<td></td>
<td>Nausea, vomiting, diarrhea, photosensitivity</td>
<td>Avoid with pregnancy near term. If CrCl&lt;30, decrease dose. Caution with hepatic disease. Inhibitor of CYPs 2C8 and 2C9</td>
<td></td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>Cefpodoxime</td>
<td>200 mg q12hr for 10 days</td>
<td>For penicillin allergy or persistent symptoms</td>
</tr>
<tr>
<td></td>
<td>Nausea, vomiting, elevated hepatic enzymes</td>
<td>For penicillin allergy or persistent symptoms</td>
<td></td>
</tr>
<tr>
<td>Cefuroxime (Ceftin)</td>
<td>250 mg q12hr for 10 days</td>
<td></td>
<td>Second-line</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Levofoxacin (Levaquin)</td>
<td>500 mg qd for 10-14 days or 750 mg qd for 5 days</td>
<td>Tendon rupture and tendonitis, myasthenia gravis exacerbation. Caution with: elderly, diabetics. Ensure adequate hydration. Oral absorption reduced by divalent or trivalent cations (e.g. antacids, dairy) so separate by 2 hr</td>
</tr>
<tr>
<td></td>
<td>400 mg qd for 10 days</td>
<td>If CrCl&lt;50, decrease dose</td>
<td>Second-line</td>
</tr>
</tbody>
</table>

**Key:**
- = first-line agent; ■ = black box warning; bid = twice daily; CAD = coronary artery disease; CKD = chronic kidney disease; CNS = central nervous system; CrCl = creatinine clearance; CYP = cytochrome P450 isoenzyme; GI = gastrointestinal; HPA = hypothalamic-pituitary-adrenal; IM = intramuscular; IV = intravenous; PO = oral; q12hr = every 12 hours; q4-6hr = every 4 to 6 hours; qd = once daily; qid = 4 times daily; qod = every other day; SC = subcutaneous; SCr = serum creatinine; tid = three times daily

PIER provides key prescribing information for practitioners but is not intended to be a source of comprehensive drug information.
Sensitivity and Specificity of a Four-Item Clinical Score for Diagnosing Acute Bacterial Sinusitis

<table>
<thead>
<tr>
<th>Score</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>99</td>
<td>49</td>
</tr>
<tr>
<td>2</td>
<td>96</td>
<td>77</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
<td>89</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>97</td>
</tr>
</tbody>
</table>

The four items are purulent rhinorrhea with unilateral predominance, local pain with unilateral predominance, bilateral purulent rhinorrhea, and presence of pus in the nasal cavity. The clinical score is derived from the number of criteria used to define the presence of acute bacterial sinusitis. The presence of any one of the criteria (score of 1) for diagnosis has a very high sensitivity (99%) of identifying acute bacterial sinusitis but also a very high false-positive rate (51%) (1 – specificity). The presence of all four criteria (score of 4) decreases the sensitivity to 24% but decreases the false-positive rate to 3%. The gold standard for these figures is sinus puncture and aspiration. Adapted from 3.
Cost-Effective Treatment, Based on Disease Likelihood

<table>
<thead>
<tr>
<th>Initial Likelihood (%)</th>
<th>Management Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>Symptomatic treatment</td>
</tr>
<tr>
<td>25-83</td>
<td>Apply clinical decision rule to decide on antibiotic use*</td>
</tr>
<tr>
<td>&gt;83</td>
<td>Empirical antibiotics†</td>
</tr>
</tbody>
</table>

* For example, use antibiotics if at least two of the following four criteria are present: purulent rhinorrhea with unilateral predominance, local pain with unilateral predominance, bilateral purulent rhinorrhea, and pus in the nasal cavity. More strict clinical criteria would restrict antibiotic treatment to patients who meet all of the following criteria: symptoms of URI for 7 days or more, facial pain or discomfort, and purulent discharge in the nose or pharynx. Less strict criteria call for meeting two of those three criteria.
† First-line options include amoxicillin, 500 mg tid, or sulfamethoxazole, 800 mg plus trimethoprim, 160 mg bid for 3 days. bid = twice daily; tid = three times daily; URI = upper respiratory (tract) infection.