CPG.63 Management of Adult Patients with Community-Acquired Pneumonia (CAP)

The contents of this clinical practice guideline are to be used as a guide. Healthcare professionals should use sound clinical judgment and individualize patient care. This CPG is not meant to be a replacement for training, experience, CME or studying the latest literature and drug information.

This guideline addresses outpatient and inpatient management of the clinical entity of pneumonia that is acquired outside of the hospital setting. It focuses on adults who do not have immunocompromised conditions, such as inherited or acquired immune deficiency, drug-induced neutropenia, active chemotherapy use or solid organ or bone marrow transplant recipients.

1. Diagnosis of pneumonia
   a. Clinical features PLUS an infiltrate on chest imaging.
      b. If chest x-ray (CXR) negative, consider computed tomography scan (CT) chest if clinical suspicion is high (as up to 15% may have negative CXR)

2. Workup
   a. Complete blood count with differential (CBCD), comprehensive metabolic panel (CMP), CXR, human immunodeficiency virus (HIV), influenza swab (if during flu season) and consider cocci (complement fixation and immunodiffusion)\(^1\). 
      b. 2x blood cultures (prior to antibiotics) and sputum culture if any of the following:
         • Plan to empirically treat for Methicillin-resistant staphylococcus aureus (MRSA) or Pseudomonas aeruginosa (P. aeruginosa).
         • Previously infected with MRSA or P. aeruginosa from respiratory tract in past year.
         • Previously hospitalized and received parenteral antibiotics in the last 90 days.
      c. No need to send procalcitonin\(^3\)- empiric antibiotic therapy should be initiated in adults with clinically suspected and radiographically confirmed CAP regardless of initial serum procalcitonin level.
      d. If classified as severe CAP (at least 1 major OR 3 minor Infectious Disease Society of America (IDSA) severe CAP criteria; see footnote)\(^2\)
         • Obtain 2x blood culture (prior to antibiotics), sputum cultures, as above, in addition to MRSA nasal swab.
         • Send Legionella urine antigen, Streptococcus pneumoniae (S. pneumoniae) urine antigen, mycoplasma immunoglobulin M (IgM) and immunoglobulin G (IgG), cocci, and consider HIV stat.
3. Determining Level of Care
   a. First level: Outpatient vs Inpatient
      • Absolute indications for admission:
        ✓ Oxygen saturation < 92%.
        ✓ Presence of sepsis.
        ✓ Inability to adhere to or tolerate PO antibiotic regimen.
        ✓ Failure of outpatient antibiotic therapy.
      • Otherwise, use clinical judgment plus the **Pneumonia Severity Index (PSI)** to determine disposition.
        ✓ Use PSI calculator at -
          PSI is recommended over other scoring systems (e.g. CURB-65) for this purpose.
          ✓ Scores ≤ 90, when used along with clinical judgment, correspond to low mortality risk and may support outpatient management.
   b. Second level: Med-Surg/Tele vs DOU vs ICU
      • Indications for ICU consultation
        ✓ Respiratory failure requiring mechanical ventilation or severe respiratory distress.
        ✓ Hypotension requiring vasopressors.
      • Triage based on number of IDSA minor criteria (plus clinical judgement) if the above indications are absent:
        ✓ ≥5 minor criteria → admit to DOU with mandatory ICU consultation.
        ✓ 3-4 minor criteria → admit to DOU.
        ✓ <3 minor criteria → admit to med-surg or telemetry.

4. Empiric Treatment Regimens
<table>
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<tr>
<th>OUTPATIENTS</th>
<th>Recommended Empiric Treatment</th>
<th>Notes:</th>
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<tr>
<td><strong>Outpatient CAP with no comorbidities</strong></td>
<td>Amoxicillin* 1g PO TID OR Doxycycline 100 mg PO BID OR Azithromycin® 500 x 1 than 250 mg PO daily</td>
<td>- Duration of treatment is 5 DAYS (see #6 below) - Comorbidities include chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; or asplenia. - Always discuss potential side effects with patients</td>
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<tr>
<td><strong>Outpatient CAP with comorbidities</strong></td>
<td>Amoxicillin/Clavulanate® 875/125mg PO BID OR Cefpodoxime 200mg PO BID OR Cefuroxime 500mg PO BID AND Azithromycin® 500 x 1 than 250mg PO daily OR Doxycycline 100 mg PO BID OR Monotherapy with Levofoxacin 750mg PO daily OR Moxifloxacin 400mg PO daily</td>
<td>- Confirm listed penicillin allergies (including the type of reaction). According to the CDC, while 10% of people report a penicillin allergy, &lt;1% of people are truly allergic. - If patient has not improved with antibiotics, consider cocci (among other potential reasons for failing to respond; see #5 below) - Note that doxycycline is a reasonable alternative if patients have contraindications to azithromycin and/or fluoroquinolones.</td>
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<th>INPATIENTS</th>
<th>Standard Inpatient Regimen (no MRSA or pseudomonas risk factors)</th>
<th>Prior respiratory isolation of MRSA or pseudomonas in the past year</th>
<th>Recent hospitalization and parenteral antibiotics in last 90 days</th>
<th>NOTES</th>
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<td><strong>None severe Inpatient CAP</strong></td>
<td>5 days of Ampicillin-sulbactam® 2g IV q6h OR Ceftriaxone 1.2 g q24h (2g if &gt;80kg) AND Azithromycin® 500mg PO/IV daily mg OR Doxycycline 100mg PO/IV daily OR Monotherapy with Levofoxacin 750mg PO/IV daily</td>
<td>Obtain sputum/blood cultures. Have a low threshold to add MRSA or P aeruginosa coverage (depending on what the patient has grown previously) if patient clinically worsens while waiting for culture data.</td>
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<td>Duration of treatment is 5 DAYS (see #6 below) - MRSA Coverage: - Add Vancomycin IV (goal trough 15-20) - Pseudomonial coverage: - Imipenem, Teicoplanin 1.5g IV q8h - If penicillin-allergic, see footnote - If starting coverage for pseudomonas, substitute one of these agents for ampicillin/sulbactam or ceftriaxone and otherwise continue the rest of the standard inpatient regimen</td>
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<tr>
<td><strong>Severe Inpatient CAP</strong></td>
<td>Same as above</td>
<td>Obtain nasal PCR for MRSA and sputum/blood cultures. Start MRSA or P aeruginosa coverage, depending on what the patient has grown previously (see right-hand column for appropriate agents). Deescalate therapy if cultures negative after 48 hrs and patient has clinically improved.</td>
<td>Obtain nasal PCR for MRSA and sputum/blood cultures. Start MRSA and P aeruginosa coverage (see right-hand column for appropriate agents). Deescalate therapy if cultures negative after 48 hrs and patient has clinically improved.</td>
<td>If patient has recently been exposed to one class of antibiotics against the above, recommend using a different class for empiric therapy.</td>
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5. Failure to respond after 72 hrs
   a. Consider: resistant or unusual organism; superinfection; infectious complication (effusion, empyema, etc); wrong diagnosis (cocci, TB, HIV, noninfectious pulmonary pathology); metastatic infectious foci, delayed host response (chronic cardiac, pulmonary, renal, or neurological disease; diabetes; HIV; EtOH; malignancy).
   b. Approach:
      • Repeat Chest X-ray (CXR), obtain blood and sputum cultures.
      • If unrevealing, consider chest CT +/- bronchoscopy.
      • If flu season, check for flu. Consider cocci, especially if peripheral eosinophilia is present.

6. Duration of therapy
   a. 5 days (if patient has responded appropriately to therapy).
   b. No follow-up CXR needed.
   c. Longer duration is indicated if:
      • Initial therapy not active against subsequently identified pathogen.
      • CAP caused by staph aureus, pseudomonas, legionella, unusual pathogens.
      • Necrotizing PNA, empyema, or lung abscess.

7. Timing of transition to oral therapy and discharge
   a. Criteria - Hemodynamically stable; improvement in fever curve, respiratory status, and WBC count; and ability to tolerate PO.

8. General Comments
   a. Abandonment of term Healthcare-associated Pneumonia (HCAP): many studies have demonstrated that the factors previously used to define HCAP do not predict high prevalence of antibiotic-resistant pathogens in most settings. Moreover, a significantly increased use of broad-spectrum antibiotics (especially vancomycin and antipseudomonal β-lactams) has resulted, without any apparent improvement in patient outcomes. It is more appropriate to determine whether or not a patient has a) previously grown MRSA or pseudomonas OR b) has been hospitalized and received IV antibiotics within the past 90 days and base coverage on these factors (as detailed above) rather than the previously-used HCAP risk factors.
   b. Coccidioidomycosis – we are increasingly seeing more of this in our county and expect more due to fires/winds. Thus, cocci titers are recommended as part of the initial lab workup for CAP.
   c. Aspiration Pneumonia – per 2019 IDSA guidelines, we suggest not routinely adding anaerobic coverage for suspected aspiration pneumonia unless lung abscess or empyema is suspected, as recent studies have shown that anaerobes are uncommon in hospitalized patients with suspected aspiration. Moreover, it is important to note that patients who aspirate gastric contents are considered to have
aspiration pneumonitis unless imaging and the clinical picture otherwise support a diagnosis of CAP. Many patients who aspirate have resolution of symptoms within 24 to 48 hours and require only supportive treatment, without antibiotics.

d. **Use of Steroids** – Do not routinely use corticosteroids in adults with CAP except in patients with septic shock refractory to adequate fluid resuscitation and vasopressor support, or if the clinical scenario otherwise deems it necessary for patients with COPD, asthma, or autoimmune diseases.

e. **Influenza** – Anti-influenza treatment, such as oseltamivir, should be prescribed for adults with CAP who test positive for influenza in the inpatient setting, independent of duration of illness before diagnosis. Antibacterial therapy should be initially prescribed for adults with clinical and radiographic evidence of CAP who test positive for influenza due to possibility of co-infection, with particular attention given to coverage of S. aureus (the decision regarding whether to start empiric coverage for staph aureus in the setting of influenza should take the severity of the patient’s presentation into account). If there is no evidence of a bacterial pathogen and there is rapid clinical improvement, consideration could be given to early discontinuation of antibacterial treatment at 48 to 72 hours.

f. **Vaccines**

- Vaccine hesitancy has been a big issue. Please educate your patients using the information provided at

  [http://www.cdc.gov/flu/prevent/misconceptions.htm?gclid=Cj0KCQiAno_uBRC1ARIsAB496lXyX5o_nN5Oe8wwwleR92Hf-CZXqfaiMrG1-5WPX47_u8xn98](http://www.cdc.gov/flu/prevent/misconceptions.htm?gclid=Cj0KCQiAno_uBRC1ARIsAB496lXyX5o_nN5Oe8wwwleR92Hf-CZXqfaiMrG1-5WPX47_u8xn98)

- All adults 65 years or older should receive a dose of PPSV23
- Adults 19-64 with immunocompromising conditions (cancer, HIV, chronic renal failure, asplenia), CSF lead, or cochlear implant should still receive Prevnar13 then Pneumovax at least 8 weeks later
- Patients <65 with chronic heart/lung/liver disease, Diabetes, alcoholism or tobacco use should receive Pneumovax23


9. Selected References


10. Footnotes

1 In addition to the most common bacterial pathogens (strep pneumoniae, h. influenzae, Mycoplasma pneumoniae, Staph aureus, Legionella spp, Chlamydia pneumoniae, and Moraxella catarrhalis), always be mindful of other common pathogens (viruses, cocci, and TB).

2 IDSA Severe CAP Major Criteria: 1) septic shock with need for vasopressors or 2) respiratory failure requiring mechanical ventilation. Minor Criteria: respiratory rate ≥ 30; P/F ratio ≤ 250; multilobar infiltrates; confusion/disorientation; BUN ≥ 20 mg/dL; leukopenia with WBC < 4000; thrombocytopenia with platelet count < 100k; hypothermia < 36C; or hypotension requiring aggressive fluid resuscitation.

3 Some have suggested that procalcitonin levels of ≤0.1 μg/L indicate a high likelihood of viral infection, whereas levels ≥0.25 μg/L indicate a high likelihood of bacterial pneumonia, but the IDSA feels there is insufficient evidence to support withholding antibiotics in CAP based on procalcitonin level.

4 For outpatients with a mild penicillin allergy, use doxycycline, azithromycin, levofloxacin, or cephalosporins. If severe penicillin allergy, use levofloxacin.

5 Caution when local macrolide Strep pneumo resistance is >25%. Refer to most recent VCMC/SPH/clinic antibiogram.

6 For inpatients with a mild penicillin allergy, use ceftriaxone 1-2g q24h + azithromycin or levofloxacin monotherapy. If severe penicillin allergy, use levofloxacin monotherapy.

7 MRSA coverage options for CAP include Vancomycin, Linezolid, and Ceftaroline. Refer to antimicrobial restricted policy found at ID website [http://www.venturafamilymed.org/rotations/infectious-disease](http://www.venturafamilymed.org/rotations/infectious-disease) if linezolid or ceftaroline is being considered.

8 For pseudomonal coverage in patients with penicillin allergies: if mild penicillin allergy without anaphylaxis, use Cefepime 2g IV q8h or Ceftazidime 2g IV q8h instead of pip/tazo. If severe penicillin allergy with anaphylaxis, use meropenem 1g IV q8h, imipenem 500mg IV q6h, or Aztreonam 2g IV q8h. Refer to antimicrobial restricted policy found at ID website [http://www.venturafamilymed.org/rotations/infectious-disease](http://www.venturafamilymed.org/rotations/infectious-disease) if these alternate agents are being considered.
## Approval Signatures

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<tr>
<th>Step Description</th>
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<tr>
<td>Committee Approvals</td>
<td>Tracy Chapman: VCMC - Med Staff</td>
<td>3/17/2020</td>
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All revision dates: 3/17/2020

Attachments

No Attachments