



Community Acquired Pneumonia CAP

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Disclosure

I have no actual or potential conflict of interest in relation to any product or service mentioned in this program or presentation.



Agenda/Objectives

1. Define Community Acquired Pneumonia (CAP)
2. List the most common bacterial cause of CAP
3. Identify antibiotics that are commonly used to treat CAP
4. Describe the criteria for outpatient, hospital and ICU treatments for CAP
5. Recognize the vaccine recommendations for CAP



Pneumonia

- Pneumonia- infection of the pulmonary parenchyma
 - Community Acquired Pneumonia - Acquired outside of the hospital.
 - Nosocomial -Acquired in hospital settings
 - Hospital-acquired pneumonia Acquired at least 48 hours after hospitalization.
 - HAP
 - Ventilator-associated pneumonia Acquired at least 48 hours after endotracheal intubation.
 - VAP



Epidemiology for CAP

- Accounts for over 4.5 million outpatient and ER visits annually in the U.S..
- Second most common cause of hospitalizations.
- Most common cause of infectious death.
 - 1.5 million CAP hospitalizations each year.
 - Almost 9 percent of patients hospitalized with CAP will be re-hospitalized because of a new episode within one year.



Risk Factors

- Older age
 - Approximately three times higher for those 65 and older,
 - 2 percent of the older population will be hospitalized with CAP.
- Chronic conditions: COPD, other forms of chronic lung disease, chronic heart disease, CVA, DM, malnutrition and compromised immunity.
- Viral pneumonias Can cause viral pneumonias and predispose to secondary bacterial pneumonia.
- Impaired airway protection Aspiration of stomach or airway secretions secondary to altered consciousness.



Risk Factors

- Smoking, alcohol and opioid usage
- Environmental
 - Crowded living conditions, low-income residence and environmental toxins.
- Risk factors are additive, i.e., amplified effect.



Infectious agents+

- Typical Bacteria
 - Strep. Pneumoniae (Most common)
 - H. Influenzae
 - Mor. Catarrhalis
 - Staph. Aureus
 - Group A Strep aerobic gram-negative
 - Microaerophilic bacteria and anaerobes-associated with aspiration



Infectious agents+

- Atypical Bacteria
 - Legionella,
 - Mycoplasma pneumoniae
 - Chlamydia pneumoniae
 - Chlamydia psittaci
 - Coxiella burnettii



Infectious Agents

- Respiratory viruses
 - Influenza A AND B
 - Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
 - Other corona viruses
 - Rhinoviruses
 - Parainfluenza viruses
 - Adeno viruses
 - Respiratory syncytial viruses (RSV)
 - Humanmetapneumo viruses
 - Human bocaviruses



Infectious agents

- Environment may affect risks.
 - Legionella
 - C. psittaci
 - Coccidiomycosis
 - Anaerobes
 - Contaminated water
 - Exposure to Birds
 - Travel to the Southwest USA
 - Poor dental hygiene
- Causative agent is only identified in half of the cases.
- Respiratory viruses detected in one third of CAP



Antibiotic resistance

- S. Pneumoniae
 - Macrolides- (erythromycin, azithromycin and clarithromycin)
 - Greater than 25 % in the US, Asia and southern Europe
 - Doxycycline
 - Less than 20%, but may be rising
 - Beta-lactam {penicillin (PCN) and cephalosporins}
 - PCN Less than 20%
 - Cephalosporins Less than 1%
 - Fluoroquinolones (Cipro)
 - Less than 2 %
 - Clinicians should check local epidemiological data.



Antibiotic resistance

- Methicillin Resistance S. Aureus (MRSA)
 - Uncommon cause of CAP
 - Gram positive cocci on gram stain
 - Recent antibiotics, especially IV antibiotics
 - Recent influenza-like illness
 - Empyema
 - Necrotizing/Cavitary pneumonia
 - Immunosuppression



Community Acquired MRSA

- Younger healthier
 - History of MRSA skin infections
 - Contact sports
 - Injection drug usage
 - Crowded living conditions
 - Men who have sex with men



CAP – Pseudomonas

- Uncommon
- Increased incidence
 - Prior infection with pseudomonas
 - Recent hospitalization or antibiotic use
 - Underlying structural lung disease such as Cystic fibrosis, advanced COPD, bronchiectasis and immune suppression
 - Antibiotic resistance is high. It may require more than one agent.



Clinical Presentation of CAP

- Varies widely
 - Mild Fever, cough and shortness of breath.
 - Severe Sepsis and respiratory distress.



Pulmonary

- Most common symptoms
 - Cough (with or without sputum)
 - Dyspnea
 - Pleuritic chest pain
 - Signs
 - Tachypnea
breathing
 - Tactile fremitus
 - Percussion dullness
 - Adventitious breath sounds including rales, crackles and rhonchi
- Increased work of
Egophony



Pulmonary

- Result of the accumulation of WBC's, fluid and protein in the alveolar spaces in the lungs
- Hypoxia can result from impaired gas exchange
- Chest Xray pulmonary opacities due to fluid and WBCs in alveoli.



Systemic Signs and Symptoms

- Fever
- Fatigue
- Pleuritic chest pain
- Tachycardia
- ESR increase
- Procalcitonin-bacterial infections
- Chills
- Malaise
- Anorexia
- Leukocytosis with left shift
- C-reactive protein increase
- Leading cause of sepsis



Signs and Symptoms

- Initial Presentation
 - Hypotension
 - Altered mental status
 - Other signs of organ dysfunction
 - Renal
 - Liver
 - Thrombocytopenia



Signs and Symptom Variations

- Signs and symptoms are largely nonspecific.
The positive predictive value of a combination of fever, tachycardia, rales, and hypoxia (O2 sat. less than 95%) was less than 60%.
- Advanced age may alter presentation.
 - Mental status changes
 - May lack fever and leukocytosis
- Immune suppressed pulmonary infiltrates may require a CT scan instead of a plain film Chest XRAY.



Diagnosis

- Requires evidence of an infiltrate on chest imaging
- Most patients posteroanterior and lateral (PA and Lat) X-rays.
 - Lobar consolidations
 - Suggestive of bacterial pathogen
 - Interstitial infiltrates
 - Cavitations
- Chest CT- may be required Immunocompromised patients.
 - Because of suppressed inflammatory responses
 - Not routinely ordered because not cost-effective.



Severity Levels and Site of care

- Most commonly used severity scores are the Pneumonia Severity Score Index (PSI) and CURB-65
 - PSI also known as Port score
 - More accurate
 - Safety and validity validated
 - Some clinicians prefer the CURB-65 because it is easier to use



Levels of Severity/Care

- Ambulatory
- Hospital Admission
- ICU



Ambulatory Care

- Mild Pneumonia

- Patients who are otherwise healthy with normal VS and no concern for complications.

- PSI score I to II

- CURB-65

- Under age 65 0

- Over age 65 1



Hospital Admission

- Peripheral O2 Sat less than 92% on RA and significant change in baseline.
- PSI score Greater than or equal to III
- Curb-65
 - Age less than 65 Greater or equal than 1
 - Age 65 or greater Greater than or equal to 2



Hospital Admission

- Patients with early sepsis, rapid progression or suspected aggressive pathogens may warrant hospitalization.
- Factors that may warrant hospitalization
 - Inability to take oral meds
 - Cognitive or physical impairment
 - Social issues that impair medication adherence or return for worsening.
 - Substance usage
 - Homelessness
 - Lives a distance from a medical facility



ICU

- Respiratory failure requiring mechanical ventilation
- Sepsis requiring vasopressors
- Early recognition

3 Criteria warrant ICU admission



ICU

- Early recognition-At least 3 of these Criteria warrant ICU admission.
 - Altered mental status
 - Hypotension-needing IV fluids
 - Temperature less than 96.8F
 - Respiratory rate greater than 30 breaths per minute
 - PaO₂/FiO₂ ratio equal to or less than 250
 - BUN greater than or equal 70 20Leukocyte count less than 4000
 - Platelet count less than 100,000
 - Multi-lobar infiltrates



Outpatient Management

- Patients less than 65 years of age/ healthy and no recent Abx.
 - Amoxicillin 1 G, three times a day, second agent is debatable.
- Major comorbidities, smokers and who have used Abx in last 3 months. Amoxicillin –Clavulanate 875 BID, Extended-release macrolide or doxycycline.



Outpatient Management

- Cephalosporins are an alternative to amoxicillin-based treatments
- Fluoroquinolones (Levofloxacin, Moxifloxacin and Gemifloxacin) may be used in patients who do not tolerate beta-lactams.
 - Structural lung disease- covers Enterobacteriaceae.
- Treat most patients for five(5) days.
 - Afebrile for 48 hours before stopping.
 - Treatment greater than seven days does not show benefit.



Inpatient and ICU

- Hospitalized empiric Abx
- ICU
 - Multiple drugs
 - Glucocorticoids-impending respiratory failure or requiring mechanical ventilation
 - 4 to 7 days dependent on response.
 - Avoid with influenza, TB and fungal infections



Glucocorticoids

- Other indications
 - Refractory shock
 - Acute COPD exacerbations
 - COVID-19



Prevention of CAP

- Three Pillars
 - Smoking Cessation
 - Influenza Vaccination for all patients
 - Pneumococcal vaccination as indicated



Vaccinations

- Pneumococcal
- Influenza
- H. Influenza
- RSV
- COVID-19
- Shingles



Pneumonia Vaccine Recommendations

- All adults 65 and older
- Adults 19 t 64 with a history of any of the following
 - Predisposing medical conditions:
 - Alcohol use disorder
 - Chronic heart disease*
 - Chronic lung disease[¶]
 - Chronic liver disease
 - Diabetes mellitus
 - Sickle cell disease or other hemoglobinopathies
 - Current cigarette smoking



Pneumonia Vaccine Recommendations

- Adults 19 to 64-continued
 - Increased risk of meningitis:
 - Cerebrospinal fluid leak
 - Cochlear implant
- Immunocompromising conditions and other conditions associated with altered immunocompetence
- History of invasive pneumococcal disease
- Pneumococcal vaccination is indicated for adults with risk factors for acquisition of or severe adverse outcomes from pneumococcal disease. These adults should receive either PCV20 alone or PCV15 followed by PPSV23. When administering the PCV15 and PPSV23 combination, PCV15 should be given first when possible.



Morbidity of pneumonia

- Well-being generally returned to pre-pneumonia status within six months
- persistent respiratory symptoms beyond 28 days were more likely to reflect age or comorbidity than the effect of pneumonia
- CAP influences long-term survival of patients who were admitted to the hospital and subsequently discharged
- the effect of CAP can persist for a long period after discharge
- CAP has been associated with acute cardiac events that may result from cardiac stress, hypoxemia, and inflammation with increased 30- and 90-day mortality
- Pulmonary complications of pneumonia, including fatigue, cough, and decreased lung function, can persist for months following acute illness
- Declines in functional capacity have been observed and associated with higher re-hospitalization and mortality rates
- Permanent lung damage can result from profound inflammatory and subsequent scarring; pulmonary fibrosis is increasingly recognized with coronavirus disease 2019
- **Pneumonia is not only a pulmonary infection and can affect several organ systems** - disease in the lungs to involve the pleural space or indirect effects on other organ systems such as the central nervous system, hematologic, cardiac, renal, endocrine, and/or hepatic systems, and others



How you can make an impact – what we ask of you.

1. Be aware & ask about social environment and exposure of the member
2. Advocate for better control of COPD and underlying lung conditions
3. Advocate for smoking , vaping, tobacco chewing cessation and provide tools
4. Advocate and educate on the benefit of vaccinations



Questions

