

### Vignette

You are spending an afternoon working in your Emergency Department's "fast-track" area, and have just written your 15<sup>th</sup> work-excuse note, when you sign up for a new patient with the chief complaint "cold." You enter the room and encounter a pleasant 50-year old gentleman with a history of hypertension, otherwise healthy, who complains to you that his "sinuses are acting up again." He complains of one week of nasal congestion, runny nose, and right-sided facial pain, which he says makes his teeth hurt. He used Afrin for 3 days with temporary improvement, but has been reluctant to use pseudoephedrine because of his hypertension. On exam, he has bilateral edematous, boggy turbinates and tenderness over the right maxillary sinus.

The patient tells you he had the same thing last year, and his doctor prescribed him antibiotics. "Within a week, it was gone." He asks what kind of antibiotic you're going to give him, and in order to avoid a fight you write him for one week of amoxicillin acid. On the way home that night, you ask yourself if you did the right thing. You begin wondering about the efficacy of antibiotics in patients with acute sinusitis. When you get home, you open up PubMed and begin searching for answers...

### PICO Question

**Population:** adult patients with clinically diagnosed acute bacterial sinusitis  
**Intervention:** antibiotics  
**Comparison:** placebo, decongestants, nasal steroids  
**Outcome:** cure rate, duration of symptoms, adverse effects, incidence of complications

### Search Strategy

You search PubMed using the strategy "acute sinusitis AND antibiotics" and the filters for randomized-controlled trials and meta-analyses (<http://tinyurl.com/cd94yhy>). This search yields 209 articles. You select the most recent Cochrane review on the subject and eliminate a 2<sup>nd</sup> meta-analysis that contains the same articles as the Cochrane review article. You also select the 3 most appropriate randomized-controlled trials, including one by several member of the ENT department here at WashU.

**Article 1:** [Williamson IG, Rumsby K, Benghe S, Moore M, Smith PW, Cross M, Little P. Antibiotics and topical nasal steroid for treatment of acute maxillary sinusitis: a randomized controlled trial. JAMA. 2007 Dec 5;298\(21\):2487-96. Answer Key.](#)

**Article 2:** [Lemiengre MB, van Driel ML, Merenstein D, Young J, De Sutter AI. Antibiotics for clinically diagnosed acute rhinosinusitis in adults. Cochrane Database Syst Rev. 2012 Oct 17;10:CD006089. Answer Key.](#)

**Article 3:** [Garbutt JM, Banister C, Spitznagel E, Piccirillo JF. Amoxicillin for acute rhinosinusitis: a randomized controlled trial. JAMA. 2012 Feb 15;307\(7\):685-92. Answer Key.](#)

**Article 4:** [Merenstein D, Whittaker C, Chadwell T, Wegner B, D'Amico F. Are antibiotics beneficial for patients with sinusitis complaints? A randomized double-blind clinical trial. J Fam Pract. 2005 Feb;54\(2\):144-51. Answer Key.](#)

### Bottom Line

Antibiotic prescription rates for upper respiratory tract infections remain high in ambulatory care settings, typically over 40% in children ([Nyquist 1998](#)) and over 50% in adults ([Gonzales 1997](#)). While rates are somewhat lower in US emergency departments, they still remain high, in the range of 24-31% for adults ([Stone 2000](#), [Ong 2007](#)). This trend has continued despite growing concerns for increased antimicrobial resistance ([Kunin 1993](#), [Austin 1999](#), [Goossens 2005](#)) and the risk of adverse reactions ([Shehab 2008](#)).

Prescribing rates are even higher in cases of acute sinusitis, with over 80% of cases receiving antibiotics in both adult ([Fairlie 2012](#)) and pediatric ([Shapiro 2011](#)) populations. Current guidelines from the Infectious Disease Society of America (ISDA) continue to recommend that “empiric antimicrobial therapy be initiated as soon as the clinical diagnosis of ABRS [acute bacterial rhinosinusitis] is established” ([Chow 2012](#), p. e3). In these guidelines, diagnosis requires persistent symptoms for  $\geq 10$  days, severe symptoms or high fever ( $\geq 39^{\circ}\text{C}$ ), or worsening of symptoms after initial improvement. These recommendations are based on evidence that shows a modest benefit from antibiotics, with a number needed to treat of 13 in adults. The authors cite concerns over enrollment criteria in previous studies, stating that many of these patients likely have viral upper respiratory tract infections rather than ABRS, thus artificially depressing the treatment effect.

We reviewed the evidence from the several of the primary studies, as well as the highest quality meta-analysis on the subject. The primary studies showed no statistically significant improvement in the primary outcomes, which included the

proportion of patients with symptoms lasting 10 or more days ([Williamson 2007](#)), mean change in [SNOT-16 score](#) at 10 days ([Garbutt 2012](#)), and the proportion of patients reporting that symptoms were “improved” at 2 weeks ([Merenstein 2005](#)). The Cochrane review ([Lemiengre 2012](#)) found a small improvement in cure rate (odds ratio [OR] 1.25, 95% CI 1.02-1.53) with a number needed to treat (NNT) of 18. However the risk of adverse effects was significantly higher in those patients receiving antibiotics (OR 2.10, 95% CI 1.60-2.77) with a NNT of 8.1. While there is no clear consensus, many would advocate that providing antibiotics for sinusitis is unnecessary, given that the majority of cases will resolve spontaneously (76.4% at 10 days in the paper by Williamson and 71% at 14 days in the Cochrane review). When one considers that treating 18 patients will result in one patient cured of symptoms of sinusitis, while providing at least 2 patients with significant side effects (diarrhea, nausea, vomiting, abdominal pain, rash, etc.), the decision to withhold antibiotics becomes more appealing.

The authors of the IDSA guideline expressed concerns that patients with symptoms less than 7 days are less likely to have ABRS, and suspect that this has led to an underestimation of antibiotic treatment effect. Two of the primary articles we reviewed required symptoms for only 7 days for inclusion, while the other did not specify a duration. The Cochrane review similarly included only studies in which participants had symptoms for more than 7 days. Future studies may wish to address the IDSA’s concerns and include only patients with at least 10 days of symptoms. The IDSA and others ([DeMuri 2012](#)) have also cited concerns over antibiotic selection, citing the presence of beta-lactamase producing bacteria (non-typable *Haemophilus influenzae* and *Moraxella catarrhalis*) in ABRS and the increasing prevalence of penicillin-resistant *Streptococcus pneumoniae*. The IDSA guidelines recommend amoxicillin-clavulanate rather than amoxicillin alone for these reasons. All three primary studies we reviewed evaluated amoxicillin alone, while only two of the 10 studies in the Cochrane review evaluated amoxicillin-clavulanate.

Despite these limitations, many agree that withholding antibiotics from patients with upper respiratory infections is reasonable. However, many also have trouble assimilating this practice in light of perceived patient expectations. One study showed that emergency physicians were more likely to prescribe antibiotics for upper respiratory infections when they believe the patient expected them (OR 5.3, 95% CI 2.9-9.6), although they were only able to correctly identify 27% of those who expected them ([Ong 2007](#)). Despite physician concerns in this study, satisfaction was similar between those who did and did not receive antibiotics (87% vs. 89%). A study in Philadelphia revealed conflicting results, with increased satisfaction among those receiving antibiotics in non-VA EDs (adjusted odds ratio [AOR] 1.97, 95% CI 1.23-3.17), but not in VA EDs (AOR 1.13, 95% CI 0.81-1.58) ([Stearns 2009](#)). While it remains unclear, it may be physician perception, rather than patient expectation, that drives antibiotic prescribing patterns.

Further studies will need to evaluate the effectiveness of antibiotics in ABRS when IDSA guidelines are followed, namely the efficacy of amoxicillin-clavulanate in

patients with clinical signs of ABRS lasting 10 or more days. In patients who do not meet these criteria, further understanding of patient expectations in the ED, which in many cases do not seem to include antibiotic prescription, may improve overall patient satisfaction ([Lateef 2011](#)), without the risk of adverse reactions and the increase in antimicrobial resistance.

