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 10/31/07
NewYork-Presbyterian Hospital
Guidelines for the Empiric Management of Adult Patients with Community-Acquired Pneumonia (CAP) and IV to PO Conversion

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
    o Pneumonia PORT Severity Index
    o Patients with asthma have increased risk of complications and may warrant hospital admission.
  - Need for hospitalization
    o 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
    o Risk factors
      ▪ Initial therapy should be individualized where appropriate based on antibiotic history, recent hospitalization, immune status, and culture history.
    o Non-ICU admission
    o 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
  - Prior to discharge, all patients should be screened for influenza vaccination during influenza season, pneumococcal vaccination, and the need for smoking cessation counseling.

References

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Pneumonia diagnosed by radiograph and symptoms

- Initiate diagnostic work-up
  - Initiate appropriate empiric antibiotic therapy (see drug therapy algorithm)

Pneumonia PORT Severity Index Score

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Pneumonia Severity Index</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>I / II</td>
<td>≤ 70 points</td>
<td>+10</td>
</tr>
<tr>
<td>III</td>
<td>71-90 points</td>
<td>+30</td>
</tr>
<tr>
<td>IV / V</td>
<td>≥ 91 points</td>
<td>+20</td>
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</tbody>
</table>

- Consider treatment as outpatient
  - Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 days
  - or Levofloxacin 500 mg PO daily x 7-10 days
- Consider hospitalization (May be treated as outpatient after evaluation of other factors including home environment and follow-up)
- 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 patient for IV to PO conversion

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:

- influenzavaccination
- 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

Immunocompromised (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

Severe pneumonia

Major criteria (need one):

- Need for mechanical ventilation
- Septic shock with need for pressors

Minor criteria (need at least three):

- Respiratory rate ≥ 30 breaths/min
- Multilobar disease
- PaO₂/FiO₂ ratio ≤ 250
- Confusion/disorientation
- Uremia (BUN ≥ 20 mg/dL)
- Leukopenia (WBC <4000 cells/mm³)
- Thrombocytopenia (platelets <100,000 cells/mm³)
- Hypothermia (temp <36°C)
- Hypotension requiring aggressive fluid resuscitation

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 (comitant oral or via tube administration of other meds)
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

**Ceftriaxone 1 g IV daily**

+ **Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 more days**

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

+ **Levofloxacin 500 mg IV daily**

**Cefuroxime (Ceftin) 500 mg PO Q12h** (7 days total)

**PO conversion**

- **Azithromycin 250 mg PO daily** (5 days total)
- **Levofloxacin 500 mg PO daily** (7 days total)

**Suspect Pseudomonas aeruginosa:**

+ Piperacillin/tazobactam 4.5 g IV Q6h
  + Azithromycin 500 mg IV daily
  + Tobramycin IV
+ Piperacillin/tazobactam 4.5 g IV Q6h
  + Levofloxacin 750 mg IV daily

### 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.

**Suspect Pseudomonas aeruginosa:**

+ Piperacillin/tazobactam 4.5 g IV Q6h
  + Azithromycin 500 mg IV daily
  + Tobramycin IV
+ Piperacillin/tazobactam 4.5 g IV Q6h
  + Levofloxacin 750 mg IV daily

### Beta-lactam (penicillin) allergy:

+ **Levofloxacin 750 mg IV daily**
  + Tobramycin IV
  + Aztreonam 2 g IV Q8h

1. Ceftriaxone should not be administered concomitantly and within 48 hrs of IV calcium-containing solutions (e.g. calcium replacement, TPN, lactated ringer’s, etc.). Use cefotaxime 1 g IV q8h in these instances in place of ceftriaxone.

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

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

4. 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.

5. Routine anaerobic coverage is not specifically needed in the majority of CAP cases. If a true aspiration pneumonia is suspected (pleuropulmonary syndrome in patients with a history of loss of consciousness as a result of alcohol/drug overdose or after seizures in patients with concomitant gingival disease or esophageal motility disorders), then consider the need for improved anti-anaerobic coverage. Piperacillin/tazobactam (instead of ceftriaxone) provides improved anaerobic coverage when true aspiration is a concern. The addition of Clindamycin 600 mg IV Q8h OR Metronidazole 500 mg IV Q8h is necessary for patients with beta-lactam allergy receiving levofloxacin. Documentation in the medical record should indicate the need for this coverage due to aspiration and risk of multi-drug resistant organisms.

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