



Acute Rhinosinusitis in Adults

**Rhinosinusitis
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These guidelines should not be construed as including all proper methods of care or excluding other acceptable methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific clinical procedure or treatment must be made by the physician in light of the circumstances presented by the patient.

Patient population: Non-immunocompromised 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 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. Many therapies are useful for the spectrum of viral to bacterial rhinosinusitis, but antibiotics are reserved for bacterial rhinosinusitis.
- **Treatment:** Antibiotic treatment for a patient suspected of having acute bacterial rhinosinusitis is best decided by weighing potential benefits against risks. Benefits depend on the probability of bacterial rhinosinusitis and the severity of symptoms. Antibiotic therapy has not been shown to decrease complications or the rate of progression to chronic rhinosinusitis. [evidence: A* {limited by power to detect outcomes}]. Risks of treating with antibiotics include severe allergic reaction, potential antibiotic side effects, and bacterial resistance.
- Trimethoprim/sulfamethoxazole and amoxicillin have been demonstrated to be superior to placebo in patients with acute rhinosinusitis [A*]. Numerous antibiotics have been compared to these agents and none have been shown superior. Trimethoprim/sulfamethoxazole and amoxicillin therefore remain the agents of choice.
- Little data exist regarding ancillary therapies for acute rhinosinusitis. Some studies examining treatments for viral upper respiratory infections have shown:
 - Efficacy in symptom control: decongestants and anticholinergics, including “first-generation” antihistamines [A*].
 - Possible efficacy: zinc gluconate lozenges, vitamin C, nasal corticosteroids, and Echinacea extract [conflicting or insufficient data].
 - No significant benefit: guaifenesin (except possibly at high dose), saline spray or irrigation, steam, “non-sedating” antihistamines.
- Follow-up. If symptoms of rhinosinusitis persist for more than three weeks on antibiotics or recur more than three times per year, a limited sinus CT scan (coronal plane) should be performed while the patient is symptomatic to reassess diagnosis and determine need for referral [C, D*]. A limited sinus CT (\$200) of a symptomatic patient provides adequate information compared to a full sinus CT scan/maxillofacial CT (\$801) and provides much better definition than a plain sinus x-ray series (\$204). Plain sinus x-rays are, therefore, not recommended.

* 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

Clinical Background

**Clinical Problem and
Management Issues**

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

Incidence. Rhinosinusitis is one of the most common reasons for an office visit in the United States, accounting for up to 5% of visits to primary care physicians.

Diagnosis. The probability of acute bacterial rhinosinusitis can be estimated as low, moderate, or high based on history and physical exam. A number of signs and symptoms have been reported by various authors to correlate with acute rhinosinusitis. In one study, however, the physician’s overall clinical impression was better than any single symptom or sign for predicting rhinosinusitis.

(continued on page 4)

Figure 1. Diagnosis of Acute Rhinosinusitis

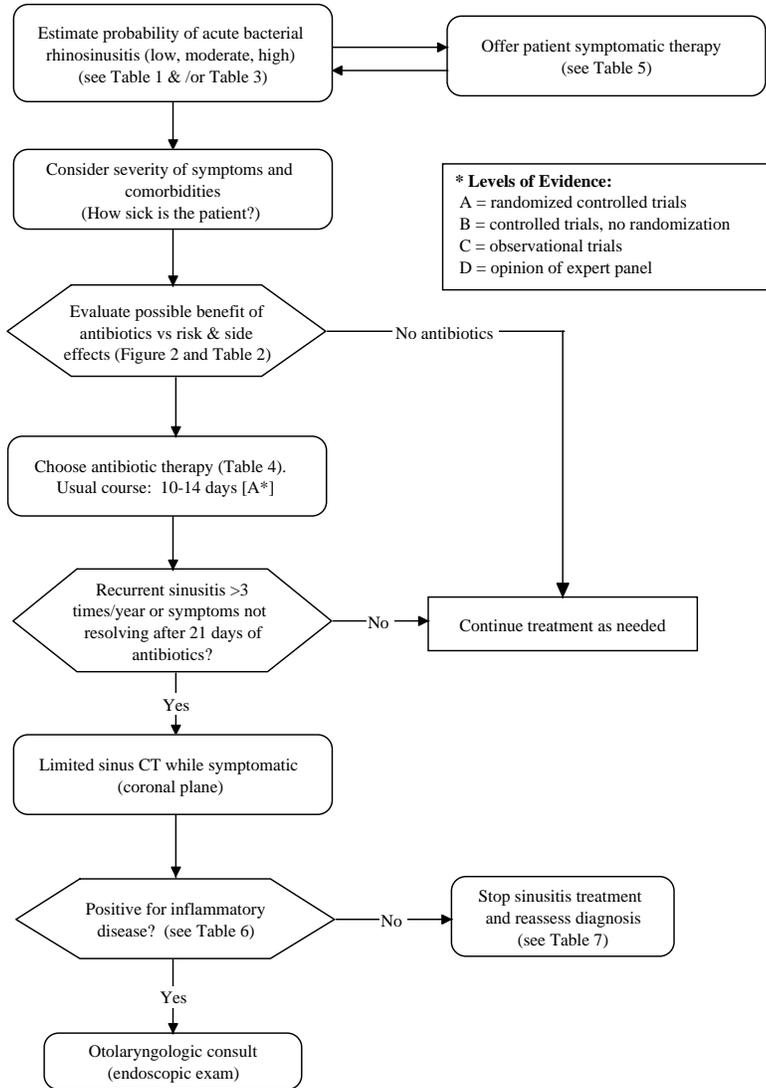


Figure 2: Antibiotic Treatment in Patients Suspected of Acute Bacterial Rhinosinusitis

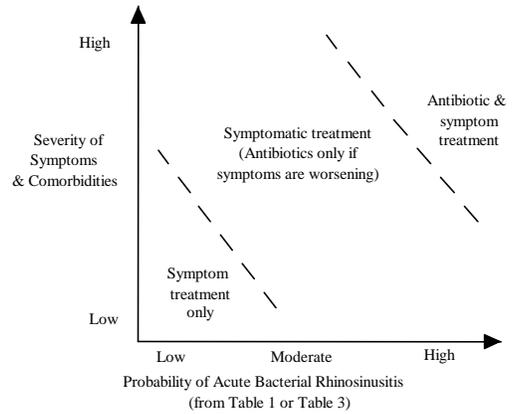


Table 1. Diagnosis of Acute Rhinosinusitis*

Best Predictors of Rhinosinusitis:

- 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

- ~ 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

A reasonable strategy for many patients is to treat symptomatically and recommend antibiotics only if symptoms worsen.

Table 3. Performance Characteristics of Signs and Symptoms for 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 Treatment for Acute Rhinosinusitis (10-14 day usual course) [UMHS Preferred Agents **Bold**]

Drug	Dose	Cost*
<u>First Line Antibiotics</u>		
Amoxicillin (<i>Amoxil</i> ®, <i>Polymox</i> ®)	500 mg q8 hr	\$7-8 gen
Trimethoprim/sulfamethoxazole (<i>Bactrim-DS</i> ®, <i>Septra-DS</i> ®)	160 mg/800 mg q12 hr	\$5-6 gen
<u>Alternative Antibiotics</u>		
Azithromycin (<i>Zithromax</i> ®)	500 mg q day x 3 days**	\$43
Loracarbef (<i>Lorabid</i> ®)	200-400 mg q12 hr	\$82-161
Clarithromycin (<i>Biaxin</i> ®)	500 mg q12 hr	\$81-114
Cefuroxime axetil (<i>Ceftin</i> ®)	250-500 mg q12 hr	\$86-156 gen
Ciprofloxacin (<i>Cipro</i> ®)	500 mg q12 hr	\$103-150
Amoxicillin/clavulanate potassium (<i>Augmentin</i> ®) generic preferred	875 mg/125 mg q12 hr	\$79-109 gen
Levofloxacin (<i>Levaquin</i> ®)	500 mg daily	\$95-133

* Cost = Average wholesale price based -10% for brand products and Maximum Allowable Cost (MAC) + \$3 for generics on 30-day supply, *Amerisource Bergen item Catalog 1/04 & Blue Cross Blue Shield of Michigan Mac List, 4/7/04.*

** FDA approved for 3 days rather than usual 5 day course.

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

Drug	Dose	Cost
<u>Likely to be effective in treating symptoms:</u>		
Decongestants ¹		
Oral ²		
Pseudoephedrine (<i>Sudafed</i> ®)	60 mg q6 hr or sustained release 120 mg q12 hr	\$6 gen
Topical ³		
Oxymetazoline 0.05% (<i>Afrin</i> ®)	2 sprays each nostril q12 hr maximum 3 days	\$4 gen
Anticholinergics		
Topical:		
Ipratropium 0.03 or 0.06% (<i>Atrovent</i> ®)	2 sprays each nostril q12 hr-q6 hr	\$36-31 gen
Antihistamines: Warning: can impair psychomotor performance		
Oral (all available as over-the-counter)		
Brompheniramine (<i>Dimetane</i> ®)	NA	NA
Chlorpheniramine (<i>Chlor-Trimeton</i> ®)	4 mg q4-6 hr or sustained release 8-12 mg q12 hr	\$10 gen
Clemastine (<i>Tavist</i> ®)	1.34 mg q12 hr	\$8 gen
Diphenhydramine (<i>Benadryl</i> ®)	25-50 mg q6 hr	\$6gen
Loratadine (<i>Claritin</i> ®, <i>Alavert</i> ®)	10 mg daily	\$8 gen
<u>Possibly effective in treating symptoms:</u>		
Zinc gluconate lozenges	1 lozenge q2h while awake	\$6 gen
Vitamin C	2-3g/day in divided doses	\$10 gen
Echinacea extract	Varies by preparation	
Nasal corticosteroids		
<u>No proven benefit / not studied in controlling symptoms:</u>		
Steam		
Saline spray		
Saline irrigation		
“Less-sedating” antihistamines		
Guaifenesin (except possibly at high dose)		

1 Many preparations combine decongestants and antihistamines.

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

3 Do not use for more than three consecutive days to prevent rhinitis medicamentosa and atrophy.

Table 6. Interpreting Limited Sinus CT Scan Reports:		
Red Flags Indicating Need for Immediate Referral: <ul style="list-style-type: none"> • Unilateral disease • Sinus expansion • Bony erosion 	Abnormal: <ul style="list-style-type: none"> • Sinus opacification • Air fluid levels (greater than minimal) • Marked mucosal thickening • Polyps 	Not Generally Clinically Concerning: <ul style="list-style-type: none"> • Small retention cysts • Concha bullosa • Minimal mucosal thickening

Table 7. Alternative Diagnoses
<ul style="list-style-type: none"> • Allergic rhinitis • Atypical facial pain • Headaches, migraine or tension • Nasal drying • Gastroesophageal reflux • Atrophic rhinitis • TMJ, dental pain

Clinical Problem and Management Issues (continued)

Medical therapy. Symptoms of rhinosinusitis can last well over two weeks with or without antibiotic treatment. If symptoms last more than three or four weeks, further evaluation is warranted. Expensive antibiotics are often prescribed when equally effective and less expensive alternatives are available.

Imaging. Advances in sinus-computed tomography (CT) have enhanced the assessment of sinus anatomy and disease. Limited sinus CT is recommended for patients with persistent or recurrent symptoms. Limited sinus CT is similar in cost to plain sinus x-rays (~\$200) and more informative.

Referral. Patients should be referred for otolaryngology evaluation only after medical therapy has failed and appropriate diagnostic imaging verifying rhinosinusitis has been obtained.

Rationale for Recommendations

Causes. Acute rhinosinusitis is primarily an infectious disease. Symptoms resolve completely with medical treatment in nearly 90% of cases. The most commonly reported agents are *Streptococcus pneumoniae* (~30%), *Haemophilus influenzae* (~20%), and viruses (~20%). Other organisms include *Staphylococcus aureus* (~4%), anaerobes (~7%), other *Streptococcus* and *Haemophilus* species (~8%), and miscellaneous gram negatives, including *Moraxella catarrhalis* (~10%). 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.

Diagnosis. 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. Clinical findings demonstrating little predictive value 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. Transillumination must be performed 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).

Other studies have found that preceding cold, unilateral facial pain, pain with bending, and mildly elevated sedimentation rate are predictive of rhinosinusitis. Although acute rhinosinusitis is frequently preceded by a "cold," less than 0.5% of colds are followed by bacterial rhinosinusitis.

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).

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.

Medical therapy. 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).

Numerous clinical studies have compared the efficacy of various antibiotics for acute bacterial rhinosinusitis. Based on a meta-analysis (6 randomized, placebo controlled trials of about 2 weeks duration) and on cost (Table 4) the recommended first line antibiotics are amoxicillin and trimethoprim/sulfamethoxazole (e.g., Bactrim-DS®). There is no evidence that the suggested alternative antibiotics have superior efficacy to first line agents. Prescribe alternatives only because of allergy or intolerance to first line agents.

A three-day course of azithromycin 500 mg q day was FDA-approved in January 2004 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 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 5-day regimen provides an equivalent of 8-12 days of treatment. Complex dosing is necessary for more extended treatment. Do not use azithromycin for treatment of chronic sinusitis.

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 antibiotic therapy for a total of three weeks before pursuing further evaluation with a limited sinus CT scan. The original antibiotic may be continued or a different antibiotic may be chosen.

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: Decongestants can be used to decrease nasal congestion; expert opinion suggests that they may improve drainage. Oral decongestants 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. Use of topical agents 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 who complain of profuse rhinorrhea. 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. 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 possibly effective in treating symptoms: Vitamin C and zinc gluconate lozenges have been shown in some studies to lead to 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 corticosteroid sprays are a mainstay in the treatment of *chronic* rhinosinusitis, but have limited proven benefit in the treatment of acute rhinosinusitis.

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 though, 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 their theoretical benefit.

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.

Diagnostic imaging, limited sinus CT. When symptoms persist after appropriate medical treatment or recur more than 3 times per year, the patient should be referred for imaging to document 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. Compared to plain sinus x-rays, the limited sinus CT yields a far superior definition of sinus pathology, sinus obstruction, and ostiomeatal complex disease. 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. Magnetic resonance imaging (MRI) is not recommended for rhinosinusitis because it fails to demonstrate the bony anatomy of the ostiomeatal complex and is overly sensitive to mucosal changes.

A limited sinus CT (\$200) is the preferred option for imaging. It is considerably less expensive than a full axial and coronal sinus CT scan (\$801) and similar in cost to a plain sinus x-ray series (\$204). The limited sinus CT provides adequate information for the screening but gives more detailed and accurate information about sinus pathology than do plain films. [UMHHC charges, August 1999.]

To help interpret CT scan reports, Table 6 lists “red flags” that should prompt urgent otolaryngology referral (i.e., 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.

Otolaryngology consultation. 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, urgent referral should be considered 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 and Surgical Alternatives

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

Surgical alternatives. Potential indications for surgical intervention 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 original literature search for this project (1996) was conducted prospectively using the major keywords of: *rhinosinusitis, MRI, CT, radiographs, medical therapy randomized controlled trials, controlled trials, observational trial, meta analysis* on Medline. An updated search added publications from 1996 through December 1998. 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 Agency for Health Care Policy and Research *Evidence Report on Diagnosis and Treatment of Acute Sinusitis* (1998). (See “Annotated References” below.)

Disclosures

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