Community Acquired Pneumonia (CAP)

- Definition
  - ... an acute infection of the pulmonary parenchyma that is associated with at least some symptoms of acute infection, accompanied by the presence of an acute infiltrate on a chest radiograph, or auscultatory findings consistent with pneumonia, in a patient not hospitalized or residing in a long term care facility for ≥ 14 days before onset of symptoms.


Pneumonias – Classification

- CAP
- HCAP
- HAP
- ICUAP
- VAP

Nosocomial Pneumonias

CAP – The Two Presentations

<table>
<thead>
<tr>
<th>Classical</th>
<th>Atypical</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Sudden onset of CAP</td>
<td>- Gradual &amp; insidious onset</td>
</tr>
<tr>
<td>- High fever, shaking chills</td>
<td>- Low grade fever</td>
</tr>
<tr>
<td>- Pleuritic chest pain, SOB</td>
<td>- Dry cough, No blood tinge</td>
</tr>
<tr>
<td>- Productive cough</td>
<td>- Good GC – Walking CAP</td>
</tr>
<tr>
<td>- Rusty sputum, blood tinge</td>
<td>- Low mortality 1-2%; except in cases of Legionellosis</td>
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<tr>
<td>- Poor general condition</td>
<td>- Mycoplasma, Chlamydiae, Legionella, Rickettsiae, Viruses are causative</td>
</tr>
<tr>
<td>- High mortality up to 20% in patients of bacteremia</td>
<td>- S.pneumoniae causative</td>
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</tbody>
</table>

CAP – Risk Factors for Pneumonia

- Age
- Obesity; Exercise is protective
- Smoking, PVD
- Asthma, COPD
- Immuno-suppression, HIV
- Institutionalization, Old age homes etc
- Dementia


CAP – The Pathogens Involved

- 40-60% - No causative agent identified
- 2-5% - Two are more agents identified

- S.pneumoniae
- H.influenza
- Chlamydia
- Legionella spp
- S.aureus
- Mycoplasma
- Gram Neg bacilli
- Viruses

Streptococcus pneumonia

(Pneumococcus)

- Most common cause of CAP
- About 2/3 of CAP are due to S.pneumoniae
- These are gram positive diplococci
- Typical symptoms (e.g. malaise, shaking chills, fever, rusty sputum, pleuritic chest pain, cough)
- Lobar infiltrate on CXR
- May be Immuno suppressed host
- 25% will have bacteremia – serious effects
**CAP – Risk Factors for Mortality**
- Age > 65
- Bacteremia (for S. pneumoniae)
- S. aureus, MRSA, Pseudomonas
- Extent of radiographic changes
- Degree of immuno-suppression
- Amount of alcohol consumption


**CAP – Evaluation of a Patient**

**CAP – Laboratory Tests**
- CXR – PA & lateral
- CBC with Differential
- BUN and Creatinine
- FBG, PPBG
- Liver enzymes
- Serum electrolytes
- Gram stain of sputum
- Culture of sputum
- Pre Rx. blood cultures
- Oxygen saturation

**CAP – Management based on PSI Score**

<table>
<thead>
<tr>
<th>PORT Class</th>
<th>PSI Score</th>
<th>Mortality %</th>
<th>Treatment Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>No RF</td>
<td>0.1 – 0.4</td>
<td>Out patient</td>
</tr>
<tr>
<td>Class II</td>
<td>≤ 70</td>
<td>0.6 – 0.7</td>
<td>Out patient</td>
</tr>
<tr>
<td>Class III</td>
<td>71 - 90</td>
<td>0.9 – 2.8</td>
<td>Brief Hospitalization</td>
</tr>
<tr>
<td>Class IV</td>
<td>91 - 130</td>
<td>8.5 – 9.3</td>
<td>Inpatient</td>
</tr>
<tr>
<td>Class V</td>
<td>&gt; 130</td>
<td>27 – 31.1</td>
<td>IP - ICU</td>
</tr>
</tbody>
</table>

**CURB 65 Rule – Management of CAP**

- **CURB 0 or 1**
  - Home Rx
- **CURB 2**
  - Short Hosp
- **CURB 3**
  - Medical Ward
- **CURB 4 or 5**
  - ICU care
Community Acquired Pneumonia (CAP)

**CAP Dx. - Algorithmic Approach**

- **Step 1**: CAP Patient
  - < 50 Years: No Co-morbidity
  - ≥ 50 Years: Co-morbidity Present

- **Step 2**: CURB
  - No CURB
  - CURB +

- **Step 3**: OP/IP/ICU
  - Class II-V

Who Should be Hospitalized?

<table>
<thead>
<tr>
<th>Class I and II</th>
<th>Usually do not require hospitalization</th>
</tr>
</thead>
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<tr>
<td>Class III</td>
<td>May require brief hospitalization</td>
</tr>
<tr>
<td>Class IV and V</td>
<td>Usually do require hospitalization</td>
</tr>
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</table>

Severity of CAP with poor prognosis

- RR > 30; PaO2/FIO2 < 250, or PO2 < 60 on room air
- Need for mechanical ventilation; Multi-lobar involvement
- Hypotension; Need for vasopressors
- Oliguria; Altered mental status

**CAP – Criteria for ICU Admission**

**Major criteria**
- Invasive mechanical ventilation required
- Septic shock with the need of vasopressors

**Minor criteria (least 3)**
- Confusion/disorientation
- Blood urea nitrogen > 20 mg%
- Respiratory rate ≥ 30 / min; Core temp. < 36°C
- Severe hypotension; PaO2/FiO2 ratio ≤ 250
- Multi-lobar infiltrates
- WBC < 4000 cells; Platelets <100,000

**Antibiotics of choice for CAP**

- **Macrolide -M**
  - Azithromycin
  - Clarithromycin
  - Erythromycin
  - Telithromycin
  - **Doxycline**

- **Fluoroquinolone-FQ**
  - Levofloxacin
  - Moxifloxacin
  - Gatifloxacin
  - Trovafloxacin

- **Betalactum - B**
  - Ceftriaxone
  - Cefotaxime
  - **B Inhibitor - BI**
  - Sulbactam
  - Tazobactam
  - Piperacillin

**Empiric Treatment – Outpatient**

- **Healthy and no risk factors for DR S.pneumoniae**
  1. Macrolide or Doxycline

- Presence of co-morbidities, use of antimicrobials within the previous 3 months, and regions with a high rate (>25%) of infection with Macrolide resistant *S. pneumoniae*
  1. Respiratory FQ – Moxiflox, Gemiflox or Levoflox
  2. Beta-lactam (High dose Amoxicillin, Amoxicillin-Clavulanate is preferred; Ceftriaxone, Cefpodoxime, Cefuroxime) plus a Macrolide or Doxycline

**Empiric Treatment – Inpatient – Non ICU**

1. A Respiratory Fluoroquinolone (FQ) or
2. A Beta-lactam plus a Macrolide (or Doxycline) (Here Beta-lactam agents are 3 Generation Cefotaxime, Ceftriaxone, Amoxiclav)
3. If Penicillin-allergic Respiratory FQ or Ertapenem is another option
Empiric Treatment: Inpatient in ICU

1. A Beta-lactam (Cefotaxime, Ceftriaxone, or Ampicillin-Sulbactam) plus either Azithromycin or Fluoroquinolone
2. For penicillin-allergic patients, a respiratory Fluoroquinolone and Aztreonam

Empiric Rx. – Suspected Pseudomonas

1. Piperacillin-Tazobactam, Cefepime, Carbapenums (Imipenem, or Meropenem) plus either Cipro or Levofloxacin
2. Above Beta-lactam + Aminoglycoside + Azithromycin
3. Above Beta-lactam + Aminoglycoside + an antipseudomonal and antipneumococcal FQ
4. If Penicillin allergic - Aztreonam to substitute the Beta-lactam

Empiric Rx. – CA MRSA

For Community Acquired Methicillin-Resistant Staphylococcus aureus (CA-MRSA)
- Vancomycin or Linezolid
  Neither is an optimal drug for MSSA
- For Methicillin Sensitive S. aureus (MSSA) B-lactam and sometimes a respiratory Fluoroquinolone, (until susceptibility results).
- Specific therapy with a penicillinase-resistant semisynthetic penicillin or 1 gen cephalosporin

CAP – Summary of Empiric Treatment

Outpatient Rx – any one of the three
- Macrolide or Doxycycline or Fluoroquinolone
  Patients in General Medical Ward
  • 3rd Generation Cephalosporin + Macrolide
  • Beta lactam / B-I + Macrolide or B / B-I + FQ
  • Fluoroquinolone alone
  Patients in ICU
  • 3GC + Macrolide or 3GC + FQ
  • B/B-I + Macrolide or B/B-I + FQ


Strategies for Prevention of CAP

- Cessation smoking
- Influenza Vaccine (Flu shot – Oct through Feb)
  It offers 90% protection and reduces mortality by 80%
- Pneumococcal Vaccine (Pneumonia shot)
  It protects against 23 types of Pneumococci
  70% of us have Pneumococci in our RT
  It is not 100% protective but reduces mortality
  Age 19-64 with co morbidity of high for pneumonia
  Above 65 all must get it even without high risk
- Starting first dose of antibiotic with in 4 h & O₂ status

CAP – How Best to Win the War?

- Early antibiotic administration within 4-6 hours
- Empiric antibiotic Rx. as per guidelines (IDSA / ATS)
- PORT – PSI scoring and Classification of cases
- Early hospitalization in Class IV and V
- Change Abx. as per pathogen & sensitivity pattern
- Decrease smoking cessation advice / counseling
- Arterial oxygenation assessment in the first 24 h
- Blood culture collection in the first 24 h prior to Abx.
- Pneumococcal & Influenza vaccination; Smoking X