Evaluation and Initial Management of Community-Acquired Pneumonia (CAP)

- Almost all major decisions in the management of CAP depend on initial assessment of severity.
- Prognostic models such as the CURB-65 can be used to help determine the site of care. (See CURB-65 Severity Score Calculator).
- Patients with CAP should be treated for a minimum of 5 days, should be afebrile for 48–72 hours, and should have no more than one CAP-associated sign of clinical instability before discontinuation of therapy.
- A longer duration of therapy may be needed if initial therapy was not active against the identified pathogen or if it was complicated by extrapulmonary infection, such as meningitis or endocarditis.

**Empirical therapy**

(See intravenous therapy, page 2)

*Compatible clinical features include but are not limited to: fever, hypothermia, rigors, sweats, new cough with / without sputum production, change in color of secretions, chest discomfort, or onset of dyspnea.† See CURB-65 Severity Scores in boxes on the right.‡ Obtain cultures as clinically indicated.§ If culture cannot be obtained, DO NOT delay antibiotic administration.

**CURB-65 Severity Score**

<table>
<thead>
<tr>
<th>Clinical Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>1</td>
</tr>
<tr>
<td>Blood urea nitrogen &gt; 19 mg per dL</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory rate ≥ 30 breaths per minute</td>
<td>1</td>
</tr>
<tr>
<td>Systolic blood pressure &lt; 90 mmHg or Diastolic blood pressure ≤ 60 mmHg</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 65 years</td>
<td>1</td>
</tr>
</tbody>
</table>

**Recommendations**

- Short inpatient hospitalization or closely supervised outpatient treatment
- Severe pneumonia; hospital and consider admitting to intensive care unit
- Low risk, consider home treatment

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**Diagnostic Testing to be Considered in ED**

(Recommended for all patients admitted to ICU)

- Blood culture (before antibiotics administered)§
- Sputum culture§
- Legionella urinary antigen test
- Pneumococcal urinary antigen test

**Mitigating Factors**

- Frail condition
- Nausea, vomiting
- Unable to tolerate supplemental oxygen requirements
- No response to oral therapy
- Severe social or psychiatric problems
- Substance abuse
- Unstable living situation
- Homelessness

**Evaluation and Initial Management of CAP**

- History
- Physical examination
- Pulse oximetry
- CBC
- Chemistry panel
- Chest X-ray

- Infiltrate and compatible clinical features supporting diagnosis of pneumonia*

- Determine site of care: CURB-65†, clinical judgment

- Hospitalize patient
  - CURB-65 score ≥ 2; clinical judgment

- Admit to ICU:
  - CURB-65 score 3-5 and/or
  - Requiring pressors or mechanical ventilation
  - Clinical judgment

- Admit to General Med Ward:
  - CURB-65 score 2-3
  - Clinical judgment

- Manage as outpatient
  - CURB-65 score 0-1; clinical judgment

- Manage / evaluate for alternative diagnosis
Empiric Antibiotic Selection for Community-Acquired Pneumonia

- **Antibiotic Timing Goal**: Administer appropriate antibiotics within 6 hours of presentation or while in the Emergency Department (See Infection by Site Antibiotic Grid).
- If culture results are available, direct antibiotic therapy based on culture results.

### Table 1: Intravenous (IV) Therapy

<table>
<thead>
<tr>
<th>Patient Population</th>
<th>Antibiotic</th>
<th>Recommended Dosing</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-ICU Patient without Pseudomonal Risk</td>
<td>ceftriaxone ** Plus (+) azithromycin OR monotherapy levofloxacin</td>
<td>2 g IV Q24 hrs.* 500 mg IV Q24 hrs.</td>
<td>If &lt; 65 years of age and no risk factors for drug-resistant pneumococcus, azithromycin is appropriate at discharge.</td>
</tr>
<tr>
<td>ICU Patient without Pseudomonal Risk</td>
<td>ceftriaxone*</td>
<td>2 g IV Q24 hrs.</td>
<td>If documented severe β-lactam allergy, use levofloxacin plus aztreonam (2 g IV Q8 hrs.**) as an alternative.</td>
</tr>
<tr>
<td>ICU and Non-ICU Patients with Pseudomonal Risk***</td>
<td>piperacillin / tazobactam ** or cefepime</td>
<td>4.5 g IV Q8 hrs.** 2 g IV Q8 hrs.**</td>
<td>If documented severe β-lactam allergy, use aztreonam plus levofloxacin with tobramycin (7 mg/kg IV Q24 hrs.**) as an alternative.</td>
</tr>
<tr>
<td>Suspected Aspiration****</td>
<td>ampicillin / subactam ** or ertapenem</td>
<td>3 g IV Q6 hrs.** 1 g IV Q24 hrs.**</td>
<td>Ertapenem should be used in patients with penicillin allergies.</td>
</tr>
<tr>
<td>Suspected MRSA Pneumonia</td>
<td>Add vancomycin</td>
<td>15-20 mg/kg Q12 hrs.**</td>
<td>Consider loading dose of 25 mg/kg.</td>
</tr>
</tbody>
</table>

*Ceftriaxone 1 g IV Q24 hrs. is adequate for patients weighing < 80 kg.

**Dose should be adjusted for renal function.

*** Risk of Pseudomonas is defined as any patient who has documentation of one of the following by the physician/advanced practice nurse/physician assistant (physician/APN/PA) or pharmacist:
- Bronchiectasis documented as a possible consideration.
  - Bronchiectasis is defined as chronic dilatation of a bronchus or bronchi, with a secondary infection that usually involves the lower portion of the lung.
  - Dilatation may be in an isolated segment or spread throughout the bronchi.
- Physician/APN/PA or pharmacist documented Pseudomonal risk.
- Structural lung disease AND documented history of repeated antibiotics or long term/chronic systemic corticosteroid use within the last 3 months. Structural lung disease includes:
  - Chronic bronchitis
  - COPD
  - Emphysema
  - Interstitial lung disease
    - Any of a group of diseases that affect the tissue and space around the air sacs of the lungs and may lead to progressive scarring of lung tissue
  - Restrictive lung disease:
    - Group of diseases that result in reduced lung volume.

**** Anaerobic coverage is clearly indicated only in the classic aspiration 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.

**Note**: Patients presenting from the community with any of the following health care exposures are at risk for MRSA and *Pseudomonas*, and therefore should receive empiric therapy for MRSA and *Pseudomonas* as outlined above: (1) hospitalized within 90 days of the infection; (2) resided in an extended care facility; (3) received recent intravenous antibiotic therapy, chemotherapy, wound care within the past 30 days of the current infection; (4) attended a hospital or hemodialysis clinic.
## Table 2: Oral Therapy

<table>
<thead>
<tr>
<th>Patient Population</th>
<th>Antibiotic</th>
<th>Recommended Dosing</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously Healthy and No Recent Antibiotic Therapy</td>
<td>azithromycin or doxycycline</td>
<td>500 mg PO Q24 hrs. 100 mg PO Q12 hrs.</td>
<td>If comorbidities, consider moxifloxacin as an alternative.</td>
</tr>
<tr>
<td>Antibiotic Therapy in Past 3 Months If previous therapy known, use an alternative agent</td>
<td>amoxicillin / clavulanate or amoxicillin (high dose) or cefdinir</td>
<td>2000/125 mg PO Q12 hrs.* 1 g PO Q8 hrs.* 300 mg PO Q12 hours*</td>
<td>High dose amox/clav targets drug-resistant S. pneumoniae (DRSP). Patients with co-morbidities or recent antimicrobial therapy are at risk of DRSP.</td>
</tr>
<tr>
<td>Plus (+) either azithromycin or doxycycline</td>
<td>500 mg PO Q24 hrs. 100 mg PO Q12 hrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR monotherapy levofloxacin</td>
<td>750 mg PO Q24 hrs.*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suspected Aspiration</td>
<td>amoxicillin / clavulanate or clindamycin</td>
<td>2000/125 mg PO Q12 hrs.* 300–450 mg PO Q6 hrs.</td>
<td>High dose amox/clav targets drug-resistant S. pneumoniae (DRSP). Patients with co-morbidities or recent antimicrobial therapy are at risk of DRSP.</td>
</tr>
</tbody>
</table>

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**Order Sets**
- MED: HCAP Pneumonia Antibiotic Management [2557]
- MED: Admission Pneumonia [2105]
- ED: CDU/OBS Pneumonia/Influenza [2428]
- ED: Dyspnea (aka pneumonia) [2399]

**References**
- OSUMC Drug Formulary
- Specifications Manual for National Hospital Quality Measures, version 4.0

**Guideline Authors**
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- Daniel Martin, MD
- Erica Reed, PharmD, BCPS

**Quality Measures**
- Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours
- Blood cultures performed in the Emergency Department prior to initial antibiotic received in the hospital
- Appropriate selection of antibiotic
- Mortality rate
- Readmission rate

**Guideline Approved**

**Disclaimer:** Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.