

Community-Acquired Pneumonia
Frederick Southwick
Division of Infectious Diseases
University of Florida

Questions you should ask

- How ill is he? Is this an emergency?
- How did he contract this infection?
- Did he have risk factors that predisposed him to infection?
- Do his symptoms help you to decide the cause of his pulmonary infection?
- What tests should I order?
- What is the most likely cause?
- How should I treat him?

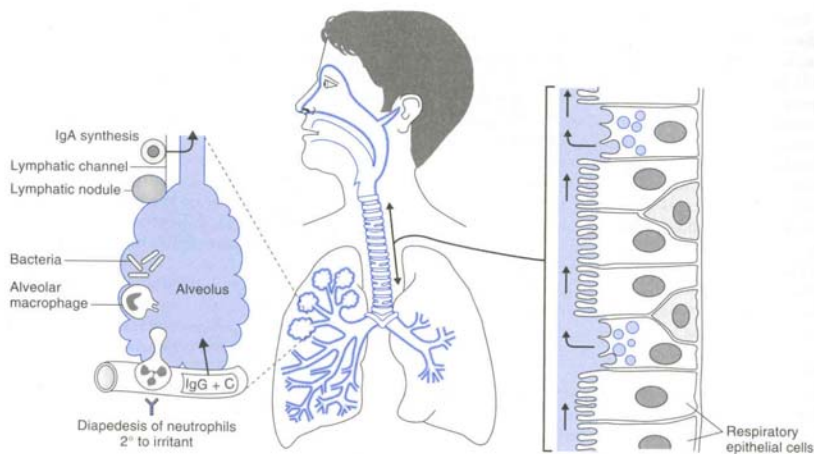
Potential Severity

- Acute pneumonia is a potentially life-threatening illness
- Requires rapid diagnosis and treatment
- A delay in antibiotic treatment increases the risk of a fatal outcome.

Prevalence

- One of the most frequent infections
- Two to three million cases of pneumonia are reported annually in the United States.
- Over 10 million physician visits, 500,000 hospitalizations and 45,000 deaths/year.
- Overall 258/100,000; > age 65 years 962/100,000 (1/100) require hospitalization for pneumonia
- Pneumonia occurs most commonly during the winter months.

Protective Mechanisms



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Pathogenesis

1. Pathogens are aspirated from nasopharynx or inhaled as small aerosolized droplets from other people (viruses, TB) or environment (*Legionella*), dust (fungi)

CAP - Predisposing Factors

1. Viral infections (damage cilia and produce serous exudate)
2. Smoking (damages bronchial epithelial cells & impairs cilia function)
3. Alcohol and other drugs (depress coughing and epiglottis function)
4. Elderly patients (defects in swallowing, reduced humoral and cell-mediated immunity)
5. Immunocompromised patients (AIDS, transplant, & cancer chemo patients)
6. Patients with chronic diseases
7. Cold dry weather (dries mucous membranes & increases person-to-person spread of infection)

CAP - Etiologies

1. *S. pneumoniae*
Most common cause (40%)
2. Atypical Pneumonia
 - a) *Mycoplasma pneumoniae*
 - b) *Chlamydia pneumoniae*
 - c) Respiratory viruses (Influenza, adenovirus, parainfluenza, & RSV)
3. Rarer causes
 - *H. influenzae* - more common in smokers
 - *S. aureus* - after Influenza, very severe
 - *Legionella pneumophila* -Elderly, smokers, and immuno-compromised host, cooling towers and shower heads, excavation
 - Aspiration - RLL most common, mouth flora (anaerobes)
 - Gram negatives - Klebsiella, Pseudomonas
 - a) Nosocomial
 - b) Elderly in nursing homes,
 - c) Cystic fibrosis, HIV, Etoh

CAP - Symptoms & Signs

- Pace of illness:
 - a) acute - symptoms develop over 24-48 hours.
 - b) chronic - symptoms progress over 3 weeks or longer
- Specific constellations of symptoms:
Typical and Atypical Pneumonia (Read about and discuss in the CMC on pneumonia)

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- **4 Symptoms are particularly helpful**

1. Cough

Frequency, production of sputum, & color of the sputum.

Nonproductive cough or scanty sputum

Productive

- rusty colored sputum

- thick red current jelly

- green colored sputum

- hemoptysis.

Considerable overlap in sputum characteristics, cannot be considered specific.

2. Pleuritic Chest pain (pain worse on inspiration)

Inflammation of pleura

Which pulmonary infection is most commonly associated with this form of chest pain?

- 3, Rigor or Rigors

- Rigors - Will be discussed in your CMC and covered in your reading.
- Single rigor suggests pneumococcal pneumonia
- Multiple rigors seen in several forms of pneumonia (most important Staph, aureus).

4. Shortness of breath

- A worrisome sign. V/Q mismatch, low O₂ sat.

CAP - Physical Findings

- Bad Prognostic signs
 - RR > 30/min
 - BP < 90 mm Hg,
 - P > 125/min
 - Temp < 35°C or > 40°C
- Depressed mental status and stiff neck = bacterial meningitis
- Pulmonary auscultation under-estimates extent of pneumonia
 - a) Rales = fluid in the alveoli
 - b) Bronchial breath sounds & egophany (e to a change) suggest consolidation
 - c) Dullness to percussion indicates consolidation or a pleural effusion
 - d) Pleural effusion is accompanied by decreased breath sounds and in some cases, a friction rub.

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CAP - CXR

- If pneumonia is being considered a CXR should always be performed

Five typical patterns:

- 1) Lobar pattern –
 - 2) Bronchopneumonia pattern –
 - 3) Interstitial pattern –
 - 4) Lung abscess
 - 5) Nodular lesions
- Only a rough guide; Overlap

CAP - BLOOD CULTURES

- Drawn for all hospitalized patients
- 2 SEPARATELY drawn blood cultures BEFORE antibiotics
- POSITIVE 1-16% OF CAP

CAP - Sputum

- Ideally the physician should supervise sputum collection
- Adequacy of the sample is assessed by low power microscopic analysis:
 - a) >10 squamous epithelial cells = extensive mouth flora contamination
 - b) > 25 PMN/lfp and/or bronchial epithelial cells = adequate sample

Sputum Gram Stain

- Obtain in all serious ill patients with pneumonia
 - a) Assess for adequate decolorization
 - b) Predominance of single organism = probable pathogen
 - c) Predominance of PMN suggests bacterial pneumonia
 - d) Predominance of mononuclear cells suggest mycoplasma, chlamydia or virus

Sputum Culture

- Never order without an accompanying Gram stain.
- A positive sputum culture in the intubated patient often represents colonization rather than infection
(A critical issue, CMCs, reading)
- Insensitive because mouth flora can overgrow the pathogen
- Helpful for determining antibiotic sensitivity of pathogens identified by Gram stain

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CAP - Other Tests

- All others blood tests are used to assess the severity of disease
 - O2 Saturation or ABGs
 - Peripheral WBC with differential

CAP – Treatment & Outcome

- Treatment within 4-8 hours of diagnosis
Delays are associated with increased mortality
- Empiric therapy
 - a) Hospitalized patient: A third generation cephalosporin (ceftriaxone or cefotaxime) combined with a macrolide (azithromycin or clarithromycin) or respiratory fluoroquinolone.
 - b) Outpatient:
 - Macrolide (azithromycin or clarithromycin)
- Outcome: Mortality ranges from 2-30%. Mortality higher if >65 y, neoplastic disease, liver disease, congestive heart failure, CVA, and renal disease

Prevention

- Influenza vaccine for elderly, pregnant, chronically ill, very young, school children.
- The 23-valent pneumococcal vaccine
 - safe and efficacious
 - >65 y, chronic disease, asplenic, immune compromised & alcoholics
- Smoking Cessation

Reading: *Infectious Diseases: A clinical short course*
pgs 79-90 general, pg 90-99 (know pneumococcal, atypical, Legionella, and aspiration) or *ID in 30 days*
pgs 107-121 general, pgs 121-136 specific causes