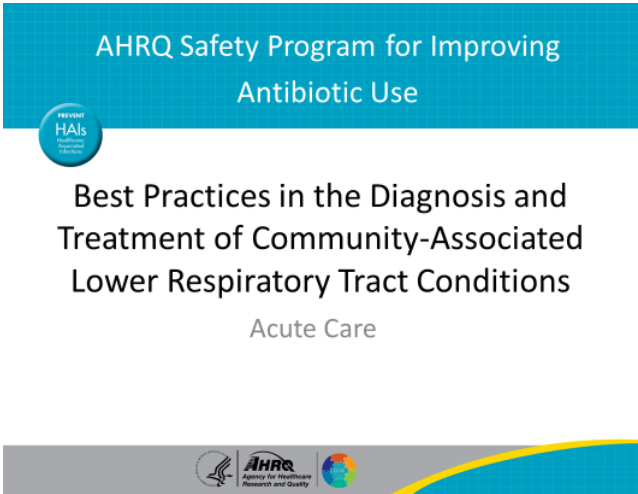


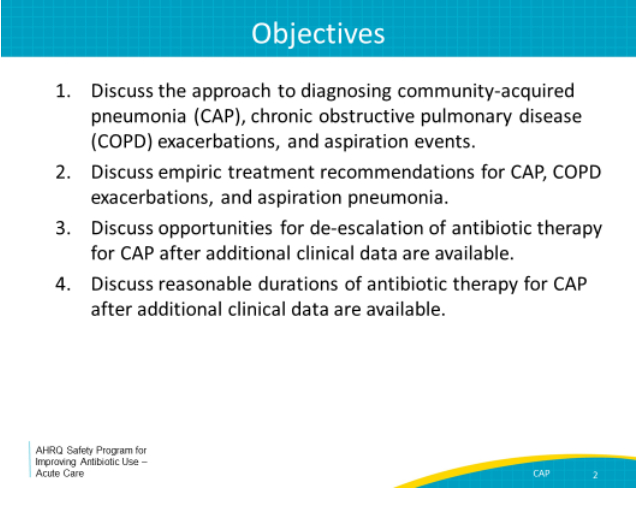
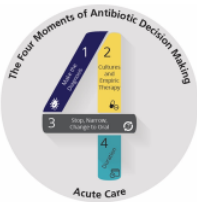

# AHRQ Safety Program for Improving Antibiotic Use

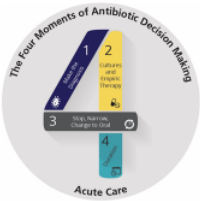





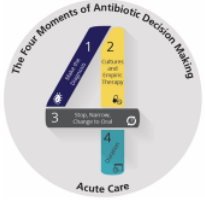


## Best Practices in the Diagnosis and Treatment of Community-Associated Lower Respiratory Tract Conditions Acute Care

Slide Title and Commentary	Slide Number and Slide
<p><b>Best Practices in the Diagnosis and Treatment of Community-Associated Lower Respiratory Tract Conditions Acute Care</b></p> <p>SAY:</p> <p>This presentation is titled “Best Practices in the Diagnosis and Treatment of Community-Associated Lower Respiratory Tract Conditions.”</p>	<p><b>Slide 1</b></p> 



Slide Title and Commentary	Slide Number and Slide
<p><b>Objectives</b></p> <p>SAY:</p> <p>This presentation will address—</p> <ul style="list-style-type: none"> <li>• The approach to diagnosing community-acquired pneumonia or CAP, chronic obstructive pulmonary disease or COPD exacerbation, and aspiration events</li> <li>• The empiric treatment recommendations for CAP, COPD exacerbation, and aspiration pneumonia</li> <li>• The opportunities for de-escalation of antibiotic therapy for CAP after additional clinical data are available</li> <li>• The reasonable durations of antibiotic therapy for CAP after additional clinical data are available</li> </ul>	<p><b>Slide 2</b></p> <p style="text-align: center;"><b>Objectives</b></p> <ol style="list-style-type: none"> <li>1. Discuss the approach to diagnosing community-acquired pneumonia (CAP), chronic obstructive pulmonary disease (COPD) exacerbations, and aspiration events.</li> <li>2. Discuss empiric treatment recommendations for CAP, COPD exacerbations, and aspiration pneumonia.</li> <li>3. Discuss opportunities for de-escalation of antibiotic therapy for CAP after additional clinical data are available.</li> <li>4. Discuss reasonable durations of antibiotic therapy for CAP after additional clinical data are available.</li> </ol> 
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>As we discuss the diagnosis and treatment of CAP, we will continue to use the Four Moments of Antibiotic Decision Making framework.</p> <p>As a reminder, Moment 1 asks: Does my patient have an infection that requires antibiotics?</p> <p>Moment 2 consists of two questions and asks: Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</p> <p>Moment 3 consists of three questions and asks: A day or more has passed since initiating antibiotics. As I have more clinical and microbiologic data available can I stop antibiotics, can I narrow antibiotics, or can I change from intravenous to oral antibiotics?</p> <p>And finally, Moment 4 asks: What duration of therapy is needed for my patient’s diagnosis?</p>	<p><b>Slide 3</b></p> <p style="text-align: center;"><b>The Four Moments of Antibiotic Decision Making</b></p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>3. A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> <li>4. What duration of antibiotic therapy is needed for my patient's diagnosis?</li> </ol> 

Slide Title and Commentary	Slide Number and Slide
<p><b>The Four Moments of Antibiotic Decision-Making</b></p> <p>SAY:</p> <p>The first moment of the Four Moments of Antibiotic Decision Making asks the question, “Does my patient have an infection that requires antibiotics?”</p>	<p><b>Slide 4</b></p> <p>The Four Moments of Antibiotic Decision Making</p> <p>1. Does my patient have an infection that requires antibiotics?</p>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 4</p>
<p><b>Moment 1: Diagnosing CAP</b></p> <p>SAY:</p> <p>A number of signs and symptoms commonly are observed with CAP. Cough and/or productive sputum are observed in over 90 percent of patients. Additionally, most patients have fevers, although this may be less common in the elderly.</p> <p>About half of patients have chills or tachypnea and a third will complain of chest pain. Crackles are generally heard upon chest auscultation.</p>	<p><b>Slide 5</b></p> <p>Moment 1: Diagnosing CAP</p> <ul style="list-style-type: none"> <li>Common signs and symptoms:<sup>1</sup> <ul style="list-style-type: none"> <li>Cough and/or sputum production (90%)</li> <li>Fever (&gt;90%) <ul style="list-style-type: none"> <li>Less common in older patients</li> </ul> </li> <li>Chills (50%)</li> <li>Tachypnea (45%)</li> <li>Pleuritic chest pain (30%)</li> <li>Crackles during chest auscultation</li> </ul> </li> </ul>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 5</p>

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 1: Diagnosing CAP</b></p> <p>SAY:</p> <p>Whenever a combination of these signs and symptoms are present, a chest x ray should be obtained. The absence of an infiltrate on chest x ray generally excludes the diagnosis of CAP. Similarly, the presence of an infiltrate on an x ray obtained for an unrelated reason without the signs and symptoms of CAP is unlikely to be CAP.</p> <p>If a patient has respiratory symptoms but does not have signs, symptoms, and imaging findings consistent with CAP, it is important to consider other causes of respiratory illness such as pulmonary embolism, asthma exacerbation, aspiration pneumonitis, or COPD exacerbations. These last two processes will be discussed later in this presentation.</p>	<p><b>Slide 6</b></p> <p>Moment 1: Diagnosing CAP</p> <ul style="list-style-type: none"> <li>• If common signs and symptoms are present, obtain chest x ray <ul style="list-style-type: none"> <li>– No infiltrates – indicates pneumonia not present</li> <li>– Presence of infiltrate without respiratory symptoms is unlikely to be CAP</li> </ul> </li> </ul>  
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>During Moment 2, ask, “Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?”</p>	<p><b>Slide 7</b></p> <p>The Four Moments of Antibiotic Decision Making</p> <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> </ol>   

## Slide Title and Commentary

### Moment 2: Diagnostic Tests

SAY:

Several diagnostic tests are available to assist with identifying the organism causing CAP. Blood cultures are recommended for patients who are moderately to severely ill or with chest imaging findings of a lung abscess or parapneumonic effusion. A sputum Gram stain and culture is recommended whenever a patient is able to produce sputum.

A respiratory viral panel is helpful as it could provide an alternative explanation for the patient's clinical symptoms—particularly during respiratory virus season.

If a *Streptococcus pneumoniae* urinary antigen test is available at your institution, it can be helpful as a positive test can assist with the narrowing of therapy—depending on the agent initially started.

A *Legionella* urinary antigen should be considered, if available, for patients with moderate to severe symptoms, smokers, immunocompromised patients, or patients over 50 years of age. Of note, the Legionella urinary antigen only detects *L. pneumophila* serogroup 1 which is responsible for 70 to 80 percent of Legionella infections.

In severely ill or immunocompromised patients not responding to therapy and when the etiology of pneumonia is unknown, a bronchoscopy should be considered to assess for rare bacterial pathogens. These include *Legionella* and *Nocardia* and fungal pathogens such as *Pneumocystis jiroveci*, *Aspergillus*, and endemic fungi, and *Mycobacterium tuberculosis* and atypical *Mycobacteria*.

## Slide Number and Slide

### Slide 8

#### Moment 2: Diagnostic Tests<sup>1</sup>

Test	Notes
Blood cultures	<ul style="list-style-type: none"><li>Recommended for patients who are moderately to severely ill or with chest imaging findings of an abscess or parapneumonic effusion</li></ul>
Sputum Gram stain and culture	<ul style="list-style-type: none"><li>Recommended for making the diagnosis of CAP</li></ul>
Respiratory viral panel	<ul style="list-style-type: none"><li>Provides an alternate explanation for the presentation</li></ul>
<i>Streptococcus pneumoniae</i> urinary antigen	<ul style="list-style-type: none"><li>Recommended, if available, to assist with narrowing antibiotic therapy</li></ul>
<i>Legionella</i> urinary antigen	<ul style="list-style-type: none"><li>Consider for patients with moderate to severe illness, smokers, or patients over 50 years of age</li><li>Only detects <i>L. pneumophila</i> serogroup 1 (70–80% of Legionella infections)</li></ul>
Bronchoscopy	<ul style="list-style-type: none"><li>Severely ill or immunocompromised patient not responding to therapy and no clear etiology</li></ul>

AHRQ Safety Program for Improving Antibiotic Use – Acute Care

CAP 8

## Moment 2: Empiric Therapy

SAY:

The Infectious Diseases Society of America and the American Thoracic Society Community Acquired-Pneumonia Guidelines for adults from 2007 recommend antibiotic regimens that cover both usual bacterial pathogens like *S. pneumoniae* and *H. influenzae* and atypical bacterial pathogens like *Legionella*.

There are several options for empiric therapy for CAP, but for most patients, current guidelines as of April 2019 suggest ampicillin-sulbactam and azithromycin or ceftriaxone and azithromycin as reasonable choices. Both ampicillin-sulbactam and ceftriaxone provide similar coverage for common bacterial causes of CAP. Azithromycin provides atypical coverage.

Ceftriaxone has more of an association with the development of *Clostridioides difficile* infection compared to ampicillin-sulbactam. But ceftriaxone is easier to administer as it is dosed less frequently and can be used in patients with non-severe penicillin allergies. Additionally, ceftriaxone provides broader coverage for *Enterobacteriaceae* such as *E. coli* and *Klebsiella* species, thus, some prefer it over ampicillin-sulbactam for patients admitted to the ICU.

For children with CAP in non-ICU settings, ampicillin or amoxicillin monotherapy are considered reasonable choices, if the child has not recently received amoxicillin. For adults with mild disease who are otherwise healthy, it is reasonable to consider ampicillin instead of ampicillin-sulbactam.

The addition of azithromycin to beta-lactam antibiotics has been shown to improve outcomes for adults with severe CAP. Although it can be considered for adult patients admitted to the general wards, data suggest that it may not improve outcomes for milder cases of CAP in non-ICU patients. The addition of doxycycline also provides coverage against atypical pathogens. Although no head-to-head trials compare outcomes of patients who received azithromycin or doxycycline as combination therapy for CAP, observational studies have suggested that macrolide-containing regimens are

## Slide 9

### Moment 2: Empiric Therapy<sup>1</sup>

Therapy	Notes
Ampicillin-sulbactam <u>PLUS</u> azithromycin (or doxycycline)	<ul style="list-style-type: none"><li>For children, otherwise healthy adults, or those with mild disease, consider ampicillin instead of ampicillin/sulbactam</li><li>Azithromycin has been associated with prolonged QTc intervals</li><li>Observational studies have suggested that doxycycline may be protective against the development of <i>Clostridioides difficile</i> infection (CDI)</li></ul>
Ceftriaxone <u>PLUS</u> azithromycin (or doxycycline)	<ul style="list-style-type: none"><li>Ceftriaxone is associated with development of CDI</li><li>Can be used in nonsevere penicillin (PCN) allergy</li></ul>
Respiratory fluoroquinolone (levofloxacin or moxifloxacin)	<ul style="list-style-type: none"><li>Strongly associated with development of CDI</li><li>Associated with prolonged QTc intervals, tendinopathies and altered mental status especially in the elderly</li><li>Consider for severe PCN allergy</li></ul>

AHRQ Safety Program for Improving Antibiotic Use – Acute Care

CAP

9

Slide Title and Commentary	Slide Number and Slide
<p>associated with better clinical outcomes for patients with severe CAP compared to other agents, possibly due to their immunomodulatory effects.</p> <p>Respiratory quinolones such as levofloxacin and moxifloxacin are also options for CAP—particularly in patients with severe penicillin allergies. However, it is important to remember that quinolones are associated with some notable adverse events such as <i>C. difficile</i> infections, prolonged QTc intervals, tendinopathies, and altered mental status changes, especially in the elderly.</p>	

## Slide Title and Commentary

### Moment 2: Empiric Therapy

In patients with recent respiratory viral infections presenting with bacterial pneumonia, consider coverage for *Staphylococcus aureus* including methicillin-resistant *S. aureus* or MRSA, in addition to standard antibiotics such as ceftriaxone. Coverage for MRSA such as vancomycin, linezolid, or trimethoprim-sulfamethoxazole should be considered in patients with cavitary lesions or if sputum Gram stain results reveal Gram-positive cocci in clusters.

Patients with bronchiectasis, those who received recent broad-spectrum antibiotic therapy, patients with a prolonged hospitalization, those admitted from a skilled nursing facility or nursing home in the past 3 months, or those who are immunocompromised may benefit from anti-pseudomonal coverage. Anti-pseudomonal agents such as cefepime or piperacillin-tazobactam should be considered for patients with these risk factors presenting with CAP, in addition to azithromycin.

During respiratory virus season, bacterial superinfections can be a concern. These are generally caused by *S. pneumoniae*, *S. agalactiae* (or Group A strep), and *S. aureus*. Generally patients have symptoms strongly suggestive of influenza followed by an improvement in signs and symptoms, with then a recurrence of fevers and respiratory findings. Chest x rays should be obtained to evaluate for a new infiltrate. For patients admitted to the ICU with a concern for a bacterial superinfection, it is reasonable to start antibiotics with coverage against both *S. aureus* and *Streptococcus* species.

## Slide Number and Slide

### Slide 10

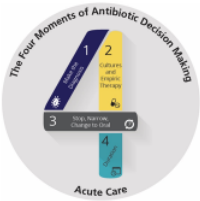

#### Moment 2: Empiric Therapy<sup>1</sup>

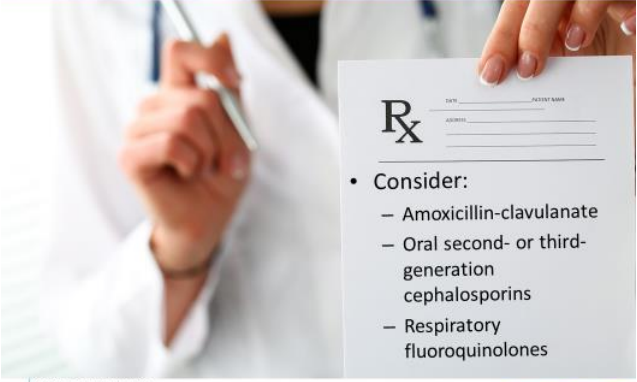
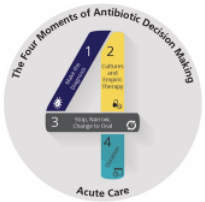
Therapy	Notes
Anti-MRSA therapy ± Ceftriaxone	<ul style="list-style-type: none"><li>In patients with recent respiratory viral infections presenting with bacterial pneumonia, consider coverage for <i>Staphylococcus aureus</i>, including MRSA, in addition to standard CAP antibiotics</li></ul>
Anti-pseudomonal therapy (e.g., cefepime PLUS azithromycin)	<ul style="list-style-type: none"><li>Risk factors include: bronchiectasis, recent broad-spectrum antibiotic use or prolonged hospitalization, admitted from or residing in a skilled nursing facility or nursing home within the past 3 months, immunocompromised</li></ul>



AHRQ Safety Program for Improving Antibiotic Use – Acute Care

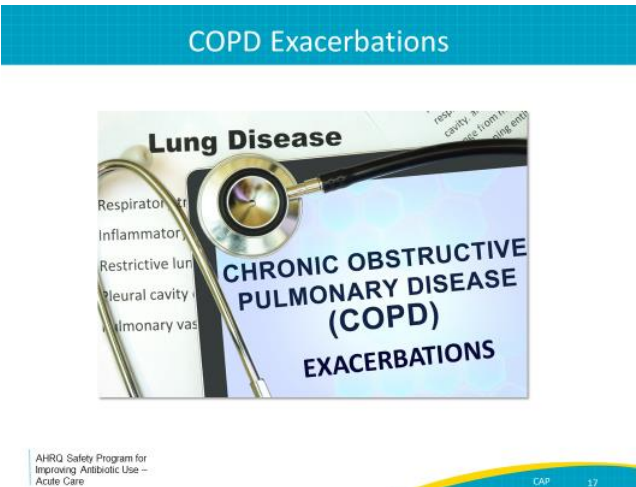
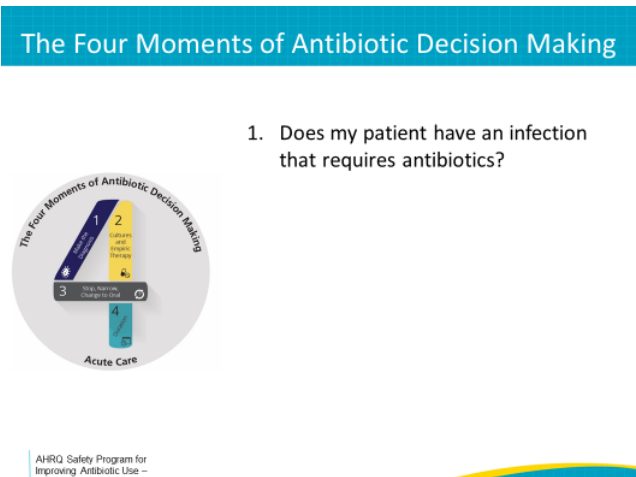
CAP 10


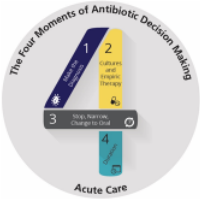



Slide Title and Commentary	Slide Number and Slide
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>Moment 3 occurs after a day or more has passed. Ask: Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</p>	<p><b>Slide 11</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>3. A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> </ol> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 11</p>
<p><b>Moment 3: Antibiotic Selection</b></p> <p>SAY:</p> <p>You can switch a patient to oral therapy as soon as clinical improvement is observed and the patient is able to tolerate oral medications.</p> <p>There are several instances when you can narrow to amoxicillin, when broader therapy has been started initially.</p> <p>If the sputum culture grows an amoxicillin or ampicillin-susceptible organism, if the streptococcal urinary antigen test is positive, or the proportion of <i>S. pneumoniae</i> isolates in your hospital that are penicillin resistant is low.</p> <p>Azithromycin has a long half-life, so if it was initiated, 3 days of azithromycin is sufficient (unless you are treating <i>Legionella</i>).</p>	<p><b>Slide 12</b></p> <p>Moment 3: Antibiotic Selection</p> <ul style="list-style-type: none"> <li>• Convert your patient to oral antibiotics as soon as clinical improvement is observed and the patient is able to tolerate oral therapy.</li> <li>• When can I narrow to amoxicillin? <ul style="list-style-type: none"> <li>– If the sputum culture grows an amoxicillin or ampicillin-susceptible organism</li> <li>– If the streptococcal urinary antigen test is positive and the proportion of <i>S. pneumoniae</i> isolates in your hospital that are penicillin resistant is low</li> </ul> </li> <li>• 3 days of azithromycin is sufficient given its long half life</li> </ul>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 12</p>

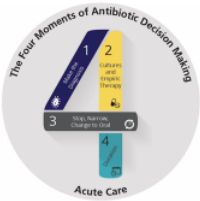
Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 3: If NO Results Are Positive....</b></p> <p>SAY:</p> <p>If no cultures are positive, consider completing therapy with amoxicillin-clavulanate, oral second- or third-generation cephalosporins, or respiratory fluoroquinolones.</p> <p>If a patient initially received ampicillin-sulbactam or IV cephalosporins, it is reasonable to convert to amoxicillin-clavulanate or an oral cephalosporin rather than switching to a respiratory fluoroquinolone which exposes the patient to additional risks from this class of antibiotics unnecessarily.</p>	<p><b>Slide 13</b></p> <p>Moment 3: If NO Results Are Positive....</p>  <ul style="list-style-type: none"> <li>• Consider: <ul style="list-style-type: none"> <li>– Amoxicillin-clavulanate</li> <li>– Oral second- or third-generation cephalosporins</li> <li>– Respiratory fluoroquinolones</li> </ul> </li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care CAP 13</p>
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>The fourth moment of antibiotic decision making is asking the question, “What duration of antibiotic therapy is needed for my patient’s diagnosis?”</p>	<p><b>Slide 14</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>3. A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> <li>4. What duration of antibiotic therapy is needed for my patient's diagnosis?</li> </ol> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care CAP 14</p>



Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 4: Duration of Therapy</b></p> <p>SAY:</p> <p>Numerous studies indicate that 5 days of antibiotic therapy is sufficient for most patients with CAP.</p> <p>Consider prolonging therapy to at least 7 days if: The patient is immunocompromised, the patient has underlying structural lung disease (not including asthma), or the patient did not have an adequate clinical response to therapy within 72 hours.</p> <p>If the patient has a nontraditional CAP pathogen such as <i>Legionella</i>, <i>Pseudomonas aeruginosa</i>, or <i>S. aureus</i>, longer durations of therapy are usually required, particularly if there is associated bacteremia.</p> <p>A lingering cough and chest x-ray abnormalities may take several weeks to improve. There is no need to prolong antibiotic therapy or repeat imaging if the patient is otherwise showing improvement.</p>	<p><b>Slide 15</b></p> <p><b>Moment 4: Duration of Therapy</b></p> <ul style="list-style-type: none"> <li>• <b>5 days</b> of antibiotic therapy is sufficient for most patients with CAP</li> <li>• Consider prolonging therapy to at least <b>7 days</b> if— <ul style="list-style-type: none"> <li>– The patient is immunocompromised</li> <li>– The patient has underlying structural lung disease (not including asthma)</li> <li>– The patient did not have an adequate clinical response to therapy within 72 hours</li> </ul> </li> <li>• If the patient has a nontraditional CAP pathogen such as <i>Legionella</i>, <i>Pseudomonas aeruginosa</i>, or <i>S. aureus</i>, longer durations of therapy are usually required, particularly if there is associated bacteremia</li> <li>• A lingering cough and chest x-ray abnormalities may take several weeks to improve</li> </ul> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> 
<p><b>5 Days of Antibiotics Are Sufficient for CAP</b></p> <p>SAY:</p> <p>A number of RCTs have shown that antibiotic treatment for 5 days is as safe and effective as longer treatment courses. One RCT even demonstrated that therapy as short as 3 days is sufficient.</p> <p>Data from bronchoscopy samples demonstrate 95 percent of patients with bacterial pneumonia eradicate pathogens after 3 days of therapy.</p> <p>Additionally, two meta-analyses have shown short courses of antibiotic therapy are effective for the treatment of CAP.</p>	<p><b>Slide 16</b></p> <p><b>5 Days of Antibiotics Is Sufficient for CAP</b></p> <ul style="list-style-type: none"> <li>• At least five randomized-controlled trials (RCTs) have shown that antibiotic treatment for 5 days is as safe and effective as longer treatment courses<sup>2-8</sup> <ul style="list-style-type: none"> <li>– One RCT even showed therapy as short as 3 days was sufficient</li> <li>– Data from bronchoscopy samples demonstrate 95% of patients with bacterial pneumonia eradicate pathogen after 3 days of therapy</li> </ul> </li> <li>• Two meta-analyses have also shown short courses of antibiotic therapy are effective for the treatment of CAP<sup>9,10</sup> <ul style="list-style-type: none"> <li>– 22 RCTs with &gt; 8,000 patients</li> </ul> </li> </ul> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> 

Slide Title and Commentary	Slide Number and Slide
<p><b>COPD Exacerbations</b></p> <p>SAY:</p> <p>Let's move on to discuss exacerbations of chronic obstructive pulmonary disease or COPD.</p>	<p><b>Slide 17</b></p> 
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>Remember, the first step is to ask yourself if your patient has an infection that requires antibiotics.</p>	<p><b>Slide 18</b></p> 

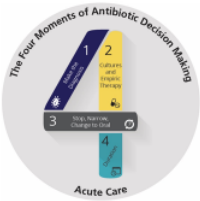

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 1: Distinguishing a COPD Exacerbation From CAP</b></p> <p>SAY:</p> <p>Distinguishing COPD from CAP in a patient with a known history of COPD can be challenging. If a chest x ray does not show evidence of a new infiltrate, he or she is more likely to have a COPD exacerbation.</p> <p>Although not all patients with a COPD exacerbation need antibiotics, patients requiring hospitalization for COPD are likely to have a moderate to severe COPD exacerbation for which antibiotic therapy is recommended.</p> <p>Remember, antibiotics generally do not improve outcomes in patients with asthma exacerbations and should not be given unless there is also evidence of concomitant CAP.</p>	<p><b>Slide 19</b></p> <p><b>Moment 1: Distinguishing a COPD Exacerbation From CAP</b></p> <ul style="list-style-type: none"> <li>• Distinguishing COPD and CAP in a patient with a known history of COPD can be challenging.</li> <li>• If a chest x ray does not show evidence of a new infiltrate, he/she is more likely to have a COPD exacerbation.</li> <li>• Although not all patients with a COPD exacerbation need antibiotics, patients requiring hospitalization for COPD are likely to have a moderate to severe COPD exacerbation for which antibiotic therapy is recommended.</li> <li>• Antibiotics do not improve outcomes in patients with asthma exacerbations and should not be given unless there is also evidence of concomitant CAP.</li> </ul>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 19</p>
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>Let's move on to moments 2 through 4 which, for simplicity, we will combine for COPD management.</p>	<p><b>Slide 20</b></p> <p><b>The Four Moments of Antibiotic Decision Making</b></p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>3. A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> <li>4. What duration of antibiotic therapy is needed for my patient's diagnosis?</li> </ol> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 20</p>

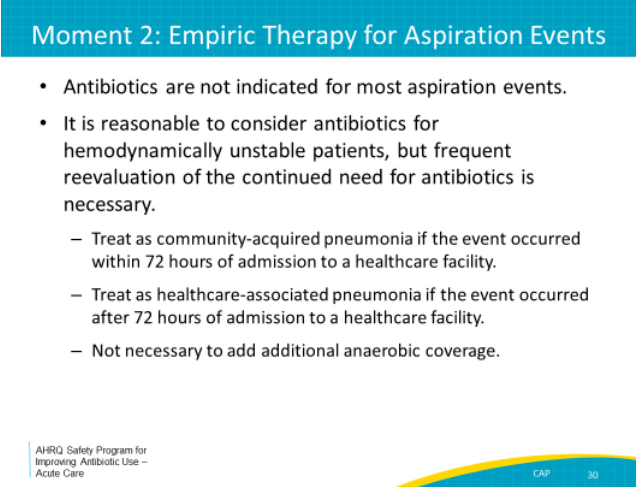
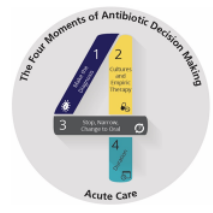

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 2–4: Management of COPD Exacerbations</b></p> <p>SAY:</p> <p>The goal of antibiotic therapy for COPD exacerbations is to reduce the bacterial burden and not to necessarily eradicate bacteria.</p> <p>Common bacteria associated with COPD exacerbations include <i>H. influenzae</i> and <i>S. pneumoniae</i>.</p> <p>Sputum Gram stain and culture is not needed in many cases of COPD exacerbations, but can be considered for patients with extensive prior antibiotic exposure or a severe COPD exacerbation to understand what organisms the patient is colonized with.</p> <p>Most patients can be treated empirically with a 3-day course of azithromycin.</p> <p>If a patient is already taking azithromycin, consider doxycycline, amoxicillin/clavulanate, or cefuroxime for a 5-day course.</p> <p>Avoid the use of fluoroquinolones unless prior or current cultures indicate infection with organisms resistant to standard therapy.</p>	<p><b>Slide 21</b></p> <p>Moments 2–4: Management of COPD Exacerbations</p> <ul style="list-style-type: none"> <li>• Common bacteria associated with COPD exacerbations include <i>H. influenzae</i> and <i>S. pneumoniae</i></li> <li>• Sputum Gram stain and culture are not needed in many cases of COPD exacerbation, but can be considered for patients with extensive prior antibiotic exposure or a severe COPD exacerbation</li> <li>• Most patients can be treated with 3 days of azithromycin<sup>11,12</sup></li> <li>• If a patient is already taking azithromycin, consider doxycycline, amoxicillin/clavulanate, or cefuroxime for a 5-day course<sup>11,12</sup></li> <li>• Avoid use of fluoroquinolones unless prior or current microbiology indicates infection with organisms resistant to standard therapy</li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 21</p>
<p><b>Aspiration Events and Aspiration Pneumonia</b></p> <p>SAY:</p> <p>Finally, let’s discuss aspiration events and aspiration pneumonia.</p>	<p><b>Slide 22</b></p> <p>Aspiration Events and Aspiration Pneumonia</p>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 22</p>


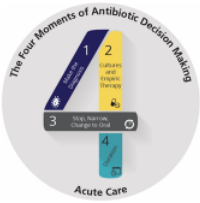

Slide Title and Commentary	Slide Number and Slide
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>We will start with moment 1 again. Does my patient have an infection that requires antibiotics?</p>	<p><b>Slide 23</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <p>1. Does my patient have an infection that requires antibiotics?</p> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 23</p>
<p><b>Moment 1: Aspiration Event</b></p> <p>SAY:</p> <p>Pneumonitis is an abrupt chemical injury caused by inhalation of sterile gastric contents. It progresses quickly to respiratory failure followed by rapid improvement within 48 hours of the event. Chest x rays can look very concerning, and supportive care is the mainstay of therapy.</p> <p>Prophylactic antibiotics have NOT been shown to be helpful in preventing pneumonia.</p>	<p><b>Slide 24</b></p> <p>Moment 1: Aspiration Event</p> <ul style="list-style-type: none"> <li>• Pneumonitis is an abrupt chemical injury caused by inhalation of sterile gastric contents<sup>13-15</sup> <ul style="list-style-type: none"> <li>– Progresses quickly to respiratory failure followed by rapid improvement <math>\leq 48</math> hours of the event</li> <li>– Chest x rays can look very concerning</li> <li>– Supportive care is the mainstay of therapy</li> <li>– Prophylactic antibiotics have NOT been shown to be helpful in preventing pneumonia</li> </ul> </li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 24</p>
<p><b>Moment 1: Distinguishing Aspiration Events From Aspiration Pneumonia</b></p> <p>SAY:</p> <p>If an aspiration event progresses to aspiration pneumonia, this generally occurs around 48 hours after the aspiration event. A portion of patients with aspiration events (about 20–25%), develop bacterial pneumonia in the ensuing 2 to 7 days. Aspiration pneumonia becomes apparent with new fevers and a worsening respiratory status after initial clinical improvement.</p>	<p><b>Slide 25</b></p> <p>Moment 1: Distinguishing Aspiration Event From Aspiration Pneumonia</p> <ul style="list-style-type: none"> <li>• Aspiration pneumonia <ul style="list-style-type: none"> <li>– Generally occurs 48 hours after the aspiration event</li> <li>– A portion of patients with aspiration events (20–25%) develop bacterial pneumonia the ensuing 2 to 7 days <ul style="list-style-type: none"> <li>• Becomes apparent because of new fevers and a worsening respiratory status after initial clinical improvement</li> </ul> </li> </ul> </li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 25</p>


Slide Title and Commentary	Slide Number and Slide
<p><b>Observational Data</b></p> <p>SAY:</p> <p>Is it safe not to treat aspiration events?</p> <p>In one study evaluating 50 patients who were observed by physicians to have an aspiration event, initial symptoms included fever, tachypnea, diffuse rales, cyanosis, cough, wheezing, apnea, and shock. Chest x rays generally revealed diffuse or localized infiltrates which progressed over the next 24 hours.</p> <p>In this cohort, 26 percent of patients progressed to bacterial pneumonia. Treatment with antibiotics at the time of the aspiration event did not appear to impact clinical outcomes.</p>	<p><b>Slide 26</b></p> <p><b>Observational Data</b></p> <ul style="list-style-type: none"> <li>• Evaluation of 50 patients observed by a physician to aspirate gastric contents<sup>14</sup></li> <li>• Initial symptoms <ul style="list-style-type: none"> <li>– Fever (94%), tachypnea (78%), diffuse rales (72%), cyanosis (32%), cough (36%), wheezing (32%), apnea (30%), shock (24%)</li> <li>– Chest x rays revealed diffuse or localized infiltrates which progressed over next 24 hours</li> </ul> </li> <li>• 13 (26%) progressed to bacterial pneumonia</li> <li>• Treatment with antibiotics at time of the aspiration event did not appear to impact clinical outcomes</li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care </p>
<p><b>Antibiotics and Aspiration Pneumonitis</b></p> <p>Say:</p> <p>In an observational study of 200 patients with aspiration pneumonitis, 38 percent received prophylactic antibiotics soon after the aspiration event and 62 percent received supportive care only without antibiotic therapy.</p> <p>The baseline characteristics were similar between the two groups. After adjustment for patient-level predictors of mortality, the in hospital mortality was similar between the groups at 25 percent and the need to transfer patients to the ICU was similar between the two groups at 5 percent and 6 percent.</p>	<p><b>Slide 27</b></p> <p><b>Antibiotics and Aspiration Pneumonitis</b></p> <ul style="list-style-type: none"> <li>• Observational study evaluating 200 patients with aspiration pneumonitis<sup>15</sup> <ul style="list-style-type: none"> <li>– 76 (38%) received prophylactic antibiotics</li> <li>– 124 (62%) received supportive care only</li> </ul> </li> <li>• Baseline characteristics were similar between groups</li> <li>• After adjustment for patient-level predictors of mortality: <ul style="list-style-type: none"> <li>– In hospital mortality similar between both groups (25% vs. 25%)</li> <li>– Transfer to ICU similar between both groups (5% vs. 6%)</li> </ul> </li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care </p>



Slide Title and Commentary	Slide Number and Slide
<p><b>The Four Moments of Antibiotic Decision-Making</b></p> <p>SAY:</p> <p>During Moment 2, ask, “Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?”</p>	<p><b>Slide 28</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> </ol> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 28</p>
<p><b>Moment 2: To Culture or not To Culture?</b></p> <p>SAY:</p> <p>Patients with aspiration events will be unlikely to produce significant sputum, making the utility of sputum cultures low. Sputum Gram stain and cultures should be considered when the diagnosis is unclear or if purulent sputum is being produced.</p>	<p><b>Slide 29</b></p> <p>Moment 2: To Culture or Not To Culture?</p> <ul style="list-style-type: none"> <li>• Patients with aspiration events are usually unlikely to produce significant sputum, making the utility of sputum cultures low.</li> <li>• Sputum Gram stain and culture should be considered when the diagnosis is unclear or purulent sputum is being produced.</li> </ul>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 29</p>

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 2: Empiric Therapy for Aspiration Events</b></p> <p>SAY:</p> <p>Antibiotics are not indicated for most aspiration events. It is reasonable to treat hemodynamically unstable patients with antibiotics but frequent reassessment for the continued need for antibiotics is needed.</p> <p>Treat as community-acquired pneumonia if the event occurred within 72 hours of admission to a healthcare facility.</p> <p>Treat as healthcare-associated pneumonia with agents like cefepime or piperacillin/tazobactam if the event occurred after 72 hours of admission to a healthcare facility or if the patient has risk factors for resistant organisms such as coming from a nursing home.</p> <p>It is not necessary to add additional anaerobic coverage with agents such as metronidazole or clindamycin as ampicillin, ampicillin-sulbactam, ceftriaxone, or agents used for healthcare-associated pneumonia such as cefepime or piperacillin-tazobactam all provide coverage for oral anaerobes.</p>	<p><b>Slide 30</b></p> <p>Moment 2: Empiric Therapy for Aspiration Events</p> <ul style="list-style-type: none"> <li>• Antibiotics are not indicated for most aspiration events.</li> <li>• It is reasonable to consider antibiotics for hemodynamically unstable patients, but frequent reevaluation of the continued need for antibiotics is necessary. <ul style="list-style-type: none"> <li>– Treat as community-acquired pneumonia if the event occurred within 72 hours of admission to a healthcare facility.</li> <li>– Treat as healthcare-associated pneumonia if the event occurred after 72 hours of admission to a healthcare facility.</li> <li>– Not necessary to add additional anaerobic coverage.</li> </ul> </li> </ul> 
<p><b>The Four Moments of Antibiotic Decision Making</b></p> <p>SAY:</p> <p>Moment 3 occurs after a day or more has passed. Ask: Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</p>	<p><b>Slide 31</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <ol style="list-style-type: none"> <li>1. Does my patient have an infection that requires antibiotics?</li> <li>2. Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>3. A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> </ol> 

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 3: Adjusting Therapy for Aspiration Events/Pneumonia</b></p> <p>SAY:</p> <p>For patients initially started on antibiotics after an aspiration event with a favorable clinical response: Rapid improvement in clinical status is anticipated within 48 hours of the aspiration event. If rapid improvement occurs, antibiotics can be discontinued.</p> <p>For patients not initially started on antibiotics without improvement within 48 hours: Treat as community-acquired pneumonia if the event occurred within 72 hours of admission to a health care facility.</p> <p>Treat as healthcare-associated pneumonia if the event occurred 72 hours or more after admission to a healthcare facility or if the patient has risk factors for resistant organisms such as coming from a nursing home.</p> <p>Again, it is not necessary to add additional anaerobic coverage.</p>	<p><b>Slide 32</b></p> <p>Moment 3: Adjusting Therapy for Aspiration Events/Pneumonia</p> <ul style="list-style-type: none"> <li>For patients initially started on antibiotics early <u>with</u> a favorable clinical response: <ul style="list-style-type: none"> <li>Rapid improvement in clinical status is anticipated within 48 hours of the aspiration event.</li> <li>If rapid improvement occurs, antibiotics can be discontinued.</li> </ul> </li> <li>For patients not initially started on antibiotics <u>without</u> improvement within 48 hours: <ul style="list-style-type: none"> <li>Treat as community-acquired pneumonia if the event occurred within 72 hours of admission to a healthcare facility.</li> <li>Treat as healthcare-associated pneumonia if the event occurred after 72 hours of admission to a healthcare facility.</li> <li>Not necessary to add additional anaerobic coverage.</li> </ul> </li> </ul> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> 
<p><b>The Four Moments of Antibiotic Decision-Making</b></p> <p>SAY:</p> <p>The fourth moment of antibiotic decision making is asking the question, “What duration of antibiotic therapy is needed for my patient’s diagnosis?”</p>	<p><b>Slide 33</b></p> <p>The Four Moments of Antibiotic Decision Making</p>  <ol style="list-style-type: none"> <li>Does my patient have an infection that requires antibiotics?</li> <li>Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?</li> <li>A day or more has passed. Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?</li> <li>What duration of antibiotic therapy is needed for my patient's diagnosis?</li> </ol> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> 

Slide Title and Commentary	Slide Number and Slide
<p><b>Moment 4: Duration of Therapy for Aspiration Pneumonia</b></p> <p>SAY:</p> <p>Duration should be determined based on clinical response and any relevant microbiology data. Most patients can receive 5 to 7 days of therapy.</p>	<p><b>Slide 34</b></p> <p>Moment 4: Duration of Therapy for Aspiration Pneumonia</p> <ul style="list-style-type: none"> <li>• Based on clinical response and organisms isolated</li> <li>• Most patients: 5–7 days</li> </ul>  <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 34</p>
<p><b>Take-Home Points</b></p> <p>SAY:</p> <p>To summarize some of the main take-home points from this presentation.</p> <p>First, regarding CAP, before prescribing antibiotics for a patient with signs and symptoms suggestive of CAP, obtain a chest x ray and sputum Gram stain and culture. Oral antibiotic step-down therapy is recommended after clinical improvement is observed and most patients can be treated for a 5-day course of antibiotics.</p> <p>Regarding COPD exacerbations, 3 days of azithromycin are generally sufficient. Fluoroquinolone use should be generally avoided, unless prior or current culture data for a specific patient suggests risk for or actual infection with organisms resistant to standard therapy.</p> <p>And finally, regarding aspiration pneumonitis, for hemodynamically stable patients, antibiotics generally are not needed and supportive care is the mainstay of therapy. Prophylactic antibiotics have not been shown to be helpful in improving outcomes.</p>	<p><b>Slide 35</b></p> <p>Take-Home Points</p> <div style="border: 1px solid black; padding: 10px;"> <p><b>CAP</b></p> <ul style="list-style-type: none"> <li>• Before prescribing antibiotics for patients with signs and symptoms suggestive of CAP, obtain chest x ray and sputum Gram stain with culture.</li> <li>• Oral step-down therapy recommended after improvement observed.</li> <li>• Most patients can be treated for a 5-day course.</li> </ul> <p><b>COPD Exacerbations</b></p> <ul style="list-style-type: none"> <li>• 3 days of azithromycin are generally sufficient if antibiotics indicated.</li> <li>• Fluoroquinolones are not necessary for most patients.</li> </ul> <p><b>Aspiration Pneumonitis</b></p> <ul style="list-style-type: none"> <li>• For hemodynamically stable patients, antibiotics are not needed and supportive care is the mainstay of therapy.</li> <li>• Prophylactic antibiotics have not been shown to be helpful in improving outcomes.</li> </ul> </div> <p>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</p> <p>CAP 35</p>

Slide Title and Commentary	Slide Number and Slide
<p><b>Disclaimer</b></p> <p>SAY:</p> <p>The findings and recommendations in this presentation are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this presentation should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.</p> <p>Any practice described in this presentation must be applied by health care practitioners in accordance with professional judgment and standards of care in regard to the unique circumstances that may apply in each situation they encounter. These practices are offered as helpful options for consideration by health care practitioners, not as guidelines.</p>	<p><b>Slide 36</b></p> <p style="text-align: center;"><b>Disclaimer</b></p> <ul style="list-style-type: none"> <li>• The findings and recommendations in this presentation are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this presentation should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.</li> <li>• Any practice described in this presentation must be applied by health care practitioners in accordance with professional judgment and standards of care in regard to the unique circumstances that may apply in each situation they encounter. These practices are offered as helpful options for consideration by health care practitioners, not as guidelines.</li> </ul> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> <p style="text-align: right;"><small>CAP 36</small></p>
<p><b>References</b></p> <p>SAY:</p> <p>Here are the references.</p>	<p><b>Slide 37</b></p> <p style="text-align: center;"><b>References</b></p> <ol style="list-style-type: none"> <li>1. Metlay JP, Waterer GW, Long AC, et al. Diagnosis and treatment of adults with community-acquired pneumonia. An official clinical practice guideline of the American Thoracic Society and Infectious Diseases Society of America. <i>Am J Respir Crit Care Med.</i> 2019 Oct 1;200(7):e45-e67. PMID: 31573350.</li> <li>2. Dunbar LM, Khasab MM, Kahn JB, et al. Efficacy of 750-mg, 5-day levofloxacin in the treatment of community-acquired pneumonia caused by atypical pathogens. <i>Curr Med Res Opin.</i> 2004 Apr;20(4):555-63. PMID: 15119993.</li> <li>3. Dunbar LM, Wunderink RG, Habib MP, et al. High-dose, short-course levofloxacin for community-acquired pneumonia: a new treatment paradigm. <i>Clin Infect Dis.</i> 2003 Sep 15;37(6):752-60. PMID: 12955634.</li> <li>4. File TM Jr, Mandell LA, Tillotson G, et al. Gemifloxacin once daily for 5 days versus 7 days for the treatment of community-acquired pneumonia: a randomized, multicenter, double-blind study. <i>J Antimicrob Chemother.</i> 2007 Jul;60(1):112-20. PMID: 17537866.</li> </ol> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> <p style="text-align: right;"><small>CAP 37</small></p>

Slide Title and Commentary	Slide Number and Slide
<p><b>References</b></p>	<p><b>Slide 38</b></p> <p style="text-align: center;"><b>References</b></p> <ol style="list-style-type: none"> <li>5. Léophonte P, Zuck P, Perronne C, et al. Routine use of extended-release clarithromycin tablets for short-course treatment of acute exacerbations of non-severe COPD. <i>Med Mal Infect.</i> 2008 Sep;38(9):471-6. PMID: 18722065.</li> <li>6. el Moussaoui R, de Borgie CA, van den Broek P, et al. Effectiveness of discontinuing antibiotic treatment after three days versus eight days in mild to moderate-severe community acquired pneumonia: randomized, double blind study. <i>BMJ.</i> 2006 Jun 10;332(7554):1355. PMID: 16763247.</li> <li>7. Montravers P, Fagon JY, Chasstre J, et al. Follow-up protected specimen brushes to assess treatment in nosocomial pneumonia. <i>Am Rev Respir Dis.</i> 1993 Jan;147(1):38-44. PMID: 8420428.</li> </ol> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> <p style="text-align: right;"><small>CAP 38</small></p>
<p><b>References</b></p>	<p><b>Slide 39</b></p> <p style="text-align: center;"><b>References</b></p> <ol style="list-style-type: none"> <li>8. Uranga A, España PP, Bilbao A, et al. Duration of antibiotic treatment in community-acquired pneumonia: a multicenter randomized clinical trial. <i>JAMA Intern Med.</i> 2016 Sep 1;176(9):1257-65. PMID: 27455166.</li> <li>9. Li JZ, Winston LG, Moore DH, et al. Efficacy of short-course antibiotic regimens for community-acquired pneumonia: a meta-analysis. <i>Am J Med.</i> 2007 Sep;120(9):783-90. PMID: 17765048.</li> <li>10. Dimopoulos G, Matthaiou DK, Karageorgopoulos DE, et al. Short-versus long-course antibacterial therapy for community-acquired pneumonia: a meta-analysis. <i>Drugs.</i> 2008;68(13):1841-54. PMID: 18729535.</li> <li>11. Bach PB, Brown C, Gelfand SE, et al. Management of acute exacerbations of chronic obstructive pulmonary disease: a summary and appraisal of published evidence. <i>Ann Intern Med.</i> 2001 Apr 3;134(7):600-20. PMID: 11281745.</li> </ol> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> <p style="text-align: right;"><small>CAP 39</small></p>
<p><b>References</b></p>	<p><b>Slide 40</b></p> <p style="text-align: center;"><b>References</b></p> <ol style="list-style-type: none"> <li>12. El Moussaoui R, Roede BM, Speelman P, et al. Short-course antibiotic treatment in acute exacerbations of chronic bronchitis and COPD: a meta-analysis of double-blind studies. <i>Thorax.</i> 2008 May;63(5):415-22. PMID: 18234905.</li> <li>13. Murray HW. Antimicrobial therapy in pulmonary aspiration. <i>Am J Med.</i> 1979 Feb;66(2):188-90. PMID: 425963.</li> <li>14. Bynum LJ, Pierce AK. Pulmonary aspiration of gastric contents. <i>Am Rev Respir Dis.</i> 1976 Dec;114(6):1129-36. PMID: 1008348.</li> <li>15. Dragan V, Wei Y, Elligsen M, et al. Prophylactic antimicrobial therapy for acute aspiration pneumonitis. <i>Clin Infect Dis.</i> 2018 Aug 1;67(4):513-8. PMID 29438467.</li> </ol> <p><small>AHRQ Safety Program for Improving Antibiotic Use – Acute Care</small></p> <p style="text-align: right;"><small>CAP 40</small></p>