

NC CLASP OUTPATIENT STEWARDSHIP YEAR 2, SESSION 3

**Enhancing Antimicrobial Stewardship in Ambulatory
Care in Patients with Acute Bacterial Sinusitis**

October 25, 2023

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 - ▶ Dr. Willis has performed contracted research with: Pfizer (pediatric nirmatrelvir-ritonavir and maternal RSV vaccine), Novavax (pediatric COVID-19 vaccine), and Merck (monoclonal antibody for RSV prevention)
- ▶ The speakers do not intend to discuss an unapproved/investigative use of a commercial product/device in this series, and all COI have been mitigated.
- ▶ These slides contain materials from a variety of colleagues, as well as the CDC, WHO, AHRQ, etc.

INTRODUCTIONS

Please put your name, clinic, and location in the chat!

CME AND CE CREDIT



▶ CME & CE for participants

- ▶ Attendance and active participation per learning session
- ▶ Click the link in the chat during the session to document your attendance
- ▶ Complete surveys as requested

QUICK REVIEW: OUTPATIENT ANTIBIOTICS

- ▶ Penicillins (amoxicillin, amox-clav)
 - ▶ Great for respiratory tract infections
 - ▶ Fairly safe other than allergy; diarrhea fairly common

- ▶ Cephalosporins (cephalexin, cefdinir)
 - ▶ Cephalexin good for Group A Strep and MSSA (SSTI)
 - ▶ Cefdinir as an alternative for respiratory tract and UTIs, though some notable weaknesses

QUICK REVIEW: OUTPATIENT ANTIBIOTICS

▶ Macrolides (mainly azithromycin)

- ▶ Good safety, convenient schedules
- ▶ Diminishing efficacy against common organisms like pneumococcus

▶ Clindamycin

- ▶ Increasing resistance in *S. aureus* and pneumococcus is limiting
- ▶ GI intolerance common; propensity to cause C-diff

QUICK REVIEW: OUTPATIENT ANTIBIOTICS

▶ Trimethoprim-sulfamethoxazole

- ▶ Good coverage of *S. aureus*; often effective in UTI as well
- ▶ Limitations: allergy, rashes (can be life-threatening), hyperkalemia in CKD

▶ Doxycycline

- ▶ Good safety (take with plenty of water and avoid the sun!)
- ▶ Good coverage of *S. aureus*, atypical pneumonia; decent coverage of typical respiratory bacteria

QUICK REVIEW: OUTPATIENT ANTIBIOTICS

▶ Fluoroquinolones

- ▶ Broad coverage: Gram-negatives including *Pseudomonas*
 - ▶ Levofloxacin and Moxifloxacin: Pneumococcus, *Haemophilus* and *Moraxella*, atypical pneumonia pathogens
- ▶ Excellent oral availability
- ▶ Many downsides:
 - ▶ Rapid development of resistance over time (target mutations)
 - ▶ Higher C-diff risk than most outpatient antibiotics
 - ▶ Rare but severe toxicities

QUICK REVIEW: THREE WAYS TO OVERUSE ANTIBIOTICS

1. Prescribing antibiotics when none are indicated
2. Using an antibiotic that is too broad for the infection (or otherwise suboptimal)
3. Using an excessive duration

HOMEWORK REVIEW

- ▶ After reviewing commonly used outpatient antibiotics, are there any that you think might be overused in your clinic setting? Or overused in your community? Which ones and for which situations?

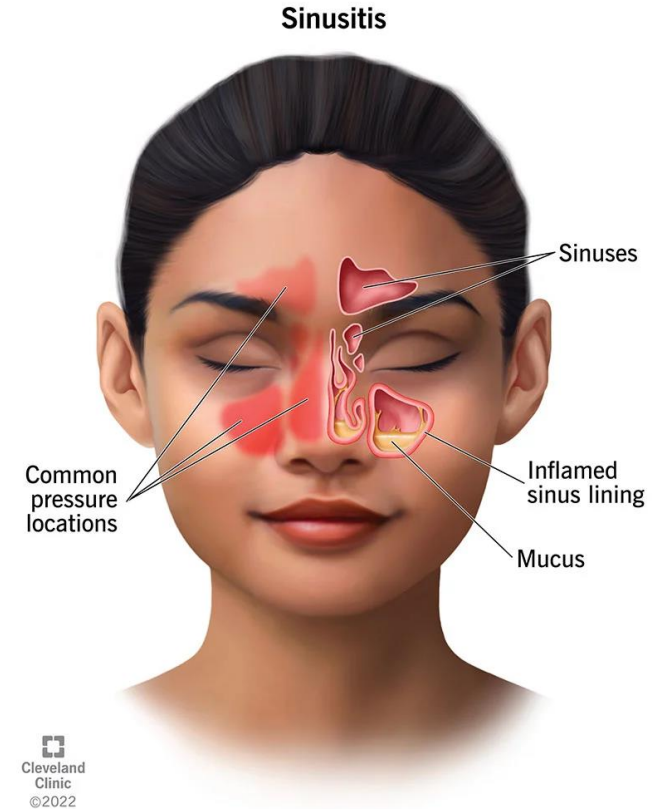
ACUTE BACTERIAL SINUSITIS

ACUTE RHINOSINUSITIS

- ▶ Out of scope:
 - ▶ Chronic sinusitis, fungal sinusitis
- ▶ Infection of the paranasal sinuses
 - ▶ Viruses and/or bacteria
 - ▶ Sinus mucosa becomes edematous and secretions thicken
 - ▶ Edema and mucus may obstruct the sinus ostia
- ▶ ~10-15% of adults have sinusitis at least once per year

ACUTE BACTERIAL SINUSITIS

- ▶ Common in both adults and children
- ▶ May present with fever, facial pain and pressure, rhinorrhea, cough
- ▶ Usually preceded by viral infection or allergic rhinitis
 - ▶ Mucous, edema, occlusion, impaired mucociliary clearance
 - ▶ A viral diagnosis does not rule out bacterial infection
- ▶ Most common pathogens:
 - ▶ Pneumococcus, *H. influenzae*, *Moraxella catarrhalis*



ABS: DIAGNOSTIC CHALLENGES

- ▶ Viral sinusitis quite common
 - ▶ Basically all respiratory viruses can cause it
 - ▶ May include fever, headache, facial pain/pressure, rhinorrhea, cough
- ▶ Definitive bacterial diagnosis requires surgery
- ▶ Physical exam rarely distinguishes viral from bacterial infection
 - ▶ Imaging also not helpful

DIAGNOSIS OF ABS

IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults

Anthony W. Chow,¹ Michael S. Benninger,² Itzhak Brook,³ Jan L. Brozek,^{4,5} Ellie J. C. Goldstein,^{6,7} Lauri A. Hicks,⁸ George A. Pankey,⁹ Mitchel Seleznick,¹⁰ Gregory Volturo,¹¹ Ellen R. Wald,¹² and Thomas M. File Jr^{13,14}

Three ways to diagnose:

1. Persistent symptoms that are not improving for ≥ 10 days
2. Severe illness ($\geq 3-4$ days)
 - ▶ High fever ($\geq 39^{\circ}\text{C}$) and purulent nasal discharge or facial pain
3. Worsening of a URI after $\geq 3-4$ days that was either stable or improved (“double-sick”)

DIAGNOSTIC VARIATION AND OVERPRESCRIBING

Appropriateness of Antibiotic Prescribing for Acute Sinusitis in Primary Care: A Cross-sectional Study

Katie N. Truitt,¹ Tiffany Brown,^{1,2} Ji Young Lee,^{1,2} and Jeffrey A. Linder^{1,2,3}

- ▶ 425 randomly selected sinusitis visits:
 - ▶ 211 (50%) did not meet antibiotic prescribing criteria
 - ▶ 193 (92%) were prescribed antibiotics – vs 96% of those who did meet prescribing criteria
- ▶ Internal data, pediatrics practices, 2017-18
 - ▶ 45% of patients prescribed antibiotics for sinusitis did not meet diagnostic criteria
 - ▶ Huge variance in percentage of sick visits treated for sinusitis (0%-20.9%)

ANTIMICROBIAL STEWARDSHIP IMPACT

- ▶ #1 indication for ambulatory antibiotics (Fleming-Dutra et al., *JAMA*, 2016)
 - ▶ 56 antibiotic prescriptions per 1000 people per year
 - ▶ Wide range by US region:
 - ▶ Western states: 27 Rx/1000 person-years
 - ▶ Midwestern states: 69 Rx/1000 person-years
- ▶ Among RTIs, sinusitis has lowest rate of non-first-line antibiotic selection (Seibert, et al., *ASHE* 2023)

OVERPRESCRIBING

▶ Factors causing overprescribing:

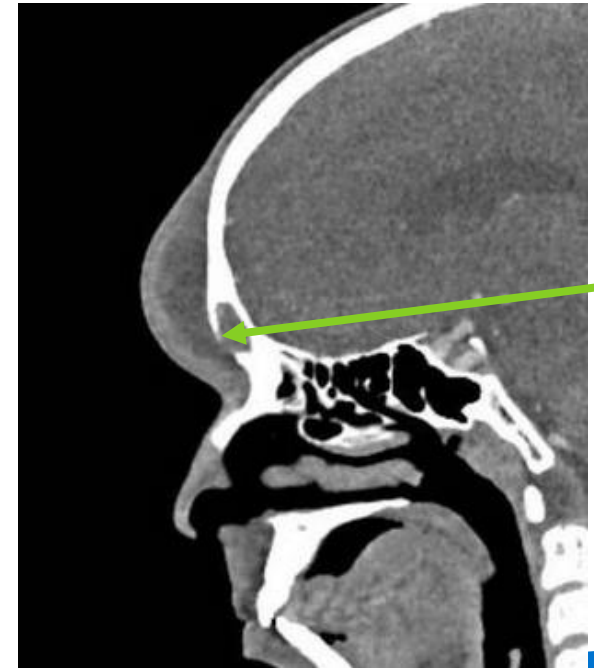
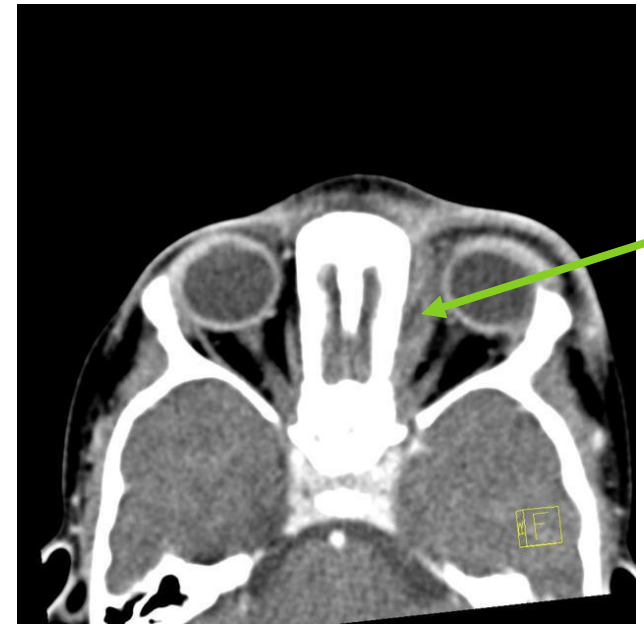
- ▶ Viral rhinosinusitis very common and often unpleasant
- ▶ Patients often accustomed to antibiotic treatment
- ▶ No objective diagnostic test is available (not even CT scans can differentiate)
- ▶ “Acute bacterial sinusitis” should always receive antibiotics

▶ All modes of overprescribing apply:

- ▶ Prescribing when not indicated
- ▶ Non-first-line antibiotics: less likely to work, more toxicity, or excessively broad-spectrum
- ▶ Excessive duration

COMPLICATIONS OF ACUTE BACTERIAL SINUSITIS

- ▶ Orbit: orbital cellulitis/abscess
- ▶ Soft tissue over frontal sinus: Pott's puffy tumor
- ▶ Epidural/subdural space: Epidural or subdural empyema, brain abscess



ACUTE BACTERIAL SINUSITIS



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<https://en.wikipedia.org/w/index.php?curid=52750625>

MICROBIOLOGY

- ▶ Very similar to acute otitis media and community-acquired pneumonia
- ▶ Pneumococcus, *H. influenzae*, and *M. catarrhalis* are most common
 - ▶ Other streptococci less common
 - ▶ *S. aureus* very uncommon

Pneumococcus	<i>H. flu, Moraxella</i>	Atypicals
Group A Strep		Oral anaerobes
MSSA		MRSA
<i>E. coli, K. pneumoniae</i>		<i>Pseudomonas</i>

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
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<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Amoxicillin

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Amoxicillin-clavulanate

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Cefdinir

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Azithromycin

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Levofloxacin

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

Doxycycline

Pneumococcus	<i>H. flu, Moraxella</i>	<u>Atypicals</u>
Group A Strep	Oral anaerobes	
MSSA	MRSA	
<i>E. coli, K. pneumoniae</i>	<i>Pseudomonas</i>	

ANTIBIOTIC SELECTION

- ▶ 1st line: Amox-clav
 - ▶ Amoxicillin is co-first-line in pediatric guidelines, but amox-clav increasingly preferred
 - ▶ High-dose amox-clav generally recommended (2 g PO BID or 90 mg/kg/day div BID in children) when pneumococcal penicillin susceptibility <90%
- ▶ 2nd line: doxycycline or levofloxacin
 - ▶ Doxy preferred for penicillin allergy
 - ▶ Levofloxacin reasonable for treatment failure
- ▶ Not recommended: oral cephalosporins, TMP-SMX

ENCOURAGING SIGNS

Trends in the Antibiotic Treatment of Acute Sinusitis: 2003–2020

Timothy J. Savage, MD, MPH, MSc,^a Matthew P. Kronman, MD, MSCE,^b Sushama Kattinakere Sreedhara, MBBS, MSPH,^a Massimiliano Russo, PhD,^a Su Been Lee, BA,^a Theresa Oduol, BS,^a Krista F. Huybrechts MS, PhD^a

- ▶ Since IDSA guidelines published in 2012:
 - ▶ Use of amoxicillin and amox-clav have gone up in children
 - ▶ Use of azithromycin and third-gen cephalosporins have gone down
- ▶ Durations have remained set at 10 days (although courses >10 days becoming less common)

DURATION OF THERAPY

- ▶ IDSA Guidelines:




- ▶ Adults: 5-7 days
- ▶ Children: 10-14 days

- ▶ Limited evidence available to reduce pediatric durations

- ▶ But 10 days certainly sufficient!

ANTIBIOTIC STEWARDSHIP INTERVENTIONS

Improving antibiotic use for sinusitis and upper respiratory tract infections: A virtual-visit antibiotic stewardship initiative

Anastasia I. Wasylshyn MD¹, Keith S. Kaye MD, MPH⁶, Julia Chen MD^{2,3} , Haley Haddad MHSA³, Jerod Nagel PharmD⁴, Joshua G. Petrie PhD⁵ , Tejal N. Gandhi MD¹ and Lindsay A. Petty MD¹ 

- ▶ Asynchronous virtual-visit setting
- ▶ Modified questionnaires, computer decision support to nudge guideline-concordant prescribing
- ▶ Antibiotic prescribing for sinusitis dropped 69.9% → 56.4%
- ▶ Use of amox-clav and doxycycline rose significantly; azithro dropped
- ▶ Antibiotic duration dropped from 10 days to 7 days

STEWARDSHIP GOALS: SINUSITIS

- ▶ Increase use of appropriate diagnostic criteria
 - ▶ This is hard to measure
- ▶ Increase use of first-line antibiotics
 - ▶ Minimal role for cefdinir and azithromycin.
 - ▶ If any significant FQ use – reduce it. Reserve fluoroquinolones for treatment failure.
- ▶ Use appropriate durations: 5-7 days
 - ▶ 10-day courses still very common

BREAKOUT SESSION

- ▶ Do you see overuse of sinusitis diagnoses in your community?
- ▶ If you're a provider, are you confident in distinguishing bacterial and viral sinusitis?
- ▶ How would you address overdiagnosis of bacterial sinusitis?

RECOMMENDATIONS

- ▶ Education for providers and patients
- ▶ Safety-net antibiotic prescriptions for patients who present early
- ▶ Templates for history-taking, diagnostic criteria
- ▶ Specific supportive care of patients with nonbacterial sinusitis
 - ▶ Allergic sinusitis: antihistamines, nasal steroids
 - ▶ Viral sinusitis: saline rinses; OTC pain relief
- ▶ Possible Metrics:
 - ▶ Sinusitis diagnoses with antibiotic prescriptions per 100 acute visits
 - ▶ Use of amox-clav for sinusitis
 - ▶ Duration of therapy



Antibiotic Stewardship Conference



11.15.23 | 9 am - 4 pm
The Friday Conference Center
Chapel Hill, NC



**North Carolina
Clinical Antibiotic
Stewardship Partners**

More information at spice.unc.edu/ncclasp/

THE NORTH CAROLINA CLINICAL ANTIBIOTIC STEWARDSHIP PARTNERS (NC CLASP)

- ▶ All the information from today's session will be on our website <https://spice.unc.edu/ncclasp/>



RESOURCES

- ▶ [New York State Antibiotic Prescribing Guide](#)

- ▶ Compendium of diagnostic and treatment guidelines for common outpatient conditions

- ▶ [CDC Treatment Recommendations](#)

- ▶ Summarizes professional society guidelines, management of penicillin allergy

- ▶ Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011. *JAMA* **2016**; 315:1864–1873.

- ▶ Chow AW, Benninger MS, Brook I, et al. IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults. *Clin Infect Dis* **2012**; 54:e72–e112.