Inpatient Pediatric Bacterial Community-Acquired Pneumonia (CAP) Guideline

This clinical guideline has been developed to assist with diagnosis, evaluation, and treatment of previously healthy children aged 3 months and older with suspected bacterial, community-acquired pneumonia requiring inpatient admission. Patients 3-6 months of age or with concerns for difficulties with initial outpatient management may require a low threshold for admission. Please direct any questions to The Pediatric Infectious Diseases Division, The Barbara Bush Children’s Hospital, at 207-662-5522.

*Streptococcus pneumoniae* is the most common invasive bacterial cause of CAP. Preschool-aged children are more likely to have a viral illness. **Patients with the following conditions are excluded** from this guideline: bronchiolitis, immunocompromised, underlying lung disease (excluding asthma), and risk of aspiration.

### SYMPTOM SEVERITY

**Mild**
- Minimal O2 requirement
- No respiratory distress
- Mild dehydration

**Moderate**
- Significant O2 requirement
- Moderate respiratory distress
- Moderate-severe dehydration

**Severe**
- SpO2 < 90%, FiO2 > 50%
- Severe respiratory distress
- Concern for impending need for ventilatory support

### EVALUATION

**Mild**
- Consider chest x-ray, CBC with diff, and blood culture
- Depending on time of year, consider influenza testing

**Moderate**
- 2-view chest x-ray
- Blood culture
- Consider CBC with diff

**Severe**
- 2-view chest x-ray
- Blood culture
- CBC with diff, BMP
- Sputum culture as soon as possible after intubation

- Depending on age and the time of year, consider influenza and RSV testing
- Sputum culture if tracheostomy present, as soon as possible after intubation and, if possible, in patients who can expectorate sputum

### TREATMENT

**Amoxicillin**
- Additional Considerations:
  - Amoxicillin/clavulanate if incomplete HiB vaccination
  - Cefdinir if non-anaphylaxis allergy to amoxicillin
  - Clindamycin if anaphylaxis

Consider treatment for atypical pneumonia*

**Ampicillin**
- Additional Considerations:
  - Ceftriaxone IV/IM for incomplete HiB vaccination, poor IV access, or failed adequate outpatient amoxicillin

Consider treatment for atypical pneumonia* or MSSA/MRSA**

**Ceftriaxone AND Vancomycin**, if severely ill with sepsis or impending intubation

- Additional Considerations:
  - Clindamycin, instead of vancomycin, if no concern for sepsis or need for ventilatory support

### TREATMENT CONSIDERATIONS

- Total duration of therapy for uncomplicated CAP is typically 10 days (IV and PO).
- *Consider treatment with azithromycin for Mycoplasma pneumoniae in patients > 5 years of age, with sore throat, low-grade fever, cough and fatigue that developed over 3-5 days. The benefit of treating Mycoplasma pneumoniae is controversial.*
- **If secondary bacterial pneumonia with influenza treat for Staphylococcus aureus.**
- If influenza positive and hospitalized, treat with antiviral, regardless of the duration of illness.

If significant worsening during treatment or if no improvement after 48-72 hours of treatment:
- Consider pediatric infectious diseases consultation
- Repeat or obtain imaging

If effusion is present, follow Complicated Pneumonia pathway (attached)
Complicated Pediatric Community-Acquired Pneumonia in a patient over 3 months of age

**DEFINITION**

- Moderate-to-large para-pneumonic effusion
- Multi-lobar pneumonia
- Cavitary lesion
- Pneumothorax

Moderate effusion >10 mm rim of fluid on decubitus film, opacifies less than half of the hemithorax on upright film.

**Patients with the following conditions are excluded from this guideline: immunocompromised, underlying lung disease (excluding asthma), and risk of aspiration.**

**EVALUATION**

- CBC with diff, CMP, CRP, ESR, blood culture – if not previously completed or available
- Sputum culture if tracheostomy present, as soon as possible after intubation, and, if possible, in patients who can expectorate sputum
- Consider chest ultrasound versus chest CT with contrast (be mindful of factors that increase risk of contrast-induced acute kidney injury: dehydration, NSAIDs, vancomycin, sepsis)
- Pleural fluid: Culture, gram stain, cell count, pH. Consider LDH, glucose, total protein.

**CONSULTS**

- Infectious diseases consultation
- Surgery consultation for consideration of drainage, chest catheter management with or without fibrinolytics, and/or VATS/other surgical intervention
- Interventional radiology if consideration of drainage with or without chest catheter placement
- Pulmonary consultation if consideration of recurrent pneumonia or other concern for structural anomaly

In general, moderate para-pneumonic effusions associated with respiratory distress, large para-pneumonic effusions, or documented purulent effusions should be drained. Commonly, consultation with surgery AND with interventional radiology is optimal for simple and complex effusions and for empyema management.

**TREATMENT**

**Moderate Illness Severity**

- **Ceftriaxone**
- **AND**
- **Clindamycin PO or IV**

Additional Considerations:

- Vancomycin, instead of clindamycin, for a known history of clindamycin-resistant MRSA

**Severe Illness Severity** (i.e. sepsis, need for ventilatory support, altered mental status)

- **Ceftriaxone**
- **AND**
- **Vancomycin**

Total duration therapy for patients with a complicated pneumonia is typically 2-4 weeks. The antibiotic choice, route of administration, and duration of treatment depends on the clinical response, adequacy of drainage, identification and sensitivity of a pathogen (i.e., MRSA typically requires longer duration), and the patient’s ability to reliably take oral antibiotics.
### Medication Dosing

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosing</th>
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<tbody>
<tr>
<td>Amoxicillin</td>
<td>90mg/kg/day PO divided q12h (max dose: 2g q12h)</td>
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<tr>
<td>Amoxicillin/clavulanate</td>
<td>90 mg/kg/day of AMOXICILLIN component PO divided q12h (max dose: 2g q12h) using appropriate dosage form:</td>
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<tr>
<td></td>
<td>• Try to use 14:1 or 17:1 ratio products</td>
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<tr>
<td>Ampicillin</td>
<td>200 mg/kg/day IV divided q6h (max dose: 2g q6h)</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>10 mg/kg PO once (max dose: 500mg), followed by 5 mg/kg PO once daily for four days (max dose: 250mg)</td>
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<tr>
<td>Cefdinir</td>
<td>14 mg/kg/day PO divided q12h (max dose: 300 mg q12h)</td>
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<tr>
<td>Ceftriaxone</td>
<td>Moderate Infection: 50 mg/kg IV once daily (max dose: 2g) Severe infection: 75 mg/kg IV once daily (max dose: 2g)</td>
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<tr>
<td>Clindamycin</td>
<td>IV/PO: 40 mg/kg/day divided q6-q8h (max daily dose: 1800 mg)</td>
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<tr>
<td>Vancomycin</td>
<td>15 mg/kg/dose IV q6-8h (if normal renal function; usual max daily dose: 2 g) Suggest Pharmacokinetic Consultation after 1st dose</td>
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Algorithms are not intended to replace providers’ clinical judgment or to establish a single protocol. Some clinical problems may not be adequately addressed in this guideline. As always, clinicians are urged to document management strategies.

*Last revised January 2020.*