This guideline is designed to provide guidance in otherwise healthy children. Management of pneumonia in patients <3 months, or in children who are immunocompromised, receiving home mechanical ventilation, or who have chronic conditions or underlying lung disease (e.g., cystic fibrosis; excluding asthma) is beyond the scope of these guidelines. Other types of pneumonia such as aspiration pneumonia, Lemierre syndrome, atypical pneumonia in infants (pertussis, *C. trachomatis*), and ventilator-associated pneumonia are also beyond the scope of these guidelines.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Empiric Therapy</th>
<th>Duration/Comments</th>
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</table>
| **Outpatient**<br>Target pathogen: *S. pneumoniae*<br>Underimmunized² Above, plus *H. influenzae* type b | 1<sup>st</sup> line:  
   - Amoxicillin* 45 mg/kg/DOSE PO BID (max: 2000 mg/DOSE)  
   - PCN allergy (preferred):  
     - Clindamycin 13 mg/kg/DOSE PO TID (max: 600 mg/DOSE)  
   Alternative if non-severe<sup>1</sup> PCN allergy:  
   - Cefuroxime* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE) (See comment)  
   Underimmunized²:  
   - Amoxicillin-clavulanate*³ 30 mg/kg/DOSE PO TID (max: 1000 mg/DOSE)  
   Underimmunized² and PCN allergy:  
   - Levofoxacin*:<br>   - <5 years:  
     - 10 mg/kg/DOSE IV/PO BID (max: 375mg/DOSE)  
   - ≥5 years:  
     - 10 mg/kg/DOSE IV/PO daily (max: 750 mg/DOSE) | • Duration:  
   - 7 days  
   • For children <5 years, given predominance of viral pneumonia, consider supportive care only  
   • Oral cephalosporins have inferior *in vitro* activity against *S. pneumoniae* compared to high-dose amoxicillin, clindamycin, and levofoxacin  
   • Azithromycin resistance occurs in up to 40% of *S. pneumoniae* |
| **Target pathogen:**<br>Children ≥5 years with features of atypical pneumonia⁴ | Consider azithromycin PO 10 mg/kg once on day 1 (max: 500 mg), followed by 5 mg/kg once daily x4 days (max: 250 mg/day) | • If unable to distinguish atypical from routine bacterial pneumonia, add azithromycin (except to levofoxacin); use azithromycin alone only if clear features of atypical pneumonia⁴.
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| **Inpatient**  
(uncomplicated or simple effusion only) | **Target pathogen:**  
*S. pneumoniae*  
Underimmunized<sup>2</sup> OR failed high-dose amoxicillin<sup>5</sup>: **Ceftriaxone** 100 mg/kg once, then 50 mg/kg/DOSE IV q24h (max: 2000 mg/DOSE)  
Alternative to ceftriaxone if severe<sup>3</sup> PCN or cephalosporin allergy: **Levofloxacin<sup>*</sup>**:  
<5 years:  
10 mg/kg/DOSE IV/PO BID  
(max: 375 mg/DOSE)  
≥5 years:  
10 mg/kg/DOSE IV/PO daily  
(max: 750 mg/DOSE) | **1<sup>st</sup> line:**  
**Amoxicillin<sup>*</sup>** 45 mg/kg/DOSE PO BID  
(max: 2000 mg/DOSE)  
PCN allergy:  
**Clindamycin** 13 mg/kg/DOSE PO TID  
(max: 600 mg/DOSE) | **Duration:**  
7 days (IV + oral) for uncomplicated pneumonia.  
With effusion, 7 days from afebrile.  
**Consider ID consult for significant prior antibiotics, no improvement with >48hrs guideline therapy, or anticipated prolonged antibiotics**  
**Tailor therapy to culture results**  
**Transition to oral therapy following clinical improvement, as evidenced by improving fever curve, stable respiratory status, and ability to tolerate PO**  
**Ceftriaxone should not be transitioned to oral cephalosporins due to inferior in vitro activity against *S. pneumoniae***  
**Discontinue if RPAN negative for atypical pathogens**  
**No additional atypical coverage needed if using levofloxacin** |
| **Target pathogens:**  
*M. pneumoniae*  
*C. pneumoniae*  
Children ≥5 years with features of atypical pneumonia<sup>4</sup>:  
Add **azithromycin** PO 10 mg/kg once on day 1 (max: 500 mg), followed by 5 mg/kg once daily x 4 days  
(max: 250 mg/day) | **PCN allergy:**  
**Clindamycin** 13 mg/kg/DOSE PO TID  
(max: 600 mg/DOSE) | **Underimmunized<sup>2</sup> with severe<sup>4</sup> PCN allergy:**  
**Levofloxacin<sup>*</sup>**:  
<5 years:  
10 mg/kg/DOSE IV/PO BID  
(max: 375 mg/DOSE)  
≥5 years:  
10 mg/kg/DOSE IV/PO daily  
(max: 750 mg/DOSE) | **Duration:**  
7 days (IV + oral) for uncomplicated pneumonia.  
With effusion, 7 days from afebrile.  
**Consider ID consult for significant prior antibiotics, no improvement with >48hrs guideline therapy, or anticipated prolonged antibiotics**  
**Tailor therapy to culture results**  
**Transition to oral therapy following clinical improvement, as evidenced by improving fever curve, stable respiratory status, and ability to tolerate PO**  
**Ceftriaxone should not be transitioned to oral cephalosporins due to inferior in vitro activity against *S. pneumoniae***  
**Discontinue if RPAN negative for atypical pathogens**  
**No additional atypical coverage needed if using levofloxacin** |
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<tbody>
<tr>
<td>Complicated and/or Severe (empyema, abscess, necrosis, or pneumonia requiring ICU care, including those with severe sepsis)</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; line: Ceftriaxone 100 mg/kg once, then 50 mg/kg/DOSE IV q12h (max: 2000 mg/DOSE) + Vancomycin* 15 mg/kg/DOSE IV q6h or 20 mg/kg/DOSE IV q8h</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; line: Amoxicillin-clavulanate*&lt;sup&gt;3&lt;/sup&gt; 30 mg/kg/DOSE PO TID (max: 1000 mg/DOSE) + TMP-SMX*&lt;sup&gt;6&lt;/sup&gt; 5 mg TMP/kg/DOSE PO BID (max: 320 mg/DOSE)</td>
<td>Duration: 7 days from afebrile. Longer duration may be required for empyema/abscess.</td>
</tr>
<tr>
<td></td>
<td>Severe&lt;sup&gt;1&lt;/sup&gt; PCN or cephalosporin allergy: Levofloxacin*:</td>
<td></td>
<td>Please consult ID for patients with complicated pneumonia, or severe illness with extensive work-up</td>
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<td>&lt;5 years: 10 mg/kg/DOSE IV/PO BID (max: 375mg/DOSE)</td>
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<td>Vancomycin goal trough: 10-15 mcg/mL</td>
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<tr>
<td></td>
<td>≥5 years: 10 mg/kg/DOSE IV/PO daily (max: 750 mg/DOSE)</td>
<td></td>
<td>Tailor therapy to culture results</td>
</tr>
<tr>
<td></td>
<td>+ Vancomycin* 15 mg/kg/DOSE IV q6h or 20 mg/kg/DOSE IV q8h</td>
<td></td>
<td>Transition to oral therapy following clinical improvement, as evidenced by improving fever curve, stable respiratory status, and ability to tolerate PO</td>
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<tr>
<td></td>
<td>Abscess or necrotizing pneumonia: Add metronidazole* 10 mg/kg/DOSE IV/PO q8h (max: 500 mg/DOSE) to either regimen</td>
<td></td>
<td>Ceftriaxone should not be transitioned to oral cephalosporins due to inferior in vitro activity against S. pneumoniae</td>
</tr>
<tr>
<td>Underimmunized&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td>PCN allergy with abscess or necrotizing pneumonia: Add metronidazole* 10 mg/kg/DOSE IV/PO q8h (max: 500 mg/DOSE)</td>
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<tr>
<td>Above, plus H. influenzae type b</td>
<td></td>
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<td>Consider discontinuing if RPAN is negative for atypical pathogens</td>
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<td></td>
<td></td>
<td></td>
<td>No additional atypical coverage needed if using levofloxacin</td>
</tr>
<tr>
<td>Target pathogens: M. pneumoniae C. pneumoniae</td>
<td>Children ≥5 years with features of atypical pneumonia&lt;sup&gt;4&lt;/sup&gt;: Add azithromycin IV/PO 10 mg/kg once on day 1 (max: 500 mg), followed by 5 mg/kg once daily x 4 days (max: 250 mg/day)</td>
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## Empiric Therapy

**Emergency Department**

- **Anticipated discharge to home:**
  - Prescribe antibiotics per Outpatient recommendations
  - If failed high-dose amoxicillin\(^1\) for typical bacterial pneumonia, use levofloxacin

- **Hypoxemic and/or not tolerating PO with negative sepsis screen:**
  - Begin empiric therapy per Inpatient recommendations
  - Transition to Outpatient empiric therapy if able to discharge

- **Positive sepsis screen and/or pneumonia with empyema, abscess, or necrosis:**
  - Begin empiric therapy per Complicated and/or Severe recommendations
  - If signs/symptoms of sepsis resolve and patient does not have empyema, abscess or necrosis, transition to Inpatient recommendations

- **Duration for outpatient therapy:**
  - 7 days (IV + oral)

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1. Severe allergy is defined by urticarial, angioedema, or anaphylaxis
2. Children who are not up-to-date for age with conjugate vaccines for S. pneumoniae or H. influenza type b
3. Use amoxicillin-clavulanate ES (600 mg/42.9 mg/5 mL) to limit the risk of diarrhea associated with high doses of clavulanate
4. Atypical pneumonia is characterized by slow progression of symptoms (over 3-5 days); typical signs/symptoms include, but are not limited to: malaise, sore throat, headache, cough, low-grade fever, and non-focal auscultatory and chest x-ray findings
5. Refers to patients who were compliant with, and tolerated oral high-dose amoxicillin for >48 hours
6. TMP-SMS: trimethoprim-sulfamethoxazole

### Reference: