Guidelines for the Empiric Management of Adult Patients with Community-Acquired Pneumonia (CAP) and IV to PO Conversion

Approved by the Anti-Infective Subcommittee
Approved by the Formulary & Therapeutics Committee

Last updated 10/15/04
Purpose:
- These guidelines serve to aid clinicians in the diagnostic work-up, assessment of severity of illness, empiric antibiotic treatment, and follow-up of adult patients with community-acquired pneumonia (CAP).
- These guidelines have been developed based on published literature including the most recent CAP guidelines and expert clinical opinions. The recommendations serve as a guide and clinicians are encouraged to use clinical judgment to manage all cases.

Components:
- Initial approach
  - Diagnostic studies
  - Patient stratification
    - Pneumonia PORT Severity Index
    - Patients with asthma have increased risk of complications and may warrant hospital admission.
  - Need for hospitalization
    - In general, patients in risk Class I and II may be managed as outpatients. Outpatient management of patients in risk Class III may be considered after assessment of patient’s clinical condition, follow-up, and home environment.
  - Need for admission to an intensive care unit

- Empiric antibiotic therapy
  - Outpatient therapy
  - Inpatient antibiotic therapy
    - Risk factors
      - Initial therapy should be individualized where appropriate based on antibiotic history, recent hospitalization, immune status, and culture history.
    - Non-ICU admission
    - ICU-admission

**every effort should be made to initiate antibiotic therapy within 4 hours of presentation**
**antibiotic therapy should always be targeted to culture and susceptibility data when available**

- IV to PO Conversion
  - Recommendations for oral conversion are provided based on initial IV therapy. The choice of oral antibiotics may be influenced by results of microbiologic studies, favoring more-narrow spectrum agents when possible.
  - Recommendations have been made to convert intravenous ceftriaxone, a third generation cephalosporin, to oral cefuroxime, a second-generation cephalosporin. Intravenous ceftriaxone has no definitive oral equivalent and conversion to cefuroxime (Ceftin®) should be adequate following initial therapy with ceftriaxone. If a specific pathogen is identified, therapy should be modified accordingly.

- Discharge

References
New York-Presbyterian Hospital
Guidelines for the Empiric Management of Adult Patients with Community-Acquired Pneumonia (CAP) and IV to PO Conversion

**Pneumonia diagnosed by radiograph and symptoms**

- Initiate diagnostic work-up

**Initiate appropriate empiric antibiotic therapy**

- (see drug therapy algorithm)

**Pneumonia PORT Severity Index Score**

**Risk Class I / II**
- Pneumonia Severity Index ≤ 70 points
  - Consider treatment as outpatient

**Risk Class III**
- Pneumonia Severity Index 71-90 points
  - Consider hospitalization
  - (May be treated as outpatient after evaluation of other factors including home environment and follow-up)

**Risk Class IV / V**
- Pneumonia Severity Index ≥ 91 points
  - Admit to hospital
  - Consider admission to ICU for severe pneumonia

**Evaluate empiric antibiotic therapy**

- Evaluate results of microbiology and diagnostic tests
- Modify antibiotic therapy if necessary

**Evaluate for discharge based on the following criteria:**

- Stable comorbid illnesses and significant improvement in pneumonia
- Should also fulfill the following criteria (*unless baseline status*):
  - temperature < 37.8°C (≥ 16 hours and in the absence of antipyretics)
  - pulse ≤ 100 beats/min
  - respiratory rate < 24 breaths/min
  - SBP > 90 mmHg
  - O₂ saturation ≥ 90%
  - ability to maintain oral intake

For all appropriate patients, prior to discharge, consider:
- influenza vaccination
- pneumococcal vaccination
- smoking cessation

**Discharge from hospital with oral antibiotic if necessary to complete a course of therapy**

**Typical diagnostic work-up**

- Vital signs
- Chest x-ray (PA and lateral)
- Complete blood count (CBC) with differential
- Basic metabolic panel
- Hepatic profile
- Pulse oximetry and/or ABG

In addition, the following are recommended for Risk Class III-V and should be considered for Risk Class I-II:
- Blood cultures x 2
- Sputum for Gram’s stain and culture (if possible)

**Additional diagnostics to consider:**

- Legionella urinary antigen
- S. pneumoniae urinary antigen (at CUMC only)
- HIV test
- EKG
- Immuno-compromised (including HIV):
  - Consider other causes of pneumonia (e.g. fungal, viral, TB, PCP) and other diagnostics
- Influenza season:
  - Nasopharyngeal swab for influenza and RSV
- Special circumstances:
  - e.g. SARS, bioterrorism

**Pneumonia PORT Severity Index Score**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Age =</td>
</tr>
<tr>
<td>Female</td>
<td>Age - 10 =</td>
</tr>
<tr>
<td>Nursing Home resident</td>
<td>+10</td>
</tr>
<tr>
<td>Co-existing illness</td>
<td></td>
</tr>
<tr>
<td>Neoplasm</td>
<td>+30</td>
</tr>
<tr>
<td>Liver disease</td>
<td>+20</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>+10</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>+10</td>
</tr>
<tr>
<td>Renal disease</td>
<td>+10</td>
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<tr>
<td>Physical exam findings</td>
<td></td>
</tr>
<tr>
<td>Altered mental status</td>
<td>+20</td>
</tr>
<tr>
<td>Respiratory rate &gt; 30 breaths/min</td>
<td>+20</td>
</tr>
<tr>
<td>Systolic BP &lt; 90 mmHg</td>
<td>+20</td>
</tr>
<tr>
<td>Temp &lt; 35°C or &gt; 40°C</td>
<td>+15</td>
</tr>
<tr>
<td>Heart rate ≥ 125 beats/min</td>
<td>+10</td>
</tr>
<tr>
<td>Lab and X-ray findings</td>
<td></td>
</tr>
<tr>
<td>Arterial pH &lt; 7.35</td>
<td>+30</td>
</tr>
<tr>
<td>BUN ≥ 30 mg/dL</td>
<td>+20</td>
</tr>
<tr>
<td>Na ≤ 130 mEq/L</td>
<td>+20</td>
</tr>
<tr>
<td>Glucose ≥ 250 mg/dL</td>
<td>+10</td>
</tr>
<tr>
<td>Hct &lt; 30%</td>
<td>+10</td>
</tr>
<tr>
<td>PO₂ &lt; 60 mmHg or O₂ saturation &lt; 90%</td>
<td>+10</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>+10</td>
</tr>
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</table>

**TOTAL SCORE**

**Severe pneumonia**

- Respiratory rate > 30 breaths/min
- Need for mechanical ventilation
- Septic shock
- SBP < 90 mmHg
- Multilobar disease
- PaO₂/FiO₂ ratio < 250
- Increasing infiltrate by 50% in 48 hours
- Oliguria
- Requiring pressors

**Criteria for IV to PO conversion**

- Clinical improvement in pulmonary signs and symptoms
- Afebrile or consistent improvement in fever over a 24-hour period
- WBC count normalizing
- Infection being treated does not require IV therapy
  - (e.g. endocarditis, meningitis)
- GI absorption likely normal
  - (absence of vomiting or abnormal GI anatomy)
- Ability to receive oral dosage form either orally or via tube
  - (concomitant oral or via tube administration of other meds)

LAST UPDATED 10/15/04
Empiric Antibiotic Therapy Options for CAP and Recommendations for PO Conversion

- Modification of antibiotic therapy may be necessary in patients with antibiotics in the past month, history of resistant pathogens (especially PCN-R S. pneumoniae), recently hospitalized, or severely immunocompromised.

- In immunocompromised patients (HIV+, solid organ transplant recipients, etc), consider other causes of pneumonia (e.g. viral, PCP, TB, etc.)

- All doses provided are for ~70 kg adults with normal renal and hepatic function

**NON-ICU ADMISSION**

<table>
<thead>
<tr>
<th>Suspect</th>
<th>Beta-lactam (penicillin) allergy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration:</td>
<td>Levofloxacin 500 mg IV daily 4 (+ clindamycin 600 mg IV Q8h for suspected aspiration)</td>
</tr>
<tr>
<td>Ceftriaxone 1 g IV daily + Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 more days</td>
<td>Piperacillin/tazobactam (Zosyn) 4.5 g IV Q8h 4 ± Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 more days</td>
</tr>
<tr>
<td>PO conversion</td>
<td>PO conversion</td>
</tr>
<tr>
<td>Cefuroxime (Ceftin) 500 mg PO Q12h (7-10 days total) 1, 4 and/or Azithromycin 250 mg PO daily (5 days total) or Levofloxacin 500 mg PO daily (7-10 days total) 2, 3, 4</td>
<td>Levofloxacin 500 mg PO daily (7-10 days total) 3, 4 (+ clindamycin 450 mg PO Q8h for suspected aspiration)</td>
</tr>
</tbody>
</table>

1. In the absence of meningitis, penicillin-susceptible and -intermediate S. pneumoniae (MIC < 0.06 - 1 mcg/mL) may be treated with ampicillin 2 g IV Q4-6h or ceftriaxone 1 g IV daily followed by amoxicillin 1 g PO Q8h

2. In the absence of meningitis, oral conversion to levofloxacin is recommended if penicillin-resistant S. pneumoniae (MIC ≥ 2 mcg/mL) is isolated

3. Oral administration of levofloxacin requires separation from concomitant administration of Mg+2-, Ca+2-, Al+3-containing antacids, sucralfate, calcium supplements, and iron products due to adsorption of the levofloxacin limiting its oral bioavailability. Separate administration times of these products from oral levofloxacin by about 2 hours.

4. Piperacillin/tazobactam, levofloxacin, tobramycin, aztreonam, cefuroxime, and amoxicillin/clavulanic acid require dose adjustment in patients with renal dysfunction

5. If necessary, consider the addition of azithromycin to cover atypical pathogens with the use of piperacillin/tazobactam ± tobramycin

6. Tobramycin IV dosing based on weight and renal function

**ICU ADMISSION**

-Initial antibiotic therapy should be individualized where appropriate based on recent hospitalization, prior antibiotic history, immunocompromised state, recent positive cultures, etc.

-Antibiotic therapy should be guided by culture and susceptibility results when available

-Once admitted to a general patient care area, patients initially admitted to the ICU may be switched to oral therapy (as above) and treated for 7-10 days total. In these patients, oral azithromycin should be continued at a dose of 500 mg daily for a total of 7-10 days.

**Beta-lactam (penicillin) allergy:**

<table>
<thead>
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<th>Suspect Pseudomonas aeruginosa:</th>
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<td>Levofloxacin 500 mg IV daily 3, 4 (+ clindamycin 600 mg IV Q8h for suspected aspiration)</td>
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<tr>
<td>Levofloxacin 750 mg IV daily 3, 4 ± Tobramycin IV 4, 6 or Aztreonam 2 g IV Q8h 4</td>
<td></td>
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