CONFLICT OF INTEREST DISCLOSURES

- The views and opinions expressed in this series are those of the speakers and do not reflect the official policy or position of any agency of the US or NC government or UNC.

- Our speakers have the following financial relationships with the manufacturer(s) and/or provider(s) of commercial services discussed in this activity:
  - 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
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tr>
<td>January 24th</td>
<td>Pharyngitis, acute otitis media</td>
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<tr>
<td>February 28th</td>
<td>UTI and STI</td>
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<tr>
<td>March 27th</td>
<td>Skin and soft-tissue infections</td>
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<td>April 24th</td>
<td>Antibiotic Allergies</td>
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<tr>
<td>May Conference</td>
<td>TBD</td>
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<tr>
<td>June 26th</td>
<td>Additional strategies to prevent antibiotic overuse</td>
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TODAY’S OVERVIEW

- Acute bronchitis, pneumonia, and COPD exacerbation
  - Quick review
- Pharyngitis
- Acute otitis media (AOM)
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
QUICK REVIEW: ACUTE BRONCHITIS

- Infection of the large airways without pneumonia
- Cough (may last 3 weeks), may have low-grade fever, mild dyspnea, wheezing
- Cause: viruses
- Antibiotics not indicated
  - But commonly prescribed
QUICK REVIEW: COMMUNITY-ACQUIRED PNEUMONIA

- Diagnosis of CAP:
  - Symptoms: fever, cough, shortness of breath
  - Chest X-ray: consolidation (lobar or interstitial)
  - Complications: hypoxemia, pleural effusion, progression to sepsis

- Etiology: viral or bacterial

<table>
<thead>
<tr>
<th>Pneumococcus</th>
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<th>Atypicals</th>
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</thead>
<tbody>
<tr>
<td>Group A Strep</td>
<td>Oral anaerobes*</td>
<td></td>
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<tr>
<td>MSSA^</td>
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<tr>
<td>E. coli, K. pneumoniae</td>
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</tbody>
</table>

- Outpatient Treatment:
  - Young, healthy adults: amoxicillin x 5-7 days +/- azithromycin
  - Adults with comorbidities: amox/clav x 7 days + azithromycin
  - Children: amoxicillin (+/- azithromycin in school-age and adolescents)
QUICK REVIEW: COPD EXACERBATION

- **Symptoms:**
  - Increase in cough, dyspnea, and/or sputum production
  - Severe: respiratory failure

- **Triggers:**
  - Viral infections
  - Environmental irritants (particulate matter)
  - Bacterial infections uncommon

- **Indications for antibiotics**
  - Purulent sputum plus either increased sputum or increased dyspnea

- **Recommended antibiotics:** amox-clav, azithromycin, or doxycycline x 5 days
PHARYNGITIS
CAUSES OF SORE THROAT

- Viruses cause **majority** of pharyngitis cases
  - Adenovirus (often with associated conjunctivitis)
  - Enterovirus – herpangina, hand-foot-mouth
  - COVID-19
  - EBV

- **After viruses**, Group A Strep is most common cause
UNCOMMON CAUSES

- *Neisseria gonorrhoeae*
- Groups C and G streptococci
  - Not detected by routine GAS testing; do not cause acute rheumatic fever
- *Arcanobacterium haemolyticum*
- *Mycoplasma pneumoniae* and *Chlamydophila pneumoniae*
PHARYNGITIS COMPLICATIONS

- Peritonsillar abscess, retropharyngeal abscess (Group A Strep, oral anaerobes most common)
- Lemierre’s syndrome (oral anaerobes, esp *Fusobacterium*)
- Epiglottitis

- Important to see the patients!
GROUP A STREP: EPIDEMIOLOGY

- 15-30% of all cases of pharyngitis in children 5-15 years
  - (At least 70% of pharyngitis cases are viral!)
- Most common in school-age children
  - Occasionally in younger children – usually in contact with school-age children
- 5-15% of cases of pharyngitis in adults
- Peaks in winter and early spring
  - Also common to see in fall after school starts
GAS PHARYNGITIS: PRESENTATION

- GAS pharyngitis is a clinical syndrome:
  - Sore throat and fever
  - Common: headache, abdominal pain, nausea, vomiting
  - Physical exam:
    - Pharyngeal and uvular erythema
    - Palatal petechiae common
    - Tonsillar enlargement and exudate common (also very common in EBV)
    - Anterior cervical lymphadenopathy

- Symptoms suggesting viral etiology:
  - Rhinorrhea, cough, conjunctivitis, hoarseness, discrete ulcerative lesions, or intraoral vesicles
WHOM TO TEST FOR STREP

- **Modified Centor Criteria**
  - McIsaac, *JAMA*, 2004

- **IDSA Guidelines (2012)**
  - Avoid testing if viral features present
    - Cough, rhinorrhea, hoarseness, oral ulcers
  - Avoid testing children <3 years of age
    - Consider if risk factors, like symptoms plus an older sibling with strep
  - Follow-up posttreatment testing not recommended
  - Do not test asymptomatic household contacts

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<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points</th>
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<tbody>
<tr>
<td>Temperature &gt;38° C</td>
<td>1</td>
</tr>
<tr>
<td>Absence of Cough</td>
<td>1</td>
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<tr>
<td>Swollen, Tender Anterior Cervical Nodes</td>
<td>1</td>
</tr>
<tr>
<td>Tonsillar Swelling or Exudate</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>3-14 Years</td>
<td>1</td>
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<tr>
<td>15-44 Years</td>
<td>0</td>
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<tr>
<td>45 Years or Older</td>
<td>-1</td>
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<table>
<thead>
<tr>
<th>Score</th>
<th>Risk of Streptococcal Infection</th>
<th>Suggested Management</th>
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</thead>
<tbody>
<tr>
<td>≤0</td>
<td>1%-2.5%</td>
<td>No Further Testing or Antibiotic</td>
</tr>
<tr>
<td>1</td>
<td>5%-10%</td>
<td>Culture All; Antibiotics Only for Positive Culture Results</td>
</tr>
<tr>
<td>2</td>
<td>11%-17%</td>
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<tr>
<td>3</td>
<td>28%-35%</td>
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<tr>
<td>≥4</td>
<td>51%-53%</td>
<td>Treat Empirically With Antibiotics and/or Culture</td>
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</tbody>
</table>
GROUP A STREP COLONIZATION

- Martin JM et al., *Pediatrics* 2014
  - Swabbed schoolchildren (K-8) twice-monthly for four years
  - On average, 15.5% of asymptomatic participants were culture-positive at any time
  - 75% of positive cultures were in asymptomatic kids
  - In any school year, 30% of kids were asymptomatic carriers at some point
  - True recurrent infections rare

- Kids with pharyngitis and a positive GAS test often have a viral infection
### Bacterial Pharyngitis

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*Oral anaerobes are rare causes of peritonsillar and pharyngeal abscess.

#### Azithromycin

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#### Clindamycin

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#### Cephalexin

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STREPTOCOCCAL PHARYNGITIS TREATMENT

IDSA Guidelines, 2012

- **First-line**: Penicillin IM x 1 OR oral penicillin OR oral amoxicillin
- **Non-anaphylactic “allergy”** to penicillin: cephalexin
- **Unable to take cephalosporins**:  
  - Clindamycin OR azithromycin  
  - There is some resistance to both, but <10%
- **Not recommended**: amox-clav, broad cephalosporins, fluoroquinolones
PHARYNGITIS: STEWARDSHIP ISSUES

- Antibiotics without positive test
- Overuse of testing – treatment of false-positives
- Broad-spectrum antibiotic use
ANTIBIOTIC SELECTION

Hersh et al., *JAMA Internal Medicine*, 2016

- First-line antibiotics: just amoxicillin or penicillin
- ~60% of children and ~40% of adults receive guideline-recommended antibiotics

- Other choices:
  - Amox-clav: not recommended
  - Macrolides: third-line
  - Broad cephalosporins: not recommended
STREP THROAT: ANTIBIOTIC STEWARDSHIP OPPORTUNITIES

▶ Do NOT treat without a **positive** test
  ▶ No presumptive treatment
  ▶ Negative test → extremely unlikely to benefit from antibiotics

▶ Avoid over-testing
  ▶ Ensure adequate pre-test probability
    ▶ Centor criteria, screen for viral symptoms (cough, runny nose)
  ▶ Avoid nurse-initiated throat swabs
  ▶ Consider phone triage for pharyngitis
    ▶ CC of sore throat and patient has cough/rhinorrhea, they can probably stay home

▶ Use amoxicillin or penicillin unless allergic
ACUTE OTITIS MEDIA
AOM: EPIDEMIOLOGY

- Most common indication for antibiotics in children:
  - <5 years of age: ~6 cases/100 children each year
- Incidence cut by more than 50% by pneumococcal vaccination
- Often triggered by viral URTI
  - Seasonal

Mohanty S et al., BMC Public Health, 2023
AOM: MICROBIOLOGY

- Very similar to sinusitis
- Viruses: RSV, enterovirus, rhinovirus, coronaviruses, influenza, etc.
- Bacteria:
  - Pneumococcus – falling due to vaccines
    - Causes the most severe disease
  - H. influenzae
  - Moraxella catarrhalis
  - Rare: Group A Strep, Staph aureus, Mycoplasma pneumoniae
# AOM Treatment

**Acute otitis media, acute bacterial sinusitis**

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<th>Pneumococcus</th>
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~100% (Always active)  
90-99% (Almost always active)  
50-89% (Resistance more frequent)  
<50% (Usually or always inactive)
ACUTE OTITIS MEDIA TREATMENT

- **AAP Guidelines, 2013**

- **Diagnosis of AOM:**
  - Moderate or severe bulging of the TM or
  - Mild bulging of the TM with new onset of ear pain or intense erythema of the TM

- **Whom to Treat:**
  - Severe AOM: moderate or severe otalgia, otalgia for at least 48 hours, or temp >= 39 (102.2F)
  - Non-severe *bilateral* AOM in young children (<2 years of age)

- **OK to treat or observe (can use a safety-net prescription):**
  - Non-severe unilateral AOM in young children
  - Non-severe AOM in older children
ACUTE OTITIS MEDIA TREATMENT

- **AAP Guidelines, 2013**
- **Amoxicillin is first-line unless:**
  - Treated with amoxicillin in prior 30 days
  - or purulent conjunctivitis (usually *H. influenzae*)
  - Penicillin-allergic
- **Duration:**
  - <2 years or severe symptoms: 10 days
  - 2-5 years: 7 days
  - 6 years and up: 5-7 days
- **Remember:** oral cephalosporins are *much less* effective than high-dose amoxicillin against pneumococcus!
- Rarely recommended: azithromycin, TMP-SMX, clindamycin
AOM IN ADULTS

- Relatively uncommon – probably ~2-5 cases per 1,000 person-years
- Similar microbiology as in children
- No published guidelines for treatment
- Antibiotic choices:
  - First-line: amoxicillin or amox-clav
  - Alternative (penicillin allergy): cephalosporins
  - Cephalosporin allergy: doxycycline or azithromycin
- Duration: generally 5-7 days
AOM: ANTIMICROBIAL STEWARDSHIP

Stringent diagnostic criteria

- Overdiagnosis probably common

Guideline-recommended treatment and duration

- Overuse of broad-spectrum antibiotics, excessive durations

Defer treatment when not needed

- Older children with non-severe disease
ANTIBIOTIC SELECTION

Hersh et al., *JAMA Internal Medicine*, 2016

- Compared to sinusitis and pharyngitis: first-line antibiotics actually most likely for AOM
- Still: 30% of children with AOM received non-first-line antibiotics – mostly macrolides and cephalosporins
  - Broader-spectrum and likely less efficacious than first-line therapy
- How to measure:
  - Proportion of AOM diagnoses with prescription for amoxicillin or amox-clav
  - Proportion of AOM diagnoses with cephalosporin or azithromycin
AMOXICILLIN: IT WORKS!


- Reviewed over 1 million cases in large nationwide databases in 2019
- Both treatment failure and recurrence were *least* common in amoxicillin recipients
- Short durations (5-7) days: slightly more treatment failure, slightly less recurrence

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Treatment failure</th>
<th>Recurrence</th>
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<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>aOR (95% CI)</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Ref</td>
<td>-</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate</td>
<td>11.80 (11.27, 12.35)</td>
<td>11.36 (10.82, 11.93)</td>
</tr>
<tr>
<td>Cefdinir</td>
<td>9.85 (9.43, 10.29)</td>
<td>9.66 (9.22, 10.12)</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>11.01 (10.49, 11.56)</td>
<td>11.79 (11.19, 12.43)</td>
</tr>
</tbody>
</table>

*Adjusted for age (ref—6 mo to <2 y), sex (ref—male), visit region (ref—West), setting.
REDUCING ANTIBIOTIC EXPOSURE

1. Ensure appropriate durations for children older than 2
   - 10-day durations commonly seen; 5-7 days recommended by guidelines

   **Increasing Guideline-Concordant Durations of Antibiotic Therapy for Acute Otitis Media**
   
   Holly M. Frost, MD, FAAP\(^1,2,3\), Yingbo Lou, MS\(^4\), Amy Keith, MPH\(^2\), Andrew Byars, BS\(^5\), and Timothy C. Jenkins, MD\(^6,7\)

2. Consider deferring antibiotics in older children with non-severe symptoms (no severe ear pain, no fever of 39.0 or above)
   - Options:
     1. Close follow-up within 48-72 hours (phone or telehealth reasonable)
     2. Safety-net antibiotic prescriptions: family can fill only if needed
BREAKOUT SESSION

- Does your practice setting see a lot of patients for pharyngitis or ear infections?

- What’s the approach to swabbing for Strep throat?

- Do you see opportunities for antibiotic stewardship for these common conditions?
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

- IDSA Clinical Practice Guidelines: Group A Streptococcal Pharyngitis
- AAP Guidelines: Acute Otitis Media
- 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