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. pneumoniae* 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: