Community-acquired Pneumonia

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- **Definition**
  - Infection of the pulmonary parenchyma or lower respiratory tract in a community dwelling patient not at risk for healthcare-associated pneumonia (HCAP)
  - Patients with hospitalization within 90 days, living in a nursing facility within 30 days, on dialysis, home infusions, or home wound care have HCAP and are at risk for resistant organisms not covered by routine CAP therapy.
  - Patients with immunosuppressive disease or therapy, or other risks for resistant organisms, should also have therapy directed more toward HCAP organisms.
- **Etiology**
  - Bacterial: S. Pneumoniae (30%), Mycoplasma, H. influenza, Moraxella, Chlamydia, Legionella, Staph Aureus
  - Viral : Influenza, rhinovirus, RSV, parainfluenza
  - Don't forget to consider coccidiomycosis, Pneumocystis jirovecii (ask about HIV risk factors; HIV may present as CAP) or noninfectious syndromes like aspiration pneumonitis, acute interstitial pneumonitis, or auto-immune processes (cryptogenic organizing pna), etc.
  - Etiology in most patients not identified due to low yield of sputum/blood cultures and therapy is empiric
- **Presentation**
  - Symptoms: dyspnea, fever, chills, cough, purulent sputum, pleurisy. Elderly patients may present with nonspecific symptoms such as delirium or falls.
  - Findings: hypoxia, tachypnea, tachycardia, fever, rhonchi, crackles, egophony with dense consolidation. Dullness suggests associated pleural effusion.
  - Look for signs of sepsis (2+ of the following: hypo/hyperthermia, tachycardia, tachypnea/low pCO2, WBC <4 or >12 or >10% bands)
- **Diagnosis**
  - New or evolving infiltrate on CXR is required for the diagnosis in most cases
  - Laboratory: Leukocytosis is often present. Occasionally, hyponatremia (legionella/mycoplasma) and elevated LDH (nonspecific, associated classically with pneumocystis)
    - PCR for respiratory viruses, *Myc. pneumonia*, *Chl. pneumoniae*
    - Influenza PCR (more sensitive than rapid antigen tests)
    - ELISA for urine Legionella antigen serotype 1 and *Str. pneumo* polysaccharide
    - Serum procalcitonin <0.1 micrograms/L) supports decision to hold antibiotics.
  - Cultures
    - Sputum cultures (>10 PMNs per epithelial cell)
      - 1/3 of patients produce a good quality sputum, 14% of patients grow a predominant organism
    - Blood cultures
      - 10% of patients have positive blood cultures, usually S. pneumo
    - Cultures should be reserved for patients with severe illness
    - Legionella urine antigen in severe pneumonia
- **Treatment**
  - Site of care decisions made by combining
    - Clinical judgment
      - Hypoxia, need for IV therapy, comorbidities, other contraindications to outpatient therapy

        - Objective tools for High vs Low Risk Stratification
            - Pneumonia Severity Index http://pda.ahrq.gov/clinic/psi/psicalc.asp
            - CURB-65 (1 point for each)
                - Confusion, BUN > 19.6, RR > 30, BP < 90/60, age 65+
                - >2= admit, >4= consider ICU
    - Outpatients: Advanced macrolide (azithro) or doxycycline. Respiratory fluoroquinolone (RFQ) are not first line therapy for outpatients but may be appropriate for those who have had antibiotics in the last 3 months, with comorbidities, or with high risk for macrolide resistance (>25%).
    - Inpatients
        - Combination of 2nd/3rd gen cephalosporin plus either doxycycline 100 mg 2x/d or azithromycin 500 mg q 24h OR RFQ
        - ICU: combination therapy ONLY (CTX/Azithro or CTX/RFQ)
        - ICU with severe sepsis: consider MRSA and Pseudomonas coverage
    - Transition to oral can occur when patients are clinically stable
        - No evidence supports further inpatient observation after switching to oral antibiotics in clinically stable patients
            - Clinical Stability = Baseline mental status, taking po meds, T <100, RR < 24, HR < 100, SBP > 90, O2 sat > 90%)
        - Patients on CTX/Azithro or CTX/Doxy can typically be switched to Azithro or Doxy alone
    - Length of therapy: 5- 7 days, no advantage to prolonged therapy in uncomplicated CAP
    - FU CXR should be done to ensure infiltrate has cleared and there is no underlying malignancy, but no sooner than 4-6 weeks.
    - Significant pleural effusions should be sampled to r/o complicated effusion/empyema
- **Prevention**
    - Pneumococcal vaccine should be administered to all inpatients with CAP prior to discharge to reduce bacteremic complications in future CAP.
    - Note pneumococcal vaccine has not been consistently shown to reduce the incidence of CAP nor the rate of hospitalization, but annual influenza vaccination **HAS** and should be administered annually to all patients.
- **Pearls**
    - Cultures are low yield, antibiotics should not be delayed to pursue them
    - Guideline-concordant antibiotic therapy should be administered as rapidly as possible, with first dose in the clinic or ED when possible
    - If patient is not responding to treatment, consider complications (complicated pleural effusion, lung abscess, resistant organisms, or alternate diagnosis)

References for Further Reading:

- Mandell LA, Wunderink RG, Anzueto A, et al. IDSA / ATS consensus guidelines on the management of community-acquired pneumonia in adults. Clin Infect Dis 2007;44 (Suppl 2):S27–72.
- Sharpe B, Flanders S. Community-acquired pneumonia: A practical approach to management for the hospitalist. J Hosp Med 2006; 1(3): 177-190.
- Niederman M. In The Clinic: Community-Acquired Pneumonia. Ann Int Med 2009. 151: ITC 1-16.
- McCabe C et al. Guideline-concordant therapy and reduced mortality and length of stay in adults with community-acquired pneumonia: playing by the rules. Arch Int Med 2009; 169: 1525-31.
- Garcia-Vazquez E, Marcos MA, Mensa J et al. Assessment of the Usefulness of Sputum Culture for Diagnosis of Community-Acquired Pneumonia Using the PORT Predictive Scoring System. Arch Intern Med 2004; 164:1807-11.
- Musher DM, Thorner AR. Community-acquired pneumonia. NEJM. 2014; 371 (17): 1619-28.