Community Acquired Pneumonia in Adults

- **Community acquired pneumonia (CAP):** acute infection acquired outside of hospital or within 48 hours of admission

**MOST COMMON MICROORGANISMS**
- Viruses are common causative pathogens and frequently implicated in coinfections with bacteria.
- The most common bacterial pathogen is *Streptococcus pneumoniae*.
  - Less common bacteria: *Haemophilus influenzae*, *Moraxella catarrhalis*, *Staphylococcus aureus*, *Legionella pneumophila*, *Enterobacterales (Enterobacteriaceae)*, *Mycoplasma pneumoniae*

**DIAGNOSTIC CONSIDERATIONS**
- Differential diagnoses: acute exacerbation of COPD, acute bronchitis, heart failure, and pulmonary embolism
- Infiltrate on chest radiograph with supportive clinical findings:
  - Symptoms include new onset fever, cough, sputum production, dyspnea, tachypnea, pleuritic chest pain
  - Physical findings consistent with signs of air space disease (e.g. crackles, bronchial breath sounds)
  - If no infiltrate on initial x-ray, patients should be reassessed within 48 to 72 hours if a high clinical suspicion of pneumonia remains
- Risk stratify using clinical judgement or the CRB-65 score:

<table>
<thead>
<tr>
<th>CRB-65: Patient Criteria</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Confusion (either based on specific mental test OR new disorientation to person, place or time)</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory rate &gt; 30 breaths per minute</td>
<td>1</td>
</tr>
<tr>
<td>Hypotension (systolic &lt; 90 mm Hg OR diastolic &lt; 60 mm Hg)</td>
<td>1</td>
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<tr>
<td>Age &gt; 65 years old</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>CRB-65 Score</th>
<th>30 Day Mortality</th>
<th>Management Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 points AND $\text{O}_2$ sat &gt; 92% (on room air)</td>
<td>2.4 % (low risk)</td>
<td>Outpatient treatment</td>
</tr>
<tr>
<td>1 – 2 points</td>
<td>13.3 % (moderate risk)</td>
<td>Consider admission to inpatient ward</td>
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<tr>
<td>3 – 4 points</td>
<td>34.3 % (high risk)</td>
<td>Often requires an ICU admission</td>
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**MANAGEMENT CONSIDERATIONS**
- This guideline does not apply to patients with cystic fibrosis, febrile neutropenia, structural lung disease, and others colonized with multidrug-resistant microorganisms.
- Macrolides are not first line because of poor *S. pneumoniae* coverage
- Consider testing for *Legionella* urinary antigen in severe CAP (requiring ICU admission) or if patient is associated with a local *Legionella* outbreak
• **Influenza testing**: recommended for CAP requiring hospital admission during periods of high influenza activity

• **Sputum cultures** if any one of:
  - ICU admission requiring intubation, starting empiric treatment for or recent infection with MRSA or resistant Gram-negatives (e.g. *Pseudomonas*), hospitalization and receipt of parenteral antibiotics in the last 90 days, or copious sputum production
  - Low quality results may be misleading as cultured bacteria often represent colonization

• **Blood cultures** if any one of:
  - Fever, ICU admission requiring intubation, starting empiric treatment for or recent infection with MRSA or resistant Gram-negatives (e.g. *Pseudomonas*), or hospitalization and receipt of parenteral antibiotics in the last 90 days

• **Empiric coverage of atypical bacteria** (e.g. *Legionella, Mycoplasma*):
  - Outpatient setting: **not recommended**
  - Non-ICU hospitalization: **benefit is unclear** and there is risk of adverse effects, especially in patients with a predisposition for QTc prolongation from macrolides (i.e. azithromycin) and multiple adverse effects from fluoroquinolones (i.e. levofloxacin)
  - ICU patients: coverage for *Legionella* is routinely recommended (see below)

• **Aspiration pneumonia**
  - Antimicrobial prophylaxis at the time of aspiration is not beneficial. Provide supportive care and reassess in 48 hours for signs and symptoms of pneumonia
  - Routine addition of anaerobic coverage, such as metronidazole, **is not recommended** unless treating an empyema or lung abscess.

### EMPIRIC TREATMENT

<table>
<thead>
<tr>
<th>Setting</th>
<th>Standard Regimen</th>
<th>Penicillin Allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient</strong></td>
<td>Amoxicillin* 500 mg to 1 g PO TID</td>
<td>Cefuroxime* 500 mg PO BID</td>
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<tr>
<td></td>
<td></td>
<td>Doxycycline 100 mg PO BID</td>
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<td></td>
<td></td>
<td>Levofloxacin* 750 mg PO daily</td>
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<tr>
<td><strong>Inpatient</strong></td>
<td>Amoxicillin* 500 mg to 1 g PO TID</td>
<td>Cefuroxime* 500 mg PO BID OR 750 mg IV q8h</td>
</tr>
<tr>
<td>(Non-ICU)</td>
<td>Ampicillin* 2 g IV q6h</td>
<td>Ceftriaxone 1 g IV q24h</td>
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<td>+/- Atypical coverage: if strong suspicion of atypical pathogens and if <strong>not receiving a fluoroquinolone</strong>:</td>
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<tr>
<td></td>
<td></td>
<td>• Azithromycin 500 mg PO daily x 3 days</td>
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<td></td>
<td></td>
<td>• Doxycycline 100 mg PO BID (preferred if prolonged QTc)</td>
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<tr>
<td><strong>ICU</strong></td>
<td>Ceftriaxone 1 g IV q24h + [Azithromycin 500 mg PO/IV daily OR Levofloxacin* 750 mg PO/IV daily]</td>
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<td>• if treating proven <em>Legionella</em>, levofloxacin is the preferred option</td>
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</table>

**For severe pneumonia consider *Pseudomonas* OR MRSA coverage if risk factors:**
Prior respiratory isolation of MRSA/*Pseudomonas*, colonization with MRSA/*Pseudomonas*, OR recent hospitalization AND receipt of parenteral antibiotics in the last 90 days

- *Pseudomonas*: Piperacillin/tazobactam* 3.375 g IV q6h + [Azithromycin OR Levofloxacin for atypical coverage]
- MRSA: ADD Vancomycin* (See NSHA Antimicrobial Handbook)

*May require renal dose adjustments.

Note: amoxicillin/clavulanate unnecessarily broad for most community acquired pneumonia in previously healthy individuals.

• **Oseltamivir** 75 mg PO BID x 5 days (dose adjust in renal dysfunction) recommended as empiric treatment in hospitalized patients with suspicion of influenza, regardless of timing of symptom onset
  - Higher doses of oseltamivir such as 150 mg BID are not recommended
DURATION

- Usual duration is **5 days**, exceptions include:
  - The patient is not yet clinically stable: ongoing vital sign abnormalities including tachycardia, tachypnea, hypotension, high oxygen requirements, or persistent fever
  - Associated bloodstream infections
  - Duration in cases of *S. aureus* or in known resistant Gram negative bacteria is at least 7 days; ID consultation should be considered
  - Longer durations required for empyema and lung abscess

SPECIAL CONSIDERATIONS

- Review IV antibiotics within 48 hours of treatment initiation and consider switching to PO antibiotics once patient is clinically improving (e.g. afebrile, hemodynamically stable, adequate PO intake).
  - CAP is often inappropriately treated with prolonged IV therapy and prolonged antibiotic courses.

REFERENCES