Acute Rhinosinusitis in Adults

Rhinosinusitis Guideline Team

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Patient population: Non-immune compromised adults.

Objectives: Improve quality of care and decrease costs by: (1) accurate diagnosis; (2) appropriate medical therapy; (3) effective radiological imaging; and (4) appropriate subspecialist consultation.

Key points

Definitions. Acute rhinosinusitis is an inflammation of the paranasal sinuses and the nasal cavity lasting no longer than 4 weeks. It can range from acute viral rhinitis (the common cold) to acute bacterial rhinosinusitis. Fewer than 5 in 1,000 colds are followed by bacterial rhinosinusitis.

Diagnosis. Estimate the probability of acute *bacterial* rhinosinusitis based on history and physical examination. The best predictors include maxillary toothache, poor response to decongestants, patient report of colored nasal discharge, purulent secretions by exam, and abnormal transillumination.

Treatment. Prescribe antibiotic therapy based on benefits and risks. Benefits depend on the probability of bacterial infection and the severity of symptoms. Risks of antibiotics include allergic reaction, potential side effects, and promotion of bacterial resistance. Antibiotics have not been shown to decrease the risk of complication or progression to chronic rhinosinusitis. Symptoms resolve within two weeks without antibiotics in 70% of cases and with antibiotics in 85% of cases.

First line antibiotics for acute bacterial rhinosinusitis are amoxicillin and trimethoprim/ sulfamethoxazole. They are superior to placebo and as effective as other agents that are more expensive, have greater risk of side effects, and/or should be reserved for more serious infections *[A*]*. Use first-line alternatives (e.g., doxycycline, azithromycin) only for patients allergic to both first line drugs. The usual initial course of antibiotics should be 10-14 days. An exception is azithromycin (500 mg daily), which should be prescribed for 3 days.

For partial but incomplete resolution after an initial course of antibiotics, extend the duration of antibiotic therapy by an additional 7 to 10 days for a total of 3 weeks of antibiotics.

For minimal or no improvement with initial treatment, consider changing to an antibiotic with broader coverage, including resistant strains. Options include amoxicillin at high dose, amoxicillin/clavulanate, and levofloxacin. Avoid ciprofloxacin due to limited activity against *Streptococcus pneumoniae.* Do not use telithromycin because risks for hepatotoxicity, loss of consciousness, and visual disturbances appear to outweigh potential benefits for this indication.

Ancillary therapies for acute rhinosinusitis have little supporting data. Some studies examining treatments for viral upper respiratory infections have shown:

- Efficacy in symptom control: decongestants and anticholinergics, including "first-generation" antihistamines (diphenhydramine, chlorpheniramine, clemastine) *[A*]*.
- Possible efficacy: zinc gluconate lozenges, vitamin C, Echinacea extract, saline irrigation *[conflicting or insufficient data]*.
- No significant benefit: guaifenesin (except possibly at high dose), saline spray, steam, "non-sedating" antihistamines (loratadine, fexofenadine, cetirizine).

For recurrent acute rhinosinusitis or acute rhinosinusitis superimposed on chronic rhinosinusitis, the addition of high dose nasal corticosteroids may decrease duration of symptoms and improve rate of clinical success *[A*]*. However, this approach is inconvenient, has potential side effects, and significant cost.

Imaging. If symptoms of rhinosinusitis persist for more than three weeks despite antibiotics or recur more than three times per year, a sinus CT scan should be performed while the patient is symptomatic to reassess diagnosis and determine need for referral *[C, D*]*. CT scans provide much better definition than a plain sinus x-ray series. Plain sinus x-rays, therefore, are not recommended.

- New low dose CT scanners are becoming available with the advantage of radiation exposure of about 10%-15% of a full sinus CT scan.
- A limited (coronal plane only) sinus CT scan provides excellent imaging detail with only 50% of the radiation exposure of a full (axial and coronal planes) sinus CT scan.
- At UM Health System the charge is $1,416 for any sinus CT scan (low dose, limited, or full).

***** Levels of evidence for the most significant recommendations:
A = randomized controlled trials; B = controlled trials, no randomization; C = observational trials; D = opinion of expert panel

Figure 1. Diagnosis of Acute Bacterial Rhinosinusitis

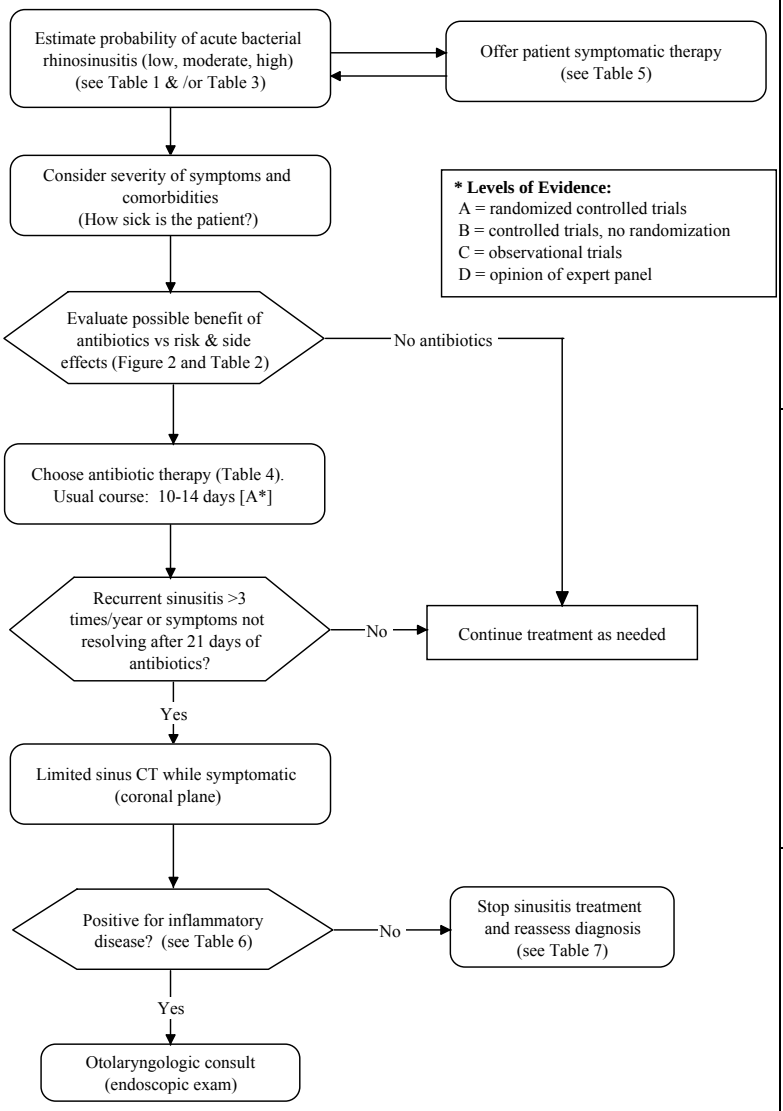

Figure 2: Antibiotic Treatment for Suspected Acute Bacterial Rhinosinusitis

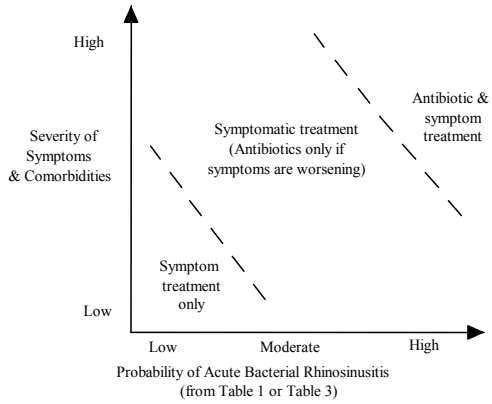

Table 1. Diagnosis of Acute Bacterial Rhinosinusitis*

Best Predictors :

- Maxillary toothache
- Purulent secretion by examination
- Poor response to decongestants
- Abnormal transillumination (see text)
- History of colored nasal discharge

Probability of Rhinosinusitis:

Predictors	Probability	95% CI
0	9%	5% - 17%
1	21%	15% - 28%
2	40%	33% - 47%
3	63%	53% - 72%
4	81%	69% - 89%
5	92%	81% - 96%

Table 2. Antibiotic Treatment Considerations for Acute Bacterial Rhinosinusitis

A reasonable strategy for many patients is to treat symptomatically and recommend antibiotics only if symptoms do not begin to improve.

- ~ 70% of patients improve within 2 weeks without antibiotics *[A*]*
- ~ 85% of patients improve within 2 weeks with antibiotics *[A*]*
- ~ 15% of patients take longer than 2 weeks to improve even with antibiotics *[A*]*
- Antibiotics have not been shown to prevent complications (including chronic rhinosinusitis)
- Antibiotics may cause side effects, including severe allergic reaction

Table 3. Performance Characteristics of Signs and Symptoms of Acute Bacterial Rhinosinusitis *

Characteristics	Sensitivity (%)	Specificity (%)	Frequency (%)	Likelihood Ratio** (Finding Present)	Likelihood Ratio** (Finding Absent)
Symptoms					
Maxillary toothache	18	93	11	2.5	0.9
No improvement with decongestants	41	80	28	2.1	0.7
Colored discharge	72	52	59	1.5	0.5
Cough	70	44	61	1.3	0.7
Signs					
Purulent secretion	51	76	34	2.1	0.7
Nasal speech	45	73	34	1.7	0.8
Abnormal transillumination	73	54	56	1.6	0.5
Sinus tenderness	48	65	39	1.4	0.8

* Adapted from Williams, et. al., Ann. Int. Med. 1992;117:705-710.

** A likelihood ratio expresses the odds that a sign or symptom would occur in a patient with, as opposed to a patient without, rhinosinusitis. When a likelihood ratio is above 1.0, probability of disease increases; when the likelihood ratio is below 1.0, probability of disease decreases.

Table 4. Antibiotic Therapy for Acute Rhinosinusitis (10-14 day usual course) [UMHS Preferred Agents **Bold**]

Drug	Dose	Cost[1]
A. First Line Antibiotic		
Amoxicillin *(Amoxil®, Polymox®, Trimox®)*	500 mg q8 hr	gen $6-8
Amoxicillin *(Amoxil®)*	875 mg q12 hr	gen $16-21
Trimethoprim/sulfamethoxazole (*Bactrim-DS®, Septra-DS®)*	160 mg/800 mg q12 hr	gen $5-6
B. If Allergic to or Intolerant of First Line Antibiotic - Alternative First Line Antibiotics		
Doxycycline hyclate *(Vibramycin®, Doryx®)*	100 mg q 12 hr	gen $6-8
Azithromycin *(Zithromax®)*	500 mg daily ***x 3 days*** [2]	$43
Cefuroxime axetil *(Ceftin®)*	250-500 mg q12 hr	gen $48-144
Loracarbef *(Lorabid ®)*	200-400 mg q12 hr	$82-161
Clarithromycin (*Biaxin ®*) [3]	500 mg q12 hr	$84-117
Clarithromycin XL *(Biaxin XL®)* [3]	1000 mg daily	$86-120
Cefprozil *(Cefzil ®)*	250 mg q12 hrs	$82-114
Cefprozil *(Cefzil ®)*high dose for "moderate to severe infections"	500 mg q12 hr	$167-233
Cefdinir *(Omnicef ®)*	300 mg q12 hrs or 600 mg daily	$82-115
C. If Treatment Failure - Second Line Antibiotics		
Amoxicillin high dose *(Amoxil®, Polymox®)*	875-1000 mg q8 hr	gen $22-34
Amoxicillin/clavulanate potassium, usual dose *(Augmentin®)*	875/125 q12 hr	$79-109
Amoxicillin/clavulanate potassium, high dose *(Augmentin XR®)*	2000/125 q12 hr	$108-152
Levofloxacin (*Levaquin®*) [4]	500 mg daily	$96-134

[1] For cost presented as range, low=10 days, high=14 days. Cost=Average wholesale price based -10% for brand products and Maximum Allowable Cost (MAC) + $3 for generics on 30-day supply or less, *RedBook Update 10/04 & Blue Cross Blue Shield of Michigan Mac List, 08/04.*

[2] FDA approved for shorter treatment course.

[3] Use with caution. There are several potential drug interactions; patients should discontinue statins while taking macrolides.

[4] Due to risk for emergence of antibiotic resistance, consider a fluoroquinolone only after treatment failure with a first line antibiotic (or allergy to all first-line antibiotics). Ciprofloxacin [Cipro®] is not recommended as a second line antibiotic for acute bacterial rhinosinusitis because it, as well as other "first generation" fluoroquinolones, has limited activity against *Streptococcus pneumoniae.* Flouoroquinolones increase the risk of tendon rupture in those over age 60, in kidney, heart, and lung transplant recipients, and with use of concomitant steroid therapy.

Clinical Background

Clinical Problem and Management Issues

Definition. Acute rhinosinusitis is a symptomatic inflammation of the paranasal sinuses and nasal cavity lasting no longer than 4 weeks.

Diagnosis. Rhinosinusitis is common and accounts for up to 5% of visits to primary care physicians. Its cause may be viral, bacterial, allergic, or, less frequently, of other etiology. Distinguishing acute *bacterial* rhinosinusitis from other types is important because of the potential benefit of antibiotic therapy. Although no single, simple factor confirms the diagnosis of acute bacterial rhinosinusitis, its probability can be estimated based a number of signs and symptoms. In one study, however, a physician's overall clinical impression was better than any single symptom or sign for predicting acute bacterial rhinosinusitis. For patients with persistent or recurrent symptoms, advances in imaging offer more informative options (limited sinus CT) than plain sinus x-rays.

Management. Symptoms of rhinosinusitis can last well over two weeks with or without antibiotic treatment. Expensive antibiotics are often prescribed when equally effective and less expensive alternatives are available. The long duration of symptoms in some patients may result in referral for otolaryngology evaluation before an adequate trial of medical therapy.

Rationale for Recommendations

Causes

Acute rhinosinusitis is primarily an infectious disease. Symptoms resolve completely with medical treatment in nearly 90% of cases. Approximately 20-30% of cases of acute rhinosinusitis are viral. The most common bacterial pathogens are *Streptococcus pneumoniae* (~20-43%) and *Haemophilus influenzae* (~22-35%), other *Streptococcus* species (3-9%), and *Moraxella catarrhalis* (~2-10%); less common are *Staphylococcus aureus* (~4%), anaerobes (~5%), and *Haemophilus* species (~8%). Several noninfectious factors are important in the pathogenesis of rhinosinusitis, including patency of sinus ostia, nasal airflow, mucociliary activity, immunocompetence, and the nature and quantity of secretions.

Table 5. Adjuvant Therapy for Acute Rhinosinusitis [UMHS Preferred Agents **Bold**]

	Drug	Dose	Cost *
Likely to be effective in treating symptoms			
Decongestants[1]			
Topical[2]	**Oxymetazoline 0.05%** (*Afrin®*)	2 sprays each nostril q12 hr maximum 3 days	gen $4
Oral[3]	**Pseudoephedrine** *(Sudafed®)*	60 mg q6 hr or sustained release 120 mg q12 hr	gen $6-8
Anticholinergics			
Topical	**Ipratropium 0.03%** *(Atrovent®)*	2 sprays each nostril q6 hr prn	gen $36
	Ipratropium 0.06% *(Atrovent®)*	2 sprays each nostril q 6 hr prn	gen $62
Oral Antihistamines – 1st generation with significant anticholinergic effect (available over-the-counter)[4]			
	Chlorpheniramine *(Chlor-Trimeton®)*	4 mg q4-6 hr or sustained release 8-12 mg q12 hr	gen $10
	Clemastine *(Tavist®)*	1.34 mg q12 hr	gen $8
	Diphenhydramine *(Benadryl®)*	25-50 mg q6 hr	gen $6
Likely to be effective in recurrent acute rhinosinusitis or acute rhinosinusitis plus chronic rhinosinusitis			
Corticosteroid Nasal Spray in high doses			
	Flunisolide *(Nasalide®, Nasarel®)* 25 mcg/spray	8 sprays (200 mcg) each nostril q12 hr x 21 days [6.25 days / container (200 sprays), = 4 containers]	$204
	Fluticasone *(Flonase®)* 50 mcg/spray	4 sprays (200 mcg) each nostril q12 hr x 21 days [7.5 days / container (120 sprays), = 3 containers]	$195
	Mometasone Furoate *(Nasonex®)* 50 mcg/spray	4 sprays (200 mcg) each nostril q12 hr x 21 days [7.5 days / container (120 sprays), = 3 containers]	$210
Possibly effective in treating symptoms (for viral infections or colds)			
	Zinc gluconate lozenges	1 lozenge q2h while awake	gen $6
	Vitamin C	2-3g/day in divided doses	gen $10
	Echinacea extract	Varies by preparation	
	Saline irrigation	30-120 ml (1/8-1/2 cup) per session	<$1
No proven benefit or not studied in controlling symptoms			
	Steam, saline spray		
	Less-sedating (2nd generation) antihistamines (loratadine, fexofenadine, cetirizine)		
	Guaifenesin (except possibly at high dose)		

* Cost = Average wholesale price based -10% for brand products and Maximum Allowable Cost (MAC) + $3 for generics on 30-day supply or less, *Amerisource Bergen item Catalog 18/04 & Blue Cross Blue Shield of Michigan Mac List, 6/7/04*

1 Many preparations combine decongestants and antihistamines.

2 Do not use for more than three consecutive days to decrease risk of rhinitis medicamentosa and atrophy.

3 Contraindicated with monoamine oxidase inhibitors (MAOIs), uncontrolled hypertension, and severe ischemic heart disease. Use with caution in stable hypertension, stable ischemic heart disease, diabetes mellitus, prostatic hypertrophy, glaucoma, and the elderly.

4. CAUTION: May impair psychomotor performance, often without other noticeable symptoms; patients should not drive or operate heavy machinery while taking. Avoid in elderly patients due to risk of delirium and cognitive impairment.

Table 6. Interpreting Limited Sinus CT Scan Reports

Red Flags*	Abnormal	Not Generally Concerning
• Unilateral disease	• Sinus opacification	• Small retention cysts
• Sinus expansion	• Air fluid levels (> minimal)	• Concha bullosa
• Bony erosion	• Marked mucosal thickening	• Minimal mucosal thickening
	• Polyps	

***** Indicate Need for Immediate Referral

Table 7. Alternative Diagnoses

- Allergic rhinitis
- Atypical facial pain
- Headache, migraine or tension
- Nasal drying
- Gastroesophageal reflux
- Atrophic rhinitis
- TMJ, dental pain

Diagnosis

Probability estimation. The probability of acute bacterial rhinosinusitis can be estimated based on history and physical exam. Williams, et al. (1992) studied VA general medicine patients suspected of having rhinosinusitis. The signs and symptoms found most likely to predict rhinosinusitis are given in Tables 1 and 3. The physician's overall clinical impression was better than any single historical or examination finding. Other predictors include unilateral facial pain, pain with bending, and mildly

elevated sedimentation rate. Findings demonstrating little predictive value, however, included headache, difficulty sleeping, sore throat, sneezing, malaise, itchy eyes, fever, chills or sweats, and painful chewing. Transillumination was found by Williams, et al. (1992) to be among the 5 best predictors of rhinosinusitis. Many other studies have not found it to be helpful. Perform transillumination in a completely darkened room, using an extremely bright light (e.g., Welch-Allyn Finnoff transilluminator or MagLite® flashlight). Penlights and otoscopes are inadequate to transilluminate bone. For the maxillary sinuses, place the light source over the infraorbital ridge and judge light transmission through the hard palate by looking into the patient's mouth, comparing side to side. For the frontal sinuses, place the light source into the superior portion of the orbit (some patients find this too painful). Interpretation of the frontal sinuses may be difficult because they naturally develop asymmetrically. You will be using a bright light, so obviously you must take great care to avoid burning the patient. Findings are normal (typical light transmission), dull (reduced light transmission), or opaque (no light transmission).

Temporality of symptoms has some predictive value. Although fewer than 5 in 1,000 colds are followed by bacterial rhinosinusitis, upper respiratory tract symptoms that persist longer than 10 days or worsen after 5 to 7 days are a moderately sensitive but not specific predictor of acute bacterial rhinosinusitis superimposed on a viral illness *[D*]*. Nasal drainage associated with an uncomplicated rhinovirus upper respiratory tract infection can occasionally persist for 2 to 3 weeks and may be clear or discolored. A patient's report of purulent nasal drainage is a moderately sensitive (72%) but less specific (52%) symptom of acute bacterial rhinosinusitis. However, a physician's observation of purulent nasal secretion is a relatively specific (76%) but less sensitive (51%) sign.

Predisposing conditions. Some predisposing conditions are: mechanical obstruction (polyps, septal deviation, tumor, trauma, foreign body); mucosal edema (rhinitis: allergic, vasomotor, viral); rapid change in altitude or pressure; impaired ciliary motility (Kartagener's syndrome, cystic fibrosis); and immunodeficiency (HIV, immunoglobulin deficiencies).

Complications. Signs and symptoms worrisome for intracranial or intraorbital extension of infection include high fever, severe pain, worsening headache, meningeal signs, infraorbital hypesthesia, altered mental status, significant facial swelling, diplopia, ptosis, chemosis, proptosis, and pupillary or extraocular movement abnormalities.

Diagnostic imaging, limited sinus CT. If symptoms persist after appropriate medical treatment or recur more than 3 times per year, refer the patient for imaging to document the presence and extent of sinus disease. It is important to note, however, that imaging is of little value unless performed *while the patient is symptomatic*.

In most cases, the preferred method of imaging the paranasal sinuses is a limited sinus computed tomography (CT). This scan consists of eight to ten 5 mm thick cuts in the coronal plane, from the frontal to the sphenoid sinuses. It is an excellent tool for identifying patients with acute rhinosinusitis and may help differentiate patients with rhinosinusitis from those with allergic rhinitis, atypical facial pain, and other problems.

A limited (coronal plane only) sinus CT scan provides excellent imaging detail with only 50% of the radiation exposure of a full (axial and coronal planes) sinus CT scan. New low dose CT scanners are becoming available with the advantage of radiation exposure of about 10%-15% of a full sinus CT scan. At UM Health System the charge is $1,416 for any sinus CT scan (low dose, limited, or full) [June 2008].

Neither plain sinus x-rays nor magnetic resonance imaging (MRI) are recommended. Compared to plain sinus x-rays, the limited sinus CT yields a far superior definition of sinus pathology, sinus obstruction, and ostiomeatal complex disease. MRI fails to demonstrate the bony anatomy of the ostiomeatal complex and is overly sensitive to mucosal changes.

To help interpret CT scan reports, Table 6 lists "red flags" that should prompt urgent otolaryngology referral (e.g., unilateral disease, bony erosion, or sinus expansion). It also lists findings that are abnormal as well as those that are generally not concerning.

CT findings must always be correlated with clinical information. If imaging suggests no inflammatory disease, then it is unlikely that a patient's symptoms are due to rhinosinusitis. Discontinue rhinosinusitis therapy, review the history and examination, and consider alternative diagnoses, some of which are listed in Table 7.

Medical Therapy

Decision to use antibiotics. Approximately 70% of patients with acute bacterial rhinosinusitis improve within 2 weeks without antibiotics; approximately 85% improve with appropriate antibiotics. The incidence of severe complications and progression from acute to chronic rhinosinusitis is extremely low. In addition, there is no evidence that antibiotic therapy of rhinosinusitis prevents severe complications or the progression to chronic disease. For these reasons, the decision to use antibiotics in an individual patient should be influenced very little or not at all by the desire to prevent complications and/or the development of chronic rhinosinusitis.

A reasonable strategy is to assess a patient's clinical probability of rhinosinusitis (Tables 1 and 3). If symptoms, clinical probability, and comorbidities are low to moderate, use symptomatic therapies without antibiotics. If, on the other hand, symptoms are moderate to severe or worsening and clinical suspicion for bacterial rhinosinusitis is high, include antibiotics in the treatment regimen (Figure 2).

Antibiotic selection. Numerous clinical studies have compared the efficacy of various antibiotics with placebo and with other antibiotics for acute bacterial rhinosinusitis. These are reviewed in a meta-analysis (6 randomized, placebo controlled trials of about 2 weeks duration) and in a Cochrane Review (49 randomized controlled trials). Based on this data and on cost, amoxicillin (500 mg q8 hr - *not q12 hr)* and trimethoprim/sulfamethoxazole (e.g., Bactrim-DS®) are the recommended first line antibiotics (Table 4, Section A) *[A*]*. Table 4, Section B lists alternatives for patients who are unable to take amoxicillin due to allergy or other intolerance. No evidence suggests that these alternative antibiotics have superior efficacy to first line agents. Prescribe alternatives only because of allergy or intolerance to first line agents, not for antibiotic failures (see below).

A three-day course of azithromycin 500 mg daily has FDA-approval for the treatment of acute bacterial sinusitis. Azithromycin is an acceptable alternative for patients who are allergic to first line antibiotics and for whom you plan to treat for shorter (10-14 days) rather than longer (14-21 days) duration. Therapeutic tissue levels (although not serum levels) of the drug are reported to persist for 3 to 7 days after azithromycin is discontinued, thus the 3-day regimen provides an equivalent of up to 10 days of antibiotic exposure. Complex dosing is necessary for more extended treatment. In general, do <u>not</u> use azithromycin for treatment of chronic sinusitis or for treatment failure of first line antibiotics or their alternatives.

Incomplete resolution. Clinical trials indicate that approximately 15% of patients require more than two weeks to improve, regardless of the initial antibiotic. Of these patients, the majority eventually achieve resolution of their symptoms. We therefore recommend extending therapy with the same antibiotic for a total of three weeks before changing antibiotics or pursuing further evaluation with a limited sinus CT scan.

Antibiotic failures – second line antibiotics. Many of the trials of antibiotic therapy for acute bacterial rhinosinusitis predate changes increases in antimicrobial resistance. Adults with symptoms and signs that are highly suspicious for acute bacterial rhinosinusitis, who have little or no improvement with a first line antibiotic or one of the first line alternatives (Table 4, Sections A & B) may need a broader spectrum ("second line") antibiotic. Dental origin of infection, and thus need for anaerobic antimicrobial coverage, may be a factor in some cases. Depending upon recent (within 4-6 weeks) antibiotic exposure and antimicrobial resistance patterns in your area, consider coverage for resistant *Streptococcus pneumoniae*, *Haemophilus influenzae,* and/or *Moraxella catarrhalis*. There are little if any data regarding risk factors for rhinosinusitis due to penicillin resistant *S. pneumoniae.* For community acquired pneumonia, major risk factors for penicillin resistant *S. pneumoniae* are: antibiotics (especially β-lactam) within 3 months; age greater than 65 years; alcoholism; and immunocompromise.

Due to risk for emergence of antibiotic resistance, use fluoroquinolone antibiotics only after treatment failure with a first line antibiotic (or in the case of allergy to all first-line antibiotics). Ciprofloxacin [Cipro®] is not recommended as a second line antibiotic for acute bacterial rhinosinusitis because it, as well as other "first generation" fluoroquinolones, has limited activity against *S. pneumoniae.* In contrast, levofloxacin [Levaquin®] (and several other newer fluoroquinolones) has better activity against *S. pneumoniae,* making it an option among second line antibiotics. *Flouoroquinolones increase the risk of tendon rupture in those over age 60, in kidney, heart, and lung transplant recipients, and with use of concomitant steroid therapy.* [Text in italics added 10/8/08]

Antibiotics options for treatment failures include (Table 4, Section C):

- Amoxicillin, high dose, 875-1000 mg q8 hr
  - OK for many resistant *S. pneumoniae*
  - Less likely to cover *H. influenzae* or *M. catarrhalis*
- Amoxicillin/clavulanic acid
  - Usual dose, 875/125 q12 hr or
  - High dose, XR 2000/125 q12 hr
- Levofloxacin 500 mg daily

Antibiotics that should not be used for acute bacterial rhinosinusitis include:

- Ciprofloxacin has limited activity against resistant Strep and is thus potentially ineffective.
- Telithromycin, as of February 2007, no longer carries FDA approval for acute bacterial rhinosinusitis. The risks for hepatotoxicity, loss of consciousness, and visual disturbances appear to outweigh potential benefits for this indication.

Adjuvant therapies. Adjuvant therapies are listed in Table 5. There are little data regarding the use of ancillary therapies for acute rhinosinusitis. Some studies support the use of adjuvant medications, but many contradict one another or show only minimal, if any, improvement in symptoms. Thus, while adjuvant therapies may improve symptoms of rhinosinusitis and colds, they have not been shown to change the course of the disease (except possibly zinc lozenges). Nevertheless, because adjuvant therapies tend to be inexpensive and have few side effects, use based on the clinician's individual judgment may be justified.

Medications likely to be effective in treating symptoms. <u>Decongestants</u> may decrease nasal congestion; expert opinion suggests that they may improve drainage. <u>Oral decongestants</u> may be used until symptoms resolve. Although they have not been found to affect blood pressure significantly in patients with *stable* hypertension, oral decongestants should be used with caution in patients with hypertension, ischemic heart disease, glaucoma, prostatic hypertrophy, or diabetes mellitus. Oral decongestants are contraindicated in patients using monoamine oxidase inhibitors (MAOIs) or having uncontrolled hypertension or severe coronary artery disease. In addition, geriatric patients may be more sensitive to the side effects of oral decongestants. <u>Topical decongestant</u> use should be limited

to 3 days due to the risk of rebound vasodilation (*rhinitis medicamentosa)* or atrophic rhinitis.

Anticholinergics may be used as adjunct therapy to decrease the production of mucus and diminish rhinorrhea for patients. Both topical medications and oral preparations (usually first-generation antihistamines) have been shown to be effective. While it is plausible that thickening of the mucus could impair its clearance from the sinuses (thereby possibly perpetuating the acute infection or leading to chronic rhinosinusitis), this phenomenon has not been documented despite numerous clinical trials with anticholinergic medications. This may be effective for symptom relief. Note that antihistamines may impair psychomotor performance often without sedation or other noticeable symptoms. Patients should not drive or operate heavy machinery while using them. Also, avoid use in elderly patients (> 65-70 years of age) due to risk of delirium and cognitive decline. Because the therapeutic effect of the antihistamines is due to their anticholinergic properties, newer, less-sedating antihistamines are less likely to be effective for diminishing rhinorrhea (unless there is a component of allergic rhinitis occurring concomitantly).

Medications likely to be effective in acute rhinosinusitis for persons with a history of chronic or recurrent sinusitis. For recurrent acute rhinosinusitis or acute rhinosinusitis superimposed on chronic rhinosinusitis, recent controlled trials have shown that the duration and severity of symptoms of acute rhinosinusitis are significantly reduced when high dose nasal steroid spray is added to antibiotic therapy. For example, in one trial, cefuroxime x 10 days (250 mg q12 hrs) plus intranasal fluticasone x 21 days (equivalent to 4 sprays each nostril q12 hr) vs. cefuroxime plus placebo spray had higher rate of clinical success (93.5% vs. 73.9%; P=.009) and more rapid improvement (median to "clinical success" 6.0 vs. 9.5 days; P=.01) *[A*]*.

Medications possibly effective in treating symptoms. Vitamin C and zinc gluconate lozenges have been shown in some studies to provide more prompt resolution of symptoms in upper respiratory infections. Other studies have refuted these claims. Echinacea extract has demonstrated a trend toward symptom improvement. While the evidence for these agents is not clear, their side-effect profile is relatively benign. Nasal saline irrigation either isotonic or hypertonic, may improve symptoms.

Medications with no proven benefit / not studied in treating symptoms. Expectorants, such as guaifenesin, thin secretions and thus theoretically improve mucus clearance. There is no clear data to support or refute this theory. Nasal saline spray, local heat, and inhaled steam may soften secretions and provide symptomatic relief, but again, little objective evidence exists regarding their use. Oral corticosteroids similarly have no proven benefit though in theory they may decrease mucosal inflammation and re-establish mucus clearance. The significant side effects of systemic steroids must be weighed against any theoretical benefit.

Otolaryngology Referral and Surgical Alternatives

Otolaryngology Referral. A patient who has failed appropriate medical therapy for acute rhinosinusitis and who has evidence of inflammatory disease on limited sinus CT should be referred for otolaryngology evaluation. Consultation is also appropriate for a patient with more than 3 episodes per year of acute rhinosinusitis and evidence of inflammatory disease on CT. Finally, consider urgent referral for a patient who has worrisome symptoms after 24 - 72 hours of antibiotic therapy, especially if the patient has been taking broad-spectrum antibiotics.

Otolaryngology evaluation. An otolaryngology evaluation will almost always include nasal endoscopy. If rhinosinusitis is confirmed, a detailed CT scan may be requested to identify the extent of sinus disease and to visualize bony detail.

Surgical alternatives. Surgery for acute rhinosinusitis is reserved for patients with threatened intraorbital or intracranial complications, for those who fail to respond to oral and parenteral antibiotics, and for some immunocompromised patients. For less urgent surgical intervention potential indications include persistent rhinosinusitis despite appropriate medical therapy and documented recurrent rhinosinusitis with identifiable and related anatomical or acute pathological abnormalities in the ostiomeatal complex. In limited studies, the reported success of endoscopic sinus surgery has been favorable with an expectation of benefit for 80% to 90% of patients. Possible complications mirror those of traditional sinus surgery. Major complications are rare, but include hemorrhage, cerebrospinal fluid leakage, intracranial trauma, blindness, and visual disturbances. Minor complications include periorbital hematoma, subcutaneous orbital emphysema, epiphora, synechiae, and natural ostia closure.

Strategy for Literature Search

The literature search for this update began with the results of the literature searches performed in 1996 to develop the initial guideline and in 1998 for an update. The literature search conducted in 2004 for this update was conducted prospectively on Medline using the major keywords of: acute rhinitis, rhinosinusitis, sinusitis; consensus development conferences, practice guidelines, guidelines, outcomes and process assessment (health care); clinical trials, controlled clinical trials, multicenter studies, randomized controlled trials, cohort studies; adults; English language; and published between 7/1/99 and 4/30/04. Terms used for specific topic searches within major key words included: history; physical exam, signs, symptoms, predictors; computed tomography, magnetic resonance imaging, x-ray, ultrasound; sinus aspiration; nasal culture; diagnosis not included above; observation, saline, steam, postural drainage, salt water gargle; decongestants; cough suppressants; antihistamines, antibiotics; guaifenesin; corticosteroids; zinc, vitamin C; ipratropium; capsaicin, Echinacea, treatment failure, recurrence, persistent;

immunocompromised, immunosuppressed, transplant; treatment or management not included above. Specific search strategy available upon request.

The search was conducted in components each keyed to a specific causal link in a formal problem structure. The search was supplemented with very recent clinical trials known to expert members of the panel. Negative trials were specifically sought. The search was a single cycle. When possible, conclusions were based on prospective randomized clinical trials. In the absence of randomized controlled trials, observational studies were considered. If none were available, expert opinion was used.

Related National Guidelines

The UMHHC Clinical Guideline on Rhinosinusitis is consistent with *Diagnosis and Treatment of Acute Bacterial Sinusitis* (1999), an evidence report published by the Agency for Health Care Policy and Research; with "Antibiotics for acute maxillary sinusitis" (2003), published by the Cochrane Database of Systematic Reviews, and with "Antimicrobial treatment guidelines for acute bacterial rhinosinusitis" (2004), developed by the Sinus and Allergy Health Partnership. (See "Annotated References" below.)

Disclosures

The University of Michigan Health System endorses the Guidelines of the Association of American Medical Colleges and the Standards of the Accreditation Council for Continuing Medical Education that the individuals who present educational activities disclose significant relationships with commercial companies whose products or services are discussed. Disclosure of a relationship is not intended to suggest bias in the information presented, but is made to provide readers with information that might be of potential importance to their evaluation of the information.

Team Member	Company	Relationship
Jane T. McCort, MD	(none)	
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Annotated References

For general information:

Sinus and Allergy Health Partnership. Antimicrobial treatment guidelines for acute bacterial rhinosinusitis. Otolaryngol Head Neck Surgery. 2004;130(1 Suppl):1-45.

Summary of pharmacokinetics and pharmacodynamics and how they relate to the effectiveness of antimicrobial therapy. These updated guidelines include most recent management principles, antimicrobial susceptibility patterns, and therapeutic options.

Williams Jr JW, Aguilar C, Cornell J, et al. Antibiotics for acute maxillary sinusitis (Cochrane Review). In: The Cochrane Library, Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.

A review of randomized trials of antibiotics for acute maxillary sinusitis (49 studies met inclusion criteria) found no significant differences in comparisons between classes of antibiotics. Authors conclude that "current evidence is limited but supports use of penicillin or amoxicillin for 7 to 14 days."

Lau J, Zucker D, Engels EA, Balk E, et al. Diagnosis and treatment of acute bacterial rhinosinusitis. Evidence Report/Technology Assessment No. 9 (Contract 290-97-0019 to the New England Medical Center). Rockville, MD: Agency for Health Care Policy and Research. March 1999.

Summary of published evidence (1966 - May 1998) on diagnosis and treatment of community-acquired acute bacterial rhinosinusitis in adults & children. Includes 6 RCTs of any antibiotic vs. placebo.

Selected issues:

Dolor RJ, Witsell DL, Hellkamp AS, et al. Comparison of cefuroxime with or without intranasal fluticasone for the treatment of rhinosinusitis. The CAFFS trial: A randomized controlled trial. JAMA. 2001;286:3097-150.

For patients with acute rhinosinusitis *and* a history of chronic or recurrent sinusitis, cefuroxime plus intranasal corticosteroids (at relatively high dose x 21 days) had significantly higher rate of clinical success and faster rate of improvement than cefuroxime plus placebo spray.

Jackson, et al. A Meta-Analysis of Zinc Salts Lozenges and the Common Cold. Arch Internal Med. 1997;157:2373-2376.

Meta-analysis of 6 trials assessing effectiveness of zinc on cold symptoms.

Williams JW Jr, Simel DL, Roberts L, Samsa GP. Clinical evaluation for sinusitis: making the diagnosis by history and physical examination. Ann Intern Med 1992;117:705-710.

Prospective study of VA general medicine patients that compared clinical findings with plain sinus radiographs in diagnosis of sinusitis.