

EXECUTIVE SUMMARY

Clinical practice guideline on adult sinusitis

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This executive summary will alert clinicians to key evidence-based statements in a multidisciplinary, clinical practice guideline on adult sinusitis developed by the American Academy of Otolaryngology–Head and Neck Surgery Foundation. Included in the guideline are 17 boldfaced action statements: 3 on viral rhinosinusitis, 7 on acute bacterial rhinosinusitis, and 7 on chronic rhinosinusitis and recurrent acute rhinosinusitis. Evidence profiles that accompany each statement are summarized to show why it was made and how it can be implemented. Guideline statements regarding acute rhinosinusitis focus on diagnosing presumed bacterial illness and using antibiotics appropriately. Guideline statements regarding chronic rhinosinusitis or recurrent acute rhinosinusitis focus on appropriate use of diagnostic tests. Surgical therapy is not discussed.

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Sinusitis affects 1 in 7 adults in the United States, resulting in diagnosis of 31 million individuals each year.¹ The direct annual health care cost of \$5.8 billion stems mainly from ambulatory and emergency department services,² but also includes 500,000 surgical procedures performed on the paranasal sinuses.³ Despite the high prevalence and economic impact of sinusitis, considerable practice variations exist across and within the multiple disciplines involved in managing the condition. These variations prompted the American Academy of Otolaryngology–Head and Neck Surgery Foundation to develop the clinical practice guideline that is the basis for this executive summary.⁴

The target patient for the guideline is aged 18 years or older with a clinical diagnosis of uncomplicated rhinosinusitis:

- *Rhinosinusitis* is defined as symptomatic inflammation of the paranasal sinuses and nasal cavity. The term *rhinosinusitis* is preferred because sinusitis is almost always accompanied by inflammation of the contiguous nasal mucosa.⁵⁻⁷ Therefore, *rhinosinusitis* is used instead of *sinusitis* in the remainder of the executive summary.
- *Uncomplicated rhinosinusitis* is defined as rhinosinusitis without clinically evident extension of inflammation outside the paranasal sinuses and nasal cavity at the time of diagnosis (e.g., no neurological, ophthalmological, or soft tissue involvement).

Rhinosinusitis may be further classified by duration as *acute* (less than 4 weeks), *subacute* (4-12 weeks), or *chronic* (more than 12 weeks, with or without acute exacerbations). Acute rhinosinusitis may be classified further by symptom

pattern into *acute bacterial rhinosinusitis* (ABRS) or *viral rhinosinusitis* (VRS). When there are 4 or more acute episodes per year of ABRS, without persistent symptoms between episodes, the condition is termed *recurrent acute* rhinosinusitis.

Most acute rhinosinusitis begins when a viral upper respiratory infection (URI) extends into the paranasal sinuses, which may be followed by bacterial infection. About 20 million cases of ABRS occur annually in the United States,⁸ rendering it one of the most common conditions encountered by primary care clinicians. The importance of ABRS relates not only to prevalence, but also to the potential for rare but serious sequelae that include meningitis, brain abscess, orbital cellulitis, and orbital abscess.^{9,10}

Chronic rhinosinusitis (CRS) is one of the most common chronic diseases, with prevalence as high or higher than many other chronic conditions such as allergy and asthma. According to The National Health Interview Survey, CRS affects 14 percent to 16 percent of the U.S. population.^{11,12} Patients with CRS have a substantial negative health impact owing to their disease, which adversely affects mood, physical functioning, and social functioning.^{13,14} Patients with CRS referred to otolaryngologists score significantly lower on measures of bodily pain and social functioning than do those with angina, back pain, congestive heart failure, and chronic obstructive pulmonary disease.¹⁵

HOW THE GUIDELINE WAS DEVELOPED

The guideline was developed by using an explicit and transparent a priori protocol for creating actionable statements on the basis of supporting evidence and the associated balance of benefit and harm.¹⁶ Key aspects of the protocol include systematic literature review, focus on a limited number of key statements, explicit linkage of evidence to statement strength, external review for implementability, and extensive prepublication comment and feedback. The multidisciplinary guideline development panel represented the fields of allergy, emergency medicine, family medicine, health insurance, immunology, infectious disease, internal medicine, medical informatics, nursing, otolaryngology–head and neck surgery, and radiology.

At the heart of the guideline are 17 evidence-based statements (Table 1) with an associated level of statement strength (Table 2). Several paragraphs then discuss the evidence base supporting the statement, concluding with an “evidence profile” of aggregate

Table 1
Outline of evidence-based statements

Clinical condition (<i>evidence-based statement number</i>)	Statement strength*
I. Presumed viral rhinosinusitis (VRS)	
a. Diagnosis (<i>statement #1a</i>)	Strong recommendation
b. Radiographic imaging (<i>statement #1b</i>)	Recommendation against
c. Symptomatic relief (<i>statement #2</i>)	Option
II. Presumed acute bacterial rhinosinusitis (ABRS)	
a. Diagnosis (<i>statement #1a</i>)	Strong recommendation
b. Radiographic imaging (<i>statement #1b</i>)	Recommendation against
c. Initial management	
i. Pain assessment (<i>statement #3a</i>)	Strong recommendation
ii. Symptomatic relief (<i>statement #3b</i>)	Option
iii. Watchful waiting (<i>statement #4</i>)	Option
iv. Antibiotic selection (<i>statement #5</i>)	Recommendation
d. Treatment failure (<i>statement #6</i>)	Recommendation
III. Subacute sinusitis (no statements)	
IV. Chronic rhinosinusitis (CRS) and recurrent acute rhinosinusitis	
a. Diagnosis (<i>statement #7a</i>)	Recommendation
b. Modifying factors (<i>statement #7b</i>)	Recommendation
c. Diagnostic testing (<i>statement #8a</i>)	Recommendation
i. Nasal endoscopy (<i>statement #8b</i>)	Option
ii. Radiographic imaging (<i>statement #8c</i>)	Recommendation
iii. Testing for allergy and immune function (<i>statement #8d</i>)	Option
d. Prevention (<i>statement #9</i>)	Recommendation

*See Table 2 for definitions.

evidence quality, benefit-harm assessment, and statement of costs. Lastly, there is an explicit statement of the value judgments, the role of patient preferences, and a repeat statement of the strength of the recommendation. This executive summary will focus on the evidence profiles for each statement, with very limited commentary on supporting text.

The role of patient preference in making decisions deserves further clarification. For some statements the evidence base demonstrates clear benefit, which would minimize the role of patient preference. If the evidence is weak or benefits are unclear, however, not all *informed* patients might opt to follow the suggestion. In these cases, the practice of *shared decision making*, in which the management decision is made by a collaborative effort between the clinician and the informed patient, becomes more useful.

GUIDELINE STATEMENTS FOR PRESUMED VIRAL RHINOSINUSITIS (TABLE 3)

Acute rhinosinusitis is diagnosed as up to 4 weeks of purulent (not clear) nasal drainage accompanied by nasal obstruction, facial pain-pressure-fullness, or both. When this symptom complex is present, the clinician should distinguish between viral rhinosinusitis (VRS) and presumed ABRS.^{7,8,17,18} This distinction is based on illness pattern and duration (Table 4), because purulent nasal drainage as a sole criterion cannot distinguish between viral and bacterial infection.¹⁹

Only about 0.5 percent to 2.0 percent of VRS episodes are complicated by bacterial infection.²⁰ In the first 3 to 4

days of illness, VRS cannot be differentiated from an early-onset ABRS; for that reason only patients with unusually severe presentations or extrasinus manifestations of infection are presumed to have a bacterial illness. Similarly, between 5 and 10 days of persistent symptoms are consistent with VRS or may represent the beginning stages of ABRS; however, initial improvement followed by worsening (“double sickening”) is consistent with ABRS.^{7,21,22} Beyond 10 days the probability of confirming a bacterial infection by sinus aspiration is about 60 percent.²³

Radiographic imaging of the paranasal sinuses is *unnecessary* for diagnosis in patients who already meet clinical diagnostic criteria (Table 4) for acute rhinosinusitis.^{24,25} Sinus involvement is common in documented viral URIs,²⁶ making it impossible to distinguish ABRS from VRS solely on the basis of imaging studies. Moreover, clinical criteria may have a comparable diagnostic accuracy to sinus radiography, and radiography is not cost-effective regardless of baseline sinusitis prevalence.²⁷

When a complication of acute rhinosinusitis or an alternative diagnosis is suspected, imaging studies may be obtained. Complications of ABRS include orbital, intracranial, or soft tissue involvement. Alternative diagnoses include malignancy and other noninfectious causes of facial pain. Radiographic imaging may also be obtained when the patient has modifying factors or comorbidities that predispose to complications, including diabetes, immune-compromised state, or a past history of facial trauma or surgery.

VRS is a self-limited disease characterized by cough, sneezing, rhinorrhea, sore throat, and nasal congestion.²⁸

Table 2
Guideline definitions for evidence-based statements

Statement	Definition	Implication
Strong recommendation	A strong recommendation means that the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation) and that the quality of the supporting evidence is excellent.	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation means that the benefits exceed the harms (or that the harms exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong.	Clinicians should also generally follow a recommendation, but should remain alert to new information and sensitive to patient preferences.
Option	An option means that either the quality of evidence that exists is suspect or that well-done studies show little clear advantage of one approach versus another.	Clinicians should be flexible in their decision making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role
No recommendation	No recommendation means that there are both a lack of pertinent evidence and an unclear balance between benefits and harms.	Clinicians should feel little constraint in their decision making and be alert to new published evidence that clarifies the balance of benefit versus harm; patient preference should have a substantial influencing role

Antibiotics are not recommend because they are ineffective for viral illness and do not relieve symptoms directly.²⁹ Sputum color should not be used to assess the need for antibiotic therapy because color is related to presence of neutrophils, not bacteria. Because neutrophils often appear in the nasal discharge of patients with VRS,^{19,30-32} sputum may be clear, cloudy, or colored.

Management of VRS is primarily symptomatic, with an analgesic or antipyretic provided for pain or fever, respectively. Topical or systemic decongestants may offer additional symptomatic relief, but their ability to prevent ABRS from developing is unproved. Systemic steroid therapy has not been shown effective for VRS, and weak evidence supports using topical nasal steroids.³³ Antihistamine therapy has been used to treat VRS because of a drying effect, but no studies have been published that assess the impact of antihistamines specifically on VRS outcomes.

GUIDELINE STATEMENTS FOR PRESUMED ACUTE BACTERIAL RHINOSINUSITIS (TABLE 5)

Pain relief is a major goal in managing ABRS and often the main reason that patients with this condition seek health care.^{34,35} Frequent use of analgesics is often necessary to permit patients to achieve comfort and rest, and to resume normal activities. Mild to moderate pain usually responds to

acetaminophen or nonsteroidal anti-inflammatory drugs given alone or in fixed combination with an opioid (eg, acetaminophen with codeine, oxycodone, or hydrocodone; ibuprofen with oxycodone). Convenience, ease of use, and cost make orally administered analgesics the preferred route of administration whenever possible.

Adjunctive treatments for rhinosinusitis that may aid in symptomatic relief include decongestants (alpha-adrenergic), corticosteroids, saline irrigation, and mucolytics. None of these products has been specifically approved by the Food and Drug Administration for use in acute rhinosinusitis (as of February 2007), and few have data from controlled clinical studies supporting this use. Moreover, existing trials often include cointerventions and a heterogeneous population of patients with viral, recurrent bacterial, chronic, and allergic rhinosinusitis. Nonetheless, clinicians may wish to consider adjuvant therapy for ABRS on an individualized basis (please consult the complete guideline for information on specific therapies).

Whereas earlier guidelines have discussed managing nonsevere ABRS without initial antibiotics,^{5,25,36} the present document is the first to offer an explicit protocol for using an “observation option” based on current best evidence. Because of evidence limitations, particularly heterogeneity in trial design, initial observation of ABRS is considered an “option” (as defined in Table 2), and *is not* a “recommended” approach in all circumstances.

Table 3
Guideline statements for presumed viral rhinosinusitis (VRS)

Evidence-based statement	Rationale	Harm and benefit	Value judgments	Other considerations
1a. Clinicians should distinguish presumed acute bacterial rhinosinusitis (ABRS) from acute rhinosinusitis caused by viral upper respiratory infections and noninfectious conditions. A clinician should diagnose ABRS when 1) symptoms or signs of acute rhinosinusitis are present 10 days or more beyond the onset of upper respiratory symptoms, or 2) symptoms or signs of acute rhinosinusitis worsen within 10 days after an initial improvement (double worsening).	<i>Strong recommendation</i> is based on diagnostic studies with minor limitations regarding signs and symptoms with a preponderance of benefit over harm.	Benefits: decrease inappropriate use of antibiotics for nonbacterial illness; distinguish noninfectious conditions from rhinosinusitis Harm: risk of misclassifying bacterial rhinosinusitis as viral, or vice versa	Importance of avoiding inappropriate antibiotic treatment of viral or nonbacterial illness; emphasis on clinical signs and symptoms for initial diagnosis; importance of avoiding unnecessary diagnostic tests	None
1b. Clinicians should not obtain radiographic imaging for patients who meet diagnostic criteria for acute rhinosinusitis, unless a complication or alternative diagnosis is suspected.	<i>Recommendation</i> against is based on diagnostic studies with minor limitations showing a preponderance of benefit over harm.	Benefit: avoid unnecessary radiation exposure; avoid delays in diagnosis from obtaining and interpreting imaging studies Harm: delayed diagnosis of serious underlying condition	Importance of avoiding unnecessary radiation and cost in diagnosing acute rhinosinusitis	Patient exclusion: suspicion of complicated acute rhinosinusitis*
2. Clinicians may prescribe symptomatic relief in managing VRS.	<i>Option</i> is based on randomized trials with limitations and cohort studies showing an unclear balance of benefit and harm that varied by patient.	Benefit: reduction of symptoms; avoidance of unnecessary antibiotics Harm: adverse effects of decongestants, antihistamines, topical steroid sprays	Provide symptomatic relief, but avoid inappropriate use of antibiotics for viral illness	Substantial role for patient preference in selection and use of therapies for symptomatic relief

*Based on severe headache, proptosis, cranial nerve palsies, facial swelling, or other clinical findings.

Table 4
Acute rhinosinusitis definitions

Term	Definition
Acute rhinosinusitis	Up to 4 weeks of <i>purulent nasal drainage</i> (anterior, posterior, or both) accompanied by <i>nasal obstruction, facial pain-pressure-fullness</i> , or both: <ul style="list-style-type: none"> • <i>Purulent nasal discharge</i> is cloudy or colored, in contrast to the clear secretions that typically accompany viral upper respiratory infection, and may be reported by the patient or observed on physical examination. • <i>Nasal obstruction</i> may be reported by the patient as nasal obstruction, congestion, blockage, or stuffiness, or may be diagnosed by physical examination. • <i>Facial pain-pressure-fullness</i> may involve the anterior face, periorbital region, or manifest with headache that is localized or diffuse.
Viral rhinosinusitis (VRS)	Acute rhinosinusitis that is caused by, or is presumed to be caused by, viral infection. A clinician should diagnose VRS when: <ol style="list-style-type: none"> a. symptoms or signs of acute rhinosinusitis are present less than 10 days and the symptoms are not worsening
Acute bacterial rhinosinusitis (ABRS)	Acute rhinosinusitis that is caused by, or is presumed to be caused by, bacterial infection. A clinician should diagnose ABRS when: <ol style="list-style-type: none"> a. symptoms or signs of acute rhinosinusitis are present 10 days or more beyond the onset of upper respiratory symptoms, <i>or</i> b. symptoms or signs of acute rhinosinusitis worsen within 10 days after an initial improvement (double worsening)

The observation option for ABRS refers to deferring antibiotic treatment of selected patients for up to 7 days after *diagnosis* and limiting management to symptomatic relief.

- Patients with *nonsevere illness* at presentation (mild pain and temperature < 38.3°C or 101°F) are candidates for observation when follow-up is ensured, and a system is in place that permits reevaluation if the illness persists or worsens. Antibiotics are started if the patient's condition fails to improve by 7 days or worsens at any time.
- Patients with *severe illness* (moderate to severe pain or temperature ≥ 38.3°C or 101°F) are treated initially with oral antibiotics. Although illness severity is a primary determinant of suitability for observation, the clinician should also consider the patient's age, general health, cardiopulmonary status, and comorbid conditions as part of the decision-making process.

The rationale for observing ABRS is based on a high percentage of spontaneous improvement when patients receive placebo in randomized controlled trials (RCTs), plus only a modest incremental benefit from antibiotic therapy. Clinicians considering the "observation option" for use in their practice should consult the complete guideline. In deciding whether or not to treat ABRS with antibiotics, clinicians should also solicit and consider patient preference, and determine the relevance of existing evidence to their specific practice setting and patient population.

When antibiotics are prescribed for ABRS, the justification for amoxicillin as first-line therapy for most patients relates to its safety, efficacy, low cost, and narrow microbiological spectrum.^{5,8,37-39} No significant differences have been found in clinical outcomes for ABRS among different antibiotic agents.^{17,37} For penicillin-allergic patients, folate inhibitors (trimethoprim-sulfamethoxazole) are a cost-effective alternative to amoxicillin.^{18,27,37,38} The macrolide class of antibiotics may also be used for patients with penicillin allergy.

Patients started on antibiotic therapy for ABRS should be counseled on use of the medication, potential adverse effects, and the importance of adherence with dosing schedules. The out-of-pocket expense of antibiotics should be considered because it could represent a potential barrier to having the prescription filled and used as directed. Information about the natural history of ABRS can aid patients in understanding symptomatology and defining realistic expectations concerning treatment. Measures such as hydration, analgesics, and other supportive therapies should be highlighted.

If the patient worsens or fails to improve with the initial management option by 7 days after diagnosis, the clinician should reassess the patient to confirm ABRS, exclude other causes of illness, and detect complications. *Worsening* is defined as the progression of presenting signs or symptoms of ABRS, or onset of new signs or symptoms. *Failure to improve* is a lack of reduction in presenting signs or symp-

Table 5
Guideline statements for presumed acute bacterial rhinosinusitis (ABRS)

Evidence-based statement	Rationale	Harm and benefit	Value judgments	Other considerations
3a. The management of ABRS should include an assessment of pain. The clinician should recommend analgesic treatment based on the severity of pain.	<i>Strong recommendation</i> is based on randomized controlled trials demonstrating superiority of analgesics over placebo for general pain relief, but no trials specifically regarding patients with ABRS.	Benefit: pain reduction Harm: side effects of analgesic medications; potential for masking underlying illness or disease progression	Pain relief is important	Role for patient preference in choice of analgesic
3b. Clinicians may prescribe symptomatic relief in managing ABRS.	<i>Option</i> is based on randomized trials with heterogeneous populations, diagnostic criteria, and outcome measures with a balance of benefit and harm.	Benefit: symptom relief Harm: side effects of medications, which include local and systemic adverse reactions	Provide symptomatic relief while minimizing adverse events and costs	Substantial role for shared decision making with patients
4. Observation without use of antibiotics is an option for selected adults with uncomplicated ABRS who have mild illness (mild pain and temperature < 38.3°C or 101°F) and assurance of follow-up.	<i>Option</i> is based on double-blind randomized controlled trials with heterogeneity in diagnostic criteria and illness severity, and a relative balance of benefit and risk	Benefit increase in cure or improvement at 7-12 days (NNT 6), and improvement at 14-15 days (NNT 16); reduced illness duration in two studies Harm: adverse effects of specific antibiotics (NNH 9), especially gastrointestinal; societal impact of antibiotic therapy on bacterial resistance and transmission of resistant pathogens; potential disease progression in patients initially observed who do not return for follow-up	Minimize drug-related adverse events and induced bacterial resistance	Patient exclusions: include but are not limited to severe illness, complicated sinusitis, immune deficiency, prior sinus surgery, or coexisting bacterial illness; the clinician should also consider the patient's age, general health, cardiopulmonary status, and comorbid conditions when assessing suitability for observation.

Table 5
(continued)

Evidence-based statement	Rationale	Harm and benefit	Value judgments	Other considerations
5. If a decision is made to treat ABRS with an antibiotic agent, the clinician should prescribe amoxicillin as first-line therapy for most adults.	<i>Recommendation</i> is based on randomized controlled trials with heterogeneity and noninferiority design with a preponderance of benefit over harm	Benefit: demonstrated superiority of amoxicillin over placebo, with clinical outcomes comparable to broader-spectrum antibiotics for initial therapy; potential for reduced bacterial resistance by using a narrow spectrum antibiotic as first-line therapy; cost-effectiveness of amoxicillin versus other antibiotic choices Harm: potential increased gastrointestinal adverse effects with amoxicillin compared with other antibiotics; adverse effects from penicillin allergy	Promote safe and cost-effective initial therapy	Some role for shared decision making with patients
6. If the patient worsens or fails to improve with the initial management option by 7 days after diagnosis, the clinician should reassess the patient to confirm ABRS, exclude other causes of illness, and detect complications. If ABRS is confirmed in the patient initially managed with observation, the clinician should begin antibiotic therapy. If the patient was initially managed with an antibiotic, the clinician should change the antibiotic.	<i>Recommendation</i> is based on randomized controlled trials with limitations supporting a cut point of 7 days for lack of improvement and expert opinion and first principles for changing therapy with a preponderance of benefit over harm.	Benefit: prevent complications, detect misdiagnosis, institute effective therapy Harm: delay of up to 7 days in changing therapy if patient fails to improve	Avoid excessive classification as treatment failures because of a premature time point for assessing outcomes; emphasize importance of worsening illness in definition of treatment failure	Potential exceptions: include but are not limited to severe illness, complicated sinusitis, immune deficiency, prior sinus surgery, or coexisting bacterial illness; the clinician should also consider the patient's age, general health, cardiopulmonary status, and comorbid conditions in determining an appropriate cutpoint for assessing treatment failure.

NNT, Number needed to treat (to get one additional treatment success); *NNH*, number needed to harm (to get one additional adverse event).

toms of ABRs by 7 days after diagnosis, which *would not* apply if the patient had persistent, yet gradually improving, symptoms. A clinical diagnosis of ABRs is confirmed when the patient's pattern of illness corresponds to the definition in Table 4.

The rationale for using a cut point of 7 days after initial diagnosis to assess treatment failure for ABRs is based on clinical outcomes in RCTs. Between 7 and 12 days after trial enrollment, about 75 percent to 85 percent of patients have clinical improvement, but rates of improvement at 3 to 5 days are only about 30 percent to 40 percent. A cut point of 3 to 5 days, therefore, would overdiagnose treatment failure. Patients who are treatment failures, especially those with a worsening pattern of illness, should be examined for complications of ABRs that include orbital or intracranial spread of infection.

If the diagnosis of ABRs is confirmed and the treatment failure involves a patient managed initially with observation, the clinician should begin treatment with amoxicillin as discussed in the preceding section. For penicillin-allergic patients, folate inhibitors (trimethoprim-sulfamethoxazole) or a macrolide antibiotic may be used. If treatment failure is observed after 7 days of antibiotic therapy, a nonbacterial cause or infection with drug-resistant bacteria should be considered and should prompt a switch to alternate antibiotic therapy and reevaluation of the patient. When a change in antibiotic therapy is made, the clinician should consider the initial agent's limitations in coverage.⁸

GUIDELINE STATEMENTS FOR CHRONIC RHINOSINUSITIS AND RECURRENT ACUTE RHINOSINUSITIS (TABLE 6)

Chronic rhinosinusitis (CRS) and recurrent acute rhinosinusitis are temporal- and frequency-based patterns of illness (Table 7) that are distinct from isolated episodes of ABRs.^{7,40,41} In both diagnoses, the clinical presentation, disease impact, and subsequent diagnostic evaluation therapy differ significantly from ABRs. Furthermore, because of the chronicity and variety of symptoms that accompany CRS and recurrent acute rhinosinusitis, these conditions should be distinguished from other causes of symptoms that are commonly associated with sinonasal disorders.

CRS and recurrent acute rhinosinusitis have potential predisposing factors that may contribute to illness persistence, recurrence, or both.⁴⁰ Allergic rhinitis,⁴² cystic fibrosis,⁴³ immunocompromised state,⁴⁴ ciliary dyskinesia,⁴⁵ and anatomical variation are some factors that have been investigated in this regard. Ideally, early identification of factors contributing to the recurrence or persistence of rhinosinusitis could play a crucial role in selecting the most appropriate treatment for individual patients.

The clinician should corroborate a diagnosis of CRS or recurrent acute rhinosinusitis to avoid mistaking these entities for neoplastic disorders, other causes of headaches or

facial pain, anatomical abnormalities that obstruct the nasal cavity, and underlying systemic disease that may predispose to recurrent infection. Diagnostic tests that may be used to corroborate a diagnosis or to investigate for underlying causes of CRS and recurrent acute rhinosinusitis include nasal endoscopy, radiographic imaging, and allergy and immune testing.

Nasal endoscopy may be obtained in diagnosing or evaluating a patient with CRS or recurrent acute rhinosinusitis. Anterior rhinoscopy, with direct illumination and a speculum to dilate the nasal vestibule, allows only limited visualization of the anterior one third of the nasal cavity. In contrast, nasal endoscopy also allows visualization of the posterior nasal cavity, nasopharynx, and, in some instances, the sinus drainage pathways in the middle meatus and superior meatus.

Nasal endoscopy can identify posterior septal deviation and polyps or secretions in the posterior nasal cavity, within the middle meatus, or in the sphenoidal recess. In addition, middle meatal cultures may be obtained under endoscopic guidance to direct antibiotic choice.^{46,47} Endoscopic findings can be divided into inflammatory, neoplastic, and anatomical.

CT of the paranasal sinuses should be obtained in diagnosing or evaluating a patient with CRS or recurrent acute rhinosinusitis. Although CT findings do not necessarily correlate with symptom severity, they offer an objective method for monitoring recurrent or chronic disease.^{48,49} Mucosal abnormalities, sinus ostial obstruction, anatomical variants, and sinonasal polyposis are best displayed on CT. The appearance of the mucosa, however, is nonspecific, and mucosal thickening should be interpreted in the context of clinical examination, nasal endoscopy, or both.⁵⁰

An important role of CT imaging is to exclude aggressive infections or neoplastic disease that might mimic CRS or recurrent acute rhinosinusitis. Osseous destruction, extrasinus extension of the disease process, and local invasion suggest malignancy. If any such findings are noted, MRI should be performed to differentiate benign obstructed secretions from tumor and to assess for intracranial spread.⁵¹

Testing for allergy and immune function may be obtained in diagnosing or evaluating a patient with CRS or recurrent acute rhinosinusitis. Evidence supports the association of allergy and rhinosinusitis in adults.⁵²⁻⁵⁶ Most patients with extensive sinus disease, quantified by CT, have demonstrated evidence of allergy,^{57,58} and about twice as many patients with allergic rhinitis, compared with normal subjects, have abnormal CT scans (67% vs 33%).⁵⁹ Identification of allergies, however, does not imply they are the only cause of sinusitis, and other factors should be considered.

Immunodeficiency should be considered in patients with CRS or recurrent acute rhinosinusitis, particularly when aggressive management has failed⁶⁰ or the patient has persistent purulent infection. Laboratory studies in patients with CRS or recurrent acute rhinosinusitis may include quantitative immunoglobulin measurements (IgG, IgA, and IgM), preimmuniza-

Table 6
Guideline statements for chronic rhinosinusitis (CRS) and recurrent acute rhinosinusitis

Evidence-based statement	Rationale	Harm and benefit	Value judgments	Other considerations
7a. Clinicians should distinguish chronic rhinosinusitis and recurrent acute rhinosinusitis from isolated episodes of acute bacterial rhinosinusitis (ABRS) and other causes of sinonasal symptoms.	<i>Recommendation</i> is based on cohort and observational studies with a preponderance of benefit over harm.	Benefit: distinguish conditions that might benefit from additional diagnostic evaluation and management from isolated cases of ABRS Harm: potential misclassification of illness because of overlapping symptomatology with other illnesses	Importance of accurate diagnosis	None
7b. Clinicians should assess the patient with chronic rhinosinusitis or recurrent acute rhinosinusitis for factors that modify management, such as allergic rhinitis, cystic fibrosis, immunocompromised state, ciliary dyskinesia, and anatomical variation.	<i>Recommendation</i> is based on observational studies with a preponderance of benefit over harm.	Benefit: identify modifying factors that would alter management of CRS or recurrent acute rhinosinusitis; identify conditions that require therapy independent of rhinosinusitis Harm: identifying and treating incidental findings or subclinical conditions that might not require independent therapy; morbidity related to specific tests	Consensus that identifying and managing modifying factors will improve outcomes	Limited role for patient preference
8a. The clinician should corroborate a diagnosis and/or investigate for underlying causes of chronic rhinosinusitis and recurrent acute rhinosinusitis.	<i>Recommendation</i> is based on observational studies with a preponderance of benefit over harm.	Benefit: corroborate diagnosis and identify underlying causes that may require management independent of rhinosinusitis for symptom relief Harm: relate to the specific test or procedure	Identifying and managing underlying conditions will improve outcomes	Limited role for patient preference

Table 6
(continued)

Evidence-based statement	Rationale	Harm and benefit	Value judgments	Other considerations
8b. The clinician may obtain nasal endoscopy in diagnosing or evaluating a patient with chronic rhinosinusitis or recurrent acute rhinosinusitis.	<i>Option</i> is based on expert opinion and a preponderance of benefit over harm.	Benefit: confirm diagnosis of CRS; detect structural abnormalities, masses, lesions; perform biopsy or culture Harm: adverse effects from topical decongestants, anesthetics, or both; discomfort; hemorrhage; trauma	Importance of a detailed, complete intranasal examination	Limited role for patient preference
8c. The clinician should obtain CT of the paranasal sinuses in diagnosing or evaluating a patient with chronic rhinosinusitis or recurrent acute rhinosinusitis.	<i>Recommendation</i> is based on diagnostic and observational studies and a preponderance of benefit over harm.	Benefit: confirm diagnosis of CRS; detect structural abnormalities, masses, lesions Harm: radiation exposure	Value judgments: minimize radiation exposure and avoid unnecessary intravenous contrast	Limited role for patient preference
8d. The clinician may obtain testing for allergy and immune function in evaluating a patient with chronic rhinosinusitis or recurrent acute rhinosinusitis.	<i>Option</i> is based on observational studies with an unclear balance of benefit versus harm.	Benefit: identify allergies or immunodeficient states that are potential modifying factors for CRS or recurrent acute rhinosinusitis Harm: procedural discomfort; instituting therapy based on test results with limited evidence of efficacy for CRS or recurrent acute rhinosinusitis; very rare chance of anaphylactic reactions during allergy testing	Need to balance detecting allergy in a population with high prevalence versus limited evidence showing benefits of allergy management on rhinosinusitis outcomes	Role for shared decision making
9. Clinicians should educate/counsel patients with chronic rhinosinusitis or recurrent acute rhinosinusitis regarding control measures.	<i>Recommendation</i> is based on randomized controlled trials and epidemiologic studies showing limitations and a preponderance of benefit over harm.	Benefit: reduce symptoms and prevent exacerbations Harm: local irritation from saline irrigation	Importance of prevention in managing patients with CRS or recurrent acute rhinosinusitis	Substantial opportunities for shared decision making

Table 7
Chronic and recurrent rhinosinusitis definitions

Term	Definition
Chronic rhinosinusitis (CRS)	<p>Twelve (12) weeks or longer of two or more of the following signs and symptoms:</p> <ul style="list-style-type: none"> • Mucopurulent drainage (anterior, posterior, or both) • Nasal obstruction (congestion) • Facial pain-pressure-fullness, or • Decreased sense of smell <p>AND inflammation is documented by one or more of the following findings:</p> <ul style="list-style-type: none"> • Purulent (not clear) mucus or edema in the middle meatus or ethmoid region • Polyps in nasal cavity or the middle meatus, and/or • Radiographic imaging showing inflammation of the paranasal sinuses
Recurrent acute rhinosinusitis	<p>Four (4) or more episodes per year of ABRS without signs or symptoms of rhinosinusitis between episodes:</p> <ul style="list-style-type: none"> • Each episode of ABRS should meet diagnostic criteria in Table 4

tion and postimmunization specific antibody responses to tetanus toxoid and pneumococcal vaccine, and measurement of T-cell number and function (delayed hypersensitivity skin tests and flow cytometric enumeration of T cells).

Primary prevention, by definition, reduces the risk of an initial rhinosinusitis episode. Patients with CRS or recurrent acute rhinosinusitis cannot prevent disease onset, but can engage in practices that may reduce the risk of developing VRS, which often precedes ABRS. Patients can minimize their exposure to pathogens by practicing good hand hygiene, especially when in contact with ill individuals. Washing hands with soap or using an alcohol-based hand rub is one of the most effective strategies for reducing the risk of developing VRS.⁶¹ Clinicians should counsel patients that smoking increases the risk of sinusitis, although exposure to secondhand smoke does not appear to be a risk factor.⁶²

Secondary prevention minimizes symptoms and exacerbations of CRS and recurrent acute rhinosinusitis when symptoms are initially detected. Saline nasal irrigation is recommended for secondary prevention and after sinus surgery.^{18,36,63} Benefits of nasal irrigation are improved mucociliary function, decreased nasal mucosal edema, and mechanical rinsing of infectious debris and allergens.⁶⁴ Limited evidence suggests that saline nasal irrigations relieve sinonasal symptoms and may reduce reliance on other medications.⁶⁵ A systematic review of the evidence linking gastroesophageal reflux (GERD) and sinusitis found weak evidence, consisting primarily of observational studies.⁶⁶ Although research in this area is quite limited, a pilot study demonstrated that treating GERD may prevent CRS.⁶⁷

OTHER CONSIDERATIONS

The guideline concludes by discussing implementation considerations and research needs. Anticipated barriers to using the “observation option” for ABRS are reluctance of patients and clinicians to consider observing a presumed bac-

terial illness, and misinterpretation by clinicians and lay press of the statement regarding observation of ABRS as a “recommendation” instead of an “option.” These barriers can be overcome with educational pamphlets and information sheets that outline the favorable natural history of nonsevere ABRS, the moderate incremental benefit of antibiotics on clinical outcomes, and the potential adverse effects of orally administered antibiotics (including induced bacterial resistance).

Some patients and clinicians might object to amoxicillin as first-line therapy for ABRS on the basis of assumptions that newer, more expensive alternatives “must be” more effective. Most favorable clinical outcomes for nonsevere ABRS, however, result from natural history, not antibiotics, and randomized trials of comparative efficacy do not support superiority of any single agent for initial empirical therapy. Pamphlets may help in dispelling myths about comparative efficacy.

Barriers may also be anticipated concerning guideline statements for CRS and recurrent acute rhinosinusitis. The diagnostic criteria for these entities are unfamiliar to many clinicians, who might benefit from a summary card or teaching aid that lists these criteria along with those for ABRS and VRS. Performance of nasal endoscopy, allergy evaluation, and immunologic assessment, when appropriate, may be hindered by access to equipment and by procedural cost. Last, successfully achieving smoking cessation in patients with CRS or recurrent acute rhinosinusitis will require patient cooperation and clinician access to educational materials and support services.

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FINANCIAL DISCLOSURE

None.

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