

PNEUMONIA

Dennis R. Wissing, PhD, RRT, FAARC
 Professor of Cardiopulmonary Science &
 Medicine
 LSU Health Shreveport

Pneumonia

- An acute inflammation of the lung tissue due to a microorganism
- Involves bronchial tubes, respiratory bronchioles, alveolar ducts, & sacs
- Most common cause of death from infection in US


Etiology

- Caused by various microorganisms
- Occurs most commonly with impairment of the lung defense mechanisms
- Previous colonization of upper airways usually precedes infection

TABLE 3-1. CAUSES OF IMPAIRED PULMONARY DEFENSES

Altered protective effects of epiglottis and glottis	
Suppressed or ineffective cough	
Impaired consciousness	
Obstructing airway lesions	
Abnormal mucus	
Defective cellular immunity	
Impaired humoral immunity	
Recent viral infection	

- Wet hair will not cause pneumonia!

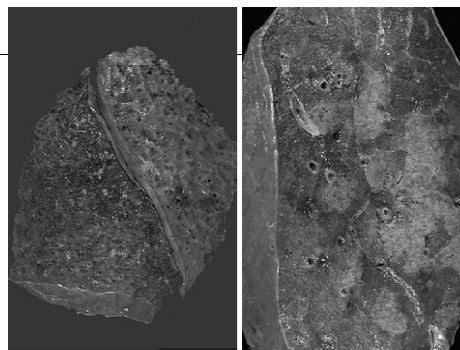
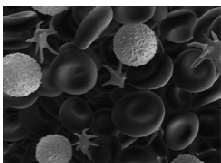


Conditions that Predispose Individuals to Pneumonia

- Chronic lung disease with infections
- Alcohol abuse
- Seizure disorders
- Altered consciousness
- Neuromuscular disease
- Immunologic disorders
- Malignant conditions/treatment
- Surgical procedures

Pathogenesis / Pathology

- Organism in distal airway incites inflammatory process --inflammatory exudates and cells
- Fluid and cellular debris fill air sacs
- WBCs (neutrophils) invade area, phagocytize organisms and release enzymes/immunologic mediators
- Atelectasis



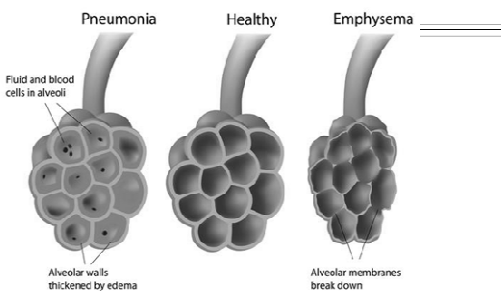
Other Complications

- Necrotizing pneumonia
- Pleural effusion
- Septicemia
- Parapneumonia
- Bronchopneumonia (airways + lung parenchyma)

Pathophysiology

- Reduced lung volumes—can't take a deep breath thus can't cough
- Alteration of V/Q
- Arterial hypoxemia
 - PaO₂
 - SaO₂

Alveoli Changes in Lung Diseases



Clinical Manifestations

- Symptoms of infection
 - **General fatigue**
 - **Chills and fever**
 - **Cough / chest pain**
 - **Dyspnea**
- Previous upper respiratory symptoms
- Expectoration will vary
- Extrapulmonary symptoms: mental confusion can overshadow the respiratory symptoms

Physical Exam

- Fever
- Tachycardia
- Tachypnea
- Poor chest excursion
- Dull percussion
- Decreased BS with inspiratory crackles
- Increased fremitus

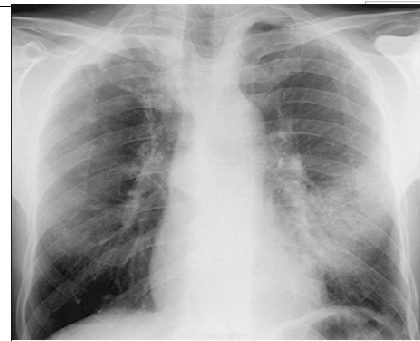
Laboratory Findings

- Decreased PaO₂ & PaCO₂
- Increase pH
- Increased WBCs
- Blood cultures may be positive (3 days)

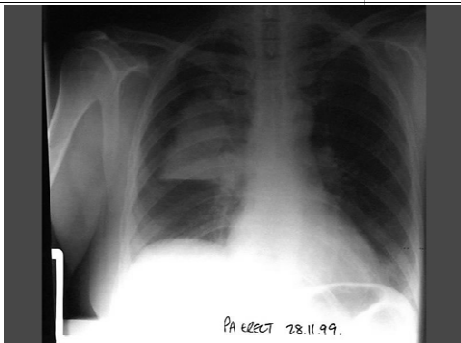
CXR Findings

- Main clue for diagnosing pneumonia
- Homogenous density involving large area of lung tissue

CXR



Segmental Pneumonia



Diagnosis and Classification

- Difficult to identify causative organism
- Sputum sample is not reliable
- Delay in identifying organism delays treatment
- 3 categories:
 - community-acquired pneumonias
 - hospital-acquired pneumonias
 - immuno-compromised host

Most common cause of bacterial pneumonia

- *Streptococcus pneumoniae*
 - Gram positive
 - Polysaccharide capsule
- Staphylococcal pneumonia
 - *Staphylococcus aureus*
 - Transmitted by cough
 - Seen with children and immune compromised patients.

Atypical pneumonia

- *Mycoplasma pneumoniae*
 - “Walking pneumonia”
 - Under 40
 - Common among college students
 - Minimal symptoms

Community-Acquired Pneumonia

- Contracted outside of hospital
- Bacterial pneumonia often caused by *Streptococcus pneumoniae*;
- *Haemophilus influenzae* (gram-) common in chronic lung patients
- *Klebsiella pneumoniae* & *Escherichia coli* are common in alcoholics and diabetics
- Anaerobic organisms typical with aspiration

Others

- *Legionella pneumophila*
- *Mycoplasma pneumoniae* most common community acquired pneumonia
- *Viral pneumonias* uncommon, but can be caused by influenza, chickenpox and adenovirus

Hospital Acquired Pneumonias

- Pneumonia contracted after 3 days in hospital
- Frequently due to gram negative bacteria and staphylococci
- Patient is pre-disposed due to: environment, medical procedures, increase use of anti-microbials, cytotoxic drugs
- Resistant organism- MRSA

Immuno-compromised Host

- Humoral immunity patient will lack antibodies and are more susceptible to infection with bacteria
- Cellular immunodeficiency have recurrent infections with low-virulence or opportunistic organisms, ie fungi, *Pneumocystis carinii*

Aspiration pneumonia

- GI contents enter lung
- Aspiration of upper airway organisms
- Most common cause of anaerobic infections
 - **Lung abscess and empyema**
- pH of aspirates key to dx
- GERD
- Swallowing mechanism
 - Dysphagia
 - Stroke

Management

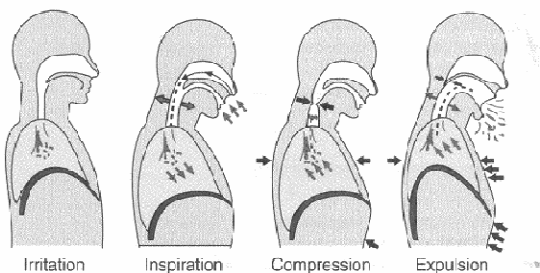
- Antibiotic therapy
- Hydration
- Nutrition
- Oxygen therapy
- Analgesics
- Encouragement of deep breath & cough
- Other measure to alleviate symptoms
- HHN / CPT ????

Antibiotic Therapy

- Sputum and blood cultures for culture and sensitivity
- Initiated in timely manner; broad spectrum antibiotic (3rd generation cephalosporin)
- Nosocomial infections will use 2nd or 3rd generation cephalosporin or Unasyn with moderate disease; big guns for sicker patients

Assessment of Cough

- **Onset**
 - What precipitates it?
 - What stops it?
 - Acute or gradual onset?
- **Effective**
- **Inadequate**
- **Productive**
- **Dry**
- **Chronic**



Lose your license.....



What is wrong with this picture?



Preventative Measures

- Good personal health habits
- Good nutrition
- Avoid excessive alcohol and smoking
- Hospital infection control
- Prevention of aspiration
- Careful use of anti-microbial therapy
- Vaccinations
- Avoid contact with infected persons

THANKS FOR LISTENING!

■ dwissi@lsuhsc.edu