

# PRACTICAL SUMMARIES IN ACUTE CARE

*A Focused Topical Review of the Literature for the Acute Care Practitioner*

## How Can I Best Diagnose and Treat Acute Rhinosinusitis in Adult Patients?

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### Introduction

SINUSITIS IS ONE OF THE MOST common diagnoses in acute care medicine. It accounts for almost 3 million ambulatory care visits annually in the United States.<sup>1</sup> Acute and chronic sinusitis taken together are estimated to affect 16% of the adult population and represent the fifth leading cause for antibiotic prescriptions in the United States, with calculated health care expenditures of \$3.4 billion annually.<sup>2</sup>

Sinusitis is frequently defined as the inflammation and/or infection of one or more paranasal sinuses, and occurs with obstruction of the normal drainage mechanism. The nasal mucosa is simultaneously involved and sinusitis rarely occurs without concurrent rhinitis, so therefore rhinosinusitis is now the preferred term for this condition.<sup>3</sup> By definition, symptoms of acute rhinosinusitis last less than three weeks, symptoms of subacute rhinosinusitis last 21–60

days, and symptoms of chronic rhinosinusitis last more than 60 days.<sup>1,3</sup>

Patients often complain of sinus congestion, mucopurulent discharge, sinus pressure, fever, and/or facial pain. The inflammation associated with acute rhinosinusitis is generally triggered by a viral upper respiratory tract infection, and only 2% of cases are subsequently complicated by bacterial sinusitis.<sup>3</sup> Many practitioners rely on clinical findings to make the diagnosis of acute rhinosinusitis.

However, the signs and symptoms of acute bacterial sinusitis and those of a prolonged viral upper respiratory tract infection are closely similar, resulting in frequent misclassification of viral cases as bacterial sinusitis. About 90% of patients in the United States are estimated to receive an antibiotic when diagnosed with acute rhinosinusitis, despite the fact that in most cases the condition resolves spontaneously without antibiotics, even if they are bacterial in origin.<sup>4</sup> This article will discuss

the scientific literature and published guidelines concerning the diagnosis and treatment of acute rhinosinusitis and focus on an evidence-based approach to the management of this highly prevalent condition.

### Can History and Exam Diagnose Acute Rhinosinusitis?

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

THIS STUDY INCLUDED 247 consecutive male patients at a Veteran's Administration (VA) medical center presenting with atraumatic facial pain or rhinorrhea and suspected sinusitis. Patient symptoms were correlated with plain film radiographs of the sinuses (showing opacification, air/fluid levels, or mucosal thickening) as the diagnos-

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tic standard. The authors found that colored nasal discharge, cough, and sneezing were very nonspecific findings (52%, 44%, and 34%, respectively), even though they demonstrated modest sensitivity in the low 70% range for each finding. While maxillary toothache was identified as highly specific (93%), this historical feature was present in only 11% of the patients. They found that non-specific historical features (sore

throat, itchy eyes, and constitutional symptoms) were not useful in excluding the diagnosis.

Transillumination of the sinuses is another physical examination technique that has long been debated for its usefulness in diagnosing sinusitis. In this study, the results of transillumination over the infraorbital rim generated a likelihood ratio of only 1.6 if either maxillary sinus was dull or opaque, and 0.5 if both maxillary sinuses illuminated normally. The authors suggest that transillumination is not an appropriate single finding for confirming the diagnosis.

A logistic regression model was used to identify signs and symptoms that independently predicted acute rhinosinusitis. They identified three symptoms (maxillary toothache, poor response to decongestants, and colored nasal discharge) and two signs (purulent nasal secretions and abnormal transillumination) as the most accurate predictors for patients with acute rhinosinusitis. The absence of any of these findings suggested that sinusitis was unlikely (likelihood ratio [LR] = 0.1), while the presence of four or more of them (LR = 6.4) made sinusitis a very likely diagnosis.

### Commentary

This report identifies five clinical findings that can help to predict the probability of sinusitis for an adult male patient experiencing nasal symptoms. Strengths of the study include avoidance of verification and expectation biases, and the reporting of good measured inter-observer agreement. Despite its publication more than 16 years ago, it remains one of the best articles inclusive of factors used to clinically diagnose acute sinusitis.

There are several important limitations for readers to consider; the patient population was comprised of 247 adult male patients from a VA

medical center, which may limit the generalizability of the results to other age and gender groups. Additionally, it is important to understand that the clinical predictive indicators evaluated in this prospective study were based on an imperfect gold standard of radiographic plain-film image evidence of sinusitis without confirmation of viral or bacterial etiologies. This method of diagnosing sinusitis has previously been shown to have only moderate sensitivity (41%–90%) and specificity (61%–85%). Publications in recent years have suggested that plain-film radiography does not play a central role in the routine diagnosis of sinusitis, and many physicians use clinical features alone to make diagnostic decisions.<sup>5,6</sup>

In this investigation, the primary care providers' overall clinical impressions were accurate with good inter-observer agreement, but this has not been universally true in several less-well-designed studies.<sup>7,8</sup> The results from this manuscript suggest that an absence of these features (maxillary toothache, poor response to decongestants, colored nasal discharge, purulent nasal secretion, or abnormal transillumination) will effectively rule out acute rhinosinusitis, and the presence of two or more can assist in making the clinical diagnosis.

## Are Additional Investigations Helpful?

Source: Lindbaek M, Hjortdahl P. The clinical diagnosis of acute purulent sinusitis in general practice – A review. *Br J Gen Pract* 2002;52:491-495.

THIS SYSTEMATIC REVIEW EVALUATES some proposed objective reference standards used to increase the diagnostic certainty of purulent bacterial sinusitis while looking at symptoms and signs that are independently associated with the diag-

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### Questions & Comments

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nosis. The target population was adult patients, and methodological standards for this study were based on the Cochrane Collaboration Methods Working Group on Diagnosis and Screening. Studies included compared clinical symptoms, signs, and blood tests with an objective reference standard (sinus puncture, computed tomography [CT], x-ray, or ultrasonography).

The clinical predictors — secretion from the nose either by history or physical examination, pain in the teeth, pain at bending forward, and two phases of illness history — were all identified as strong clinical predictors for acute rhinosinusitis. Serum assessments of erythrocyte sedimentation rate (ESR) ( $> 10/20$  in male/female) in patients meeting clinical criteria had LR = 1.7–2.9 for acute purulent sinusitis. C-reactive protein (CRP) elevation  $> 10$  also correlated with a LR = 1.8 for purulent sinusitis. Radiographic imaging of the sinuses identifying air-fluid levels, total opacity, or mucosal thickening had sensitivity of 0.90 (95% confidence interval [CI] 0.68–0.97) and specificity of 0.61 (95% CI 0.20–0.91). CT with the same findings yielded an unreported sensitivity and a specificity of 0.76 (95% CI 0.58–0.84).

### Commentary

In this systematic review, several objective testing methods were evaluated as adjunctive and potentially helpful in the confirmation of acute purulent rhinosinusitis. Sinus puncture was considered to be the gold standard and purulent secretions on aspiration provide direct evidence for the condition. However, sinus puncture can only rarely be clinically justified, given its inconvenience and associated patient discomfort. While ESR and CRP were found to be associated with a diagnosis of sinusitis, these laboratory assess-

ments are very nonspecific and are not typically useful for the primary assessment for patients with isolated sinusitis.

The authors of this review incorporated any objective reference standard, and since only four studies met inclusion criteria there were four different reference standards discussed in this paper. This creates a difficult situation, and the results from these very different studies are challenging to compare. While radiographic imaging, such as plain-film x-rays, ultrasound, and CT scan, can provide indirect evidence of sinusitis, they do not provide any information about whether or not the causative pathogen is viral or bacterial. In addition, the heterogeneity in objective approach and limitations of access to testing modalities in primary care settings make it difficult to recommend further optimal investigation techniques. The authors note that many patients with confirmed rhinosinusitis recover without antibiotic treatment, and recommend thoughtful consideration about whether antibiotic therapy is medically necessary in each case.

## Are Antibiotics Needed for Acute Sinusitis?

*Source:* Falagas ME, Giannopoulou KP, Vardakas KZ, et al. Comparison of antibiotics with placebo for treatment of acute sinusitis: A meta-analysis of randomized controlled trials. *Lancet Infect Dis* 2008; 8:543-552.

THIS RECENT META-ANALYSIS OF randomized, controlled trials assessed the therapeutic role of antibiotics for acute sinusitis compared to placebo, and reports that while the use of antibiotics may confer a small therapeutic benefit over placebo, there is a corresponding increase in the risk of adverse events. In total, 3,291 outpatients

(2,915 adults and 376 children) were randomly assigned to receive study treatment in the clinical trials that were included in this meta-analysis.

Overall, a greater proportion of patients with acute sinusitis were cured or improved with antibiotic treatment within a 7–15 day time period when compared with placebo (2,648 patients, odds ratio [OR] 1.64; 95% CI 1.35–2.00). In the 10 trials that specifically compared amoxicillin to placebo, cure or improvement was more likely in patients who received amoxicillin (1,702 patients, OR 1.48; 95% CI 1.17–1.89). Adverse reactions were also more common in those treated with antibiotics (1,963 patients, OR 1.87; 95% CI 1.21–2.90), although most adverse events were related to gastrointestinal disturbances and not considered clinically significant. No difference was found with regard to disease complication (1,815 patients, OR 0.68; 95% CI 0.22–2.09).

### Commentary

The publication of this well-designed meta-analysis in 2008 is timely, as there continues to be an ongoing debate about the safety and efficacy of antibiotic treatment for various upper respiratory infections, including acute rhinosinusitis. The findings of this analysis suggest a small potential benefit for the use of antibiotics in patients with acute sinusitis, although the therapeutic effect does not appear to be large (a 77% proportion of cure for patients with antibiotics versus 68% for patients with placebo). To be included in this analysis, a clinical diagnosis of acute sinusitis was inferred by the presence of at least two major criteria, or of at least one major and two minor criteria, or of nasal purulence at rhinoscopy. Alternatively, sinusitis-like symptoms were required to be present and not improving after seven days from

onset, or to be worsening after five days from onset. While these clinical criteria for diagnosing sinusitis are reflective of how clinicians make the diagnosis in practice, these results must be viewed within the context that a substantial percentage of patients with acute sinusitis in these studies were likely of non-bacterial causes (as there was no defined confirmation of bacterial disease).

Consideration of these factors makes clear recommendations difficult to establish for when to appropriately prescribe antibiotic therapy for suspected acute sinusitis. For diseases where a high rate of spontaneous resolution occurs (such as sinusitis), an analysis to demonstrate a faster rate of recovery would be another end-point that could justify antibiotic treatment as a way to speed resolution. However, this meta-analysis was unable to provide such a pooled analysis although they report that many of the included individual studies suggested such a benefit. When making decisions about whether or not to administer antibiotics, the reported 10% added benefit in clinical outcome with antibiotics with an equal increase in adverse medication events must be weighed against the very rare risk of serious disease complications and the increased risk of bacterial drug resistance. These findings are supported by the Cochrane Review on the use of antibiotics for acute sinusitis which was also published in 2008, and points out that 80% of patients who received placebo improved within two weeks of diagnosis.<sup>10</sup> In another well-written meta-analysis recently published, the odds ratio for an overall antibiotic treatment effect was 1.37 (95% CI, 1.13–1.66), with a number needed to treat (NNT) of 15.<sup>12</sup> Even this study only reached a NNT of eight when purulent discharge was noted on exam. Antibiotics are certainly

not appropriate for every patient with symptoms of acute rhinosinusitis, and the limited benefit of antibiotics should be reserved for those patients in whom bacterial disease is highly suspected.

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## Do Patients Expect Antibiotics?

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*Source:* Ong S, Nakase J, Moran GJ, et al. Antibiotic use for emergency department patients with upper respiratory infections: Prescribing practices, patient expectations, and patient satisfaction. *Ann Emerg Med* 2007;50:213-220.

THIS PROSPECTIVE, COHORT ANALYSIS conducted at 10 academic emergency departments sought to evaluate the factors that physicians consider when prescribing antibiotics (e.g., patient expectations) and the perceived factors associated with patient satisfaction. All patients presenting with uncomplicated upper respiratory infection symptoms were considered for inclusion in the study protocol.

This prospective study enrolled 272 patients and found that 82% of patients with sinusitis, 68% of patients with bronchitis, and 9% of patients with upper respiratory infection received antibiotics. Physicians were more likely to prescribe antibiotics when they believed that patients expected them (OR 5.3; 95% CI 2.9–9.6), although they were able to correctly identify only 27% of the patients who expected antibiotics. There was no correlation between receipt of antibiotics and patient satisfaction, as patients reported being satisfied with their visit by 87% of patients who received antibiotics and 89% of those not receiving antibiotics. Satisfaction with the visit was higher (92%) for those patients who believed they had a better understanding of their illness (72%, OR 4.4; 95% CI 2.0–8.4).

## Commentary

This study is one of several that have examined patient expectations and how they can influence physician prescribing practices. The results of this study support those of other similar investigations that suggest that patient satisfaction is not correlated with receiving antibiotic prescriptions. Patients whose physician believed that antibiotics were expected by the patient were significantly more likely to receive them. However, physician assessment of patient expectation was correct in only about one patient out of four, and receipt of antibiotics was not associated with patient satisfaction.

The bottom line is that physicians are terrible at predicting which patients want or expect antibiotic prescriptions. In this age of increasing antimicrobial resistance, following practice guidelines to limit unnecessary antibiotic use has evidence to demonstrate that this will not decrease patient satisfaction. Physicians who spend a few extra minutes explaining their management decisions when antibiotics are not necessary will improve their patient satisfaction scores while reducing the number of inappropriate antibiotic prescriptions.

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## Does Prescribing Antibiotics with a Nasal Steroid Work?

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*Source:* Williamson IG, Rumsby K, Bengt S, et al. Antibiotics and topical nasal steroid for treatment of acute maxillary sinusitis. A randomized controlled trial. *JAMA* 2007;298:2487-2496.

THIS STUDY IS THE LARGEST DOUBLE-blind, randomized controlled trial comparing antibiotics and nasal steroids to placebo treatment for acute maxillary sinusitis that has not been funded by a pharmaceutical

company. Using previously studied predictive diagnostic criteria for sinusitis, a cohort of 240 patients age 16 years and older were prospectively enrolled from 54 different family practice offices. All patients met a minimum of two positive criteria (had two diagnostic criteria: purulent rhinorrhea with unilateral predominance, localized facial pain with unilateral predominance, purulent bilateral rhinorrhea, presence of purulence in the nasal cavity) and were randomized to one of four treatment groups: antibiotic (amoxicillin 500 mg three times daily for seven days) and nasal steroid (budesonide 200 mcg/nare each day for 10 days); placebo antibiotic and nasal steroid; antibiotic and placebo nasal steroid; placebo antibiotic and placebo nasal steroid. Patients provided daily self-reported outcomes.

Using an intention-to-treat analysis, 10 days after initiating therapy there were no significant differences between any of the groups for symptom variables such as nasal congestion, discharge, unpleasant taste/smell, pain, headache, or quality of life. The time to overall cure with no residual symptoms was similar in all four groups.

### Commentary

This non-pharmaceutically funded study was well designed and provides evidence that neither an antibiotic nor a topical steroid alone or even in combination are effective in altering symptom severity, duration, or the natural course of acute sinusitis. While this study was one of the 17 randomized trials included in the recent meta-analysis conferring a small benefit (with associated side effects) to antibiotic use without intranasal steroids, there are a number of studies such as this one that do not support a central role for antibiotic therapy in treating acute sinusitis.<sup>11,13</sup> This paper provides the addi-

tional data that allows us to determine that intranasal steroids do not appear to be beneficial either with or without antibiotic therapy.

Strengths of this study include its lack of pharmaceutical affiliation (eliminating that as a potential source of bias), a large sample size from many different clinical sites (240 patients from 54 different primary care offices), and the use of clinical diagnostic definitions that mirror clinical practice patterns. Despite the lack of bacterial confirmation for pathogenesis, the study design here allows easy generalizability to common outpatient primary care populations, where such testing is not routinely done as part of the patient visit. This study continues to make the argument that antibiotics are not appropriate for every patient with sinusitis, and clinicians can therefore focus their time on appropriately educating patients regarding the time expectations of acute rhinosinusitis and providing symptomatic relief measures.

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## What Are Potential Complications of Rhinosinusitis?

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*Source:* Betz CS, Issing W, Matschke J, et al. Complications of acute frontal sinusitis: A retrospective study. *Eur Arch Otorhinolaryngol* 2008;265:63-72.

**T**HIS RETROSPECTIVE OBSERVATIONAL cohort study was completed as a review of surgical documentation in a tertiary otorhinolaryngological referral center. The study was designed to evaluate the potential complications of frontal sinusitis that required surgical intervention. In the seven-year period examined, almost 4,500 surgical procedures were completed of the paranasal sinus system, of which 78 were completed for an acute infectious complication. Twelve patients met the inclusion criteria for

this retrospective study, with diagnoses of acute frontal sinus infections and associated complications. These patients had a mean age of 47 years (range 11–74 years). The diagnoses of these complications included osteomyelitis of the frontal bone (four cases), cerebral abscesses (two cases), cellulitis of frontal soft tissue (two cases), diffuse frontal cerebritis (one case), epidural empyema (one case), intraorbital abscess (one case), and endoluminal empyema of the frontal sinus (one case).

### Commentary

While this study identifies the complications of presumably progressive frontal rhinosinusitis, these diseases remain extremely rare as evidenced by the very few cases found at this tertiary care referral facility within a seven-year period. The most significant complications of rhinosinusitis are related to the proximity of the paranasal sinuses to the anterior cranial fossa and orbits, as well as the venous drainage of the mid-facial structures into the intracranial venous sinuses. Up to 75% of orbital infections are attributable to persistent sinonasal disease, with the ethmoid sinus as the primary source. Orbital complications include orbital cellulitis, subperiosteal abscess, and intraorbital abscess, with the potential of blindness as a result of venous compression around the optic nerve. Orbital complications occur via direct transmission through the thin medial orbital wall (lamina papyracea) or by hematogenous route to the neighboring orbital structures. Frontal sinusitis may lead to osteomyelitis of the frontal bone (Pott's puffy tumor) and may also destroy the posterior table of the sinus, leading to extradural and subdural empyema. Sinusitis may also lead to meningitis, intracranial abscess, and cavernous sinus thrombosis, the latter occurring via

hematogenous spread through the superior ophthalmic veins or pterygoid venous plexus.

This study has many limitations, such as referral bias, that included only patients requiring operations at a tertiary ENT referral center. This represents patients with the most severe and significant complications of sinusitis. Many patients with less severe complications may be managed at smaller institutions or never require operative intervention. Therefore, this manuscript is perhaps most useful for describing for clinicians the unusual, atypical, and significant complications that can arise from sinusitis. Clinicians can keep this information in mind as they reassess their own patients who are being treated for sinusitis, and provide adequate education to patients regarding signs and symptoms of disease progression and the need for appropriate followup.

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## Do Physicians Follow Practice Guidelines for Rhinosinusitis?

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*Source:* Varonen H, Rautakorpi UM, Nyberg S, et al, for the MIKSTRA Collaborative Study Group. Implementing guidelines on acute maxillary sinusitis in general practice—A randomized controlled trial. *Fam Pract* 2007;24:201-206. Epub 2007.

**D**ESPITE PUBLISHED PRACTICE guidelines and experimental literature to guide clinical management, the treatment of acute rhinosinusitis often includes antibiotics and other prescription medications with little or no proven medical value. Guidelines have been proposed as a means to change professional practice patterns, but the impact of these measures has not led to a substantial shift in patient management patterns. In this randomized, controlled trial, the aim was to assess the impact of a

nationwide guideline implementation program on the management of acute sinusitis in primary care within Finland. This trial was conducted from 1998 to 2002 in 30 health centers covering a population of 819,777 people. The participating centers were randomized to implement guidelines either according to a problem-based learning (PBL) or an academic detailing (AD) method created and facilitated by local physicians. The primary outcome measure was compliance with the key points of management in the national Finnish guidelines for sinusitis, including the use of imaging methods to verify retention in sinuses, avoiding antibiotics for symptoms lasting less than one week, and the use of amoxicillin for a seven-day course as their recommended first-line agent in Finland.

The data gathered suggested that implementation of the guidelines produced only minor changes. Use of the first-line drug amoxicillin increased slightly (from 39% to 48% in AD centers and from 33% to 45% in PBL centers, controls 40%). The proportion of courses of antibiotics with appropriate duration improved (from 34% to 40% in AD centers and from 32% to 47% in PBL centers, controls 43%), without an increase in overall antibiotic use. The use of antibiotics for acute sinusitis did not decrease during the study period.

### Commentary

Despite implementing an educational process to improve the compliance with national practice guidelines for acute sinusitis, appropriate antibiotic selection and course duration only improved marginally. There were serious difficulties described by the authors in properly implementing the study as designed. Some health centers did not realize the project as intended, which decreases the internal validity of the study.

However, the underlying premise of this study is well established from other similar studies—despite creation of practice guidelines, many physicians do not follow these guidelines. In fact, review of serial data from the National Ambulatory Medical Care Surveys (NAMCS) from 1999 through 2005 does show a slight downward trend in antibiotic prescribing for acute sinusitis: Data from the 2004 and 2005 NAMCS reveal that family physicians prescribed antibiotics for 80% of patients with acute sinusitis in 2004 and 76% of patients in 2005.<sup>14</sup> However a decline in 4% prescribing despite improving evidence supporting non-antimicrobial therapies is not adequate. The reasons for this noncompliance are multi-factorial and are not adequately addressed in this study. However, when considering some of the practice guidelines that have been recently published regarding the treatment of rhinosinusitis, physicians should recognize the difficulty in implementing such changes in widespread clinical practice, even when they are supported by reliable data.<sup>15</sup>

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## Summary

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As one of the most common complaints seen by primary care providers, the clinical characteristics of acute rhinosinusitis pose unique diagnostic challenges. Distinguishing bacterial from viral infection is difficult on clinical grounds. While purulent nasal secretions, maxillary facial pain (especially with unilateral predominance), maxillary tooth pain, altered sense of smell, and worsening illness after a period of initial improvement have some predictive value to detect bacterial disease, even their presence is not a reliable predictor. The diagnostic capabilities of sinus CT scans may be more reliable than plain film x-rays for diagnosing

acute rhinosinusitis, however radiographic imaging modalities still have poor accuracy for distinguishing viral from bacterial infections and are not uniformly available for immediate clinical utilization. For management of most acute rhinosinusitis patients, clinical characteristics remain the mainstay of diagnosis. In the acute phase of illness, radiographic imaging should be reserved for uncertainty of diagnosis or possible disease complications.

Perhaps more importantly, acute rhinosinusitis often will resolve spontaneously with symptomatic treatment and will not require antibiotic therapy. When symptomatic treatment proves unsuccessful at 7–10 days of illness, treatment with antibiotics may confer a small therapeutic benefit that is accompanied by a rise in the risk for adverse medication events. The use of nasal steroids as an adjunctive treatment for this condition is not supported by experimental data.<sup>11</sup> Antibiotics should be reserved for patients with a higher probability of a bacterial disease process, and are not appropriate for everyone with sinusitis. When antibiotics are used to treat bacterial sinusitis, amoxicillin is an appropriate first-line therapy for most patients for a minimum duration of seven days. Trimethoprim–sulfamethoxazole or a macrolide is an acceptable alternative for patients allergic to penicillins.<sup>12</sup>

Serious complications of acute sinusitis, such as brain abscess, periorbital cellulitis, or meningitis, are very infrequent. Systemically ill patients with signs and symptoms of acute bacterial sinusitis, such as high fever, periorbital erythema or edema, severe headache, or intense facial pain must be carefully evaluated and treated appropriately if invasive disease is suspected.

Physician prescribing patterns for acute rhinosinusitis have led to cir-

cumstances where providers may feel that patients will be resistant to conservative management and may demand antibiotic treatment even when not clinically indicated. However, studies have shown that patient satisfaction scores will not be negatively impacted by following prescribing guidelines to limit unnecessary antibiotic prescriptions. Providers should take enough time to educate patients about the natural course of their illness and the reasons why antibiotics are not always necessary. Practice guidelines from a multidisciplinary group developed by the American Academy of Otolaryngology Head and Neck Surgery Foundation are available to help clinicians determine the evidence-based methods for diagnosing and treating acute rhinosinusitis.<sup>12</sup>

Clinicians can use such practice guidelines along with the information learned from the recent literature discussed within this manuscript to help make informed treatment decisions for their patients.

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CME QUESTIONS

11. Which of the following clinical findings is most suggestive of acute rhinosinusitis?
- Unilateral nasal discharge
  - Bilateral nasal discharge
  - Sinus tenderness on palpation
  - Purulent nasal discharge
12. Physician assessment of patient expectations regarding the receipt of antibiotics for upper respiratory infections is correct what percentage of the time?
- 5%
  - 25%
  - 50%
  - 75%
13. Which of the following statements is true regarding a recent randomized, controlled trial comparing a combination of antibiotics and nasal steroids for acute sinusitis?
- Antibiotics plus nasal steroids gave significant relief of symptoms compared to placebo.
  - Patient symptoms were the same with or without antibiotics and steroids.
  - Nasal steroids alone prevented the progression to chronic sinusitis.
  - Antibiotics alone were superior to antibiotics plus nasal steroids.
14. Which of the following is a described (although uncommon) infectious complication of frontal sinusitis?
- HSV encephalitis
  - Purulent conjunctivitis
  - Tuberculous meningitis
  - Frontal bone osteomyelitis
15. Which of the following are true regarding published clinical practice guidelines for management of acute rhinosinusitis?
- Physicians' compliance with guideline recommendations is 80%–90%.
  - Guidelines have not been shown to markedly decrease the numbers of prescriptions written for this disease.
  - Problem-based learning has been demonstrated as a statistically more effective method of teaching guidelines when compared to an academic detailing approach.
  - Physicians who follow practice guidelines have significantly lower rates of patient complications for sinusitis.

Answers: 11. d; 12. b; 13. b; 14. d; 15. b

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