

Pneumonia

Pneumonia

- ✚ An inflammation and infection of lung and lung parenchyma
- ✚ Inflammatory infiltrate in alveoli (consolidation)
- ✚ Common illness which occurs in all age group
- ✚ Leading cause of M&M in Infants and Older People & people who are chronically & terminal ill.

Pneumonia cont'd...

- Normally, Lungs Are Well Protected
- For pneumonia to occur, at least one of the following three conditions must occur:
 - ◆ Failure or Defect in Host Defenses
 - ◆ Exposure to Very Virulent Pathogens
 - ◆ Exposure to an Overwhelming Load of Pathogens

Pneumonia cont'd...

Host Defenses

- ▶ Natural Barriers of the Body
- ▶ Antibodies or Immunoglobulin Production
- ▶ Cellular Immunity by Phagocytosis

Pneumonia cont'd...

Failure of Host Defenses

- ▶ Hair of nares
- ▶ Absence of Cough or Epiglottic (Gag) reflex
- ▶ Dysfunctional Muco-ciliary blanket
- ▶ Local production of secretory IgA is reduced
- ▶ Normal flora adhering to mucosal cells of the oro-pharynx

Pneumonia cont'd...

Failure of Host Defenses cont'd

- ▶ Immune Response Stunted:
 - ◆ Defective Neutrophil Function
 - ◆ Decreased Immunoglobulin Production
- ▶ Prior Viral Infection (Common Cold)
- ▶ Compromises Overall Immunity
- ▶ Systemic Sepsis Weakens Immune Response

Pneumonia cont'd...

Failure of Host Defenses cont'd

- ▶ Immunosuppressive drugs decrease host response
- ▶ Cigarette/second-hand exposure or other toxic fume also weaken lung system
- ▶ Change in mental status (coma, seizure, drug intoxication)

Pneumonia cont'd...

Predisposing factors

- Decrease level of consciousness
- Tracheal intubation
- Malnutrition
- Alcohol, cigarette smoking, Stroke, seizures
- Advanced age
- Asthma, cystic fibrosis, anemia etc
- Increased gram-negative bacilli in oro-pharynx

Pneumonia cont'd...

Cause

- Pneumonia can result from a variety of causes:
 - Bacterial (Gram-positive bacteria, Gram-negative bacteria, "Atypical" bacteria)
 - Virus
 - Fungi
 - Parasites
 - Chemical or physical injury to the lungs

Pneumonia cont'd...

- ✓ Streptococcus pneumoniae

- Most common cause of uncomplicated
in all age groups

- ✓ Atypical Bacteria

- Mycoplasma

- Chlamydia

- Legionella

Pneumonia cont'd...

Classification

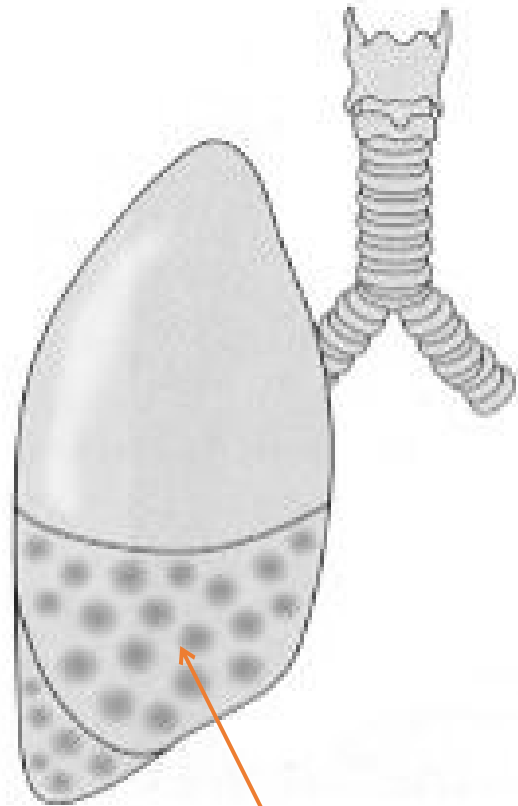
► Based on causative agent

- ◆ Bacterial or typical pneumonia,
- ◆ Atypical pneumonia

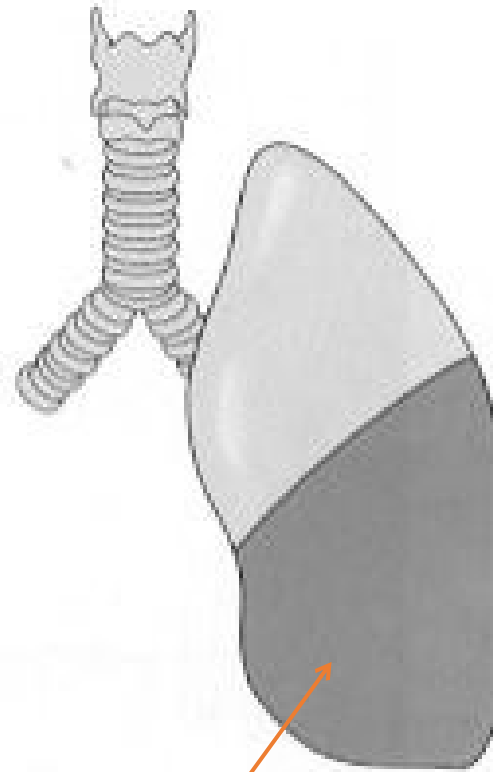
► According to the X-ray appearance

- ◆ Lobar pneumonia- homogeneous consolidation of one or more lung lobes
- ◆ Broncho- pneumonia- multiple patchy shadows in a localized or segmental area.

Pneumonia cont'd...

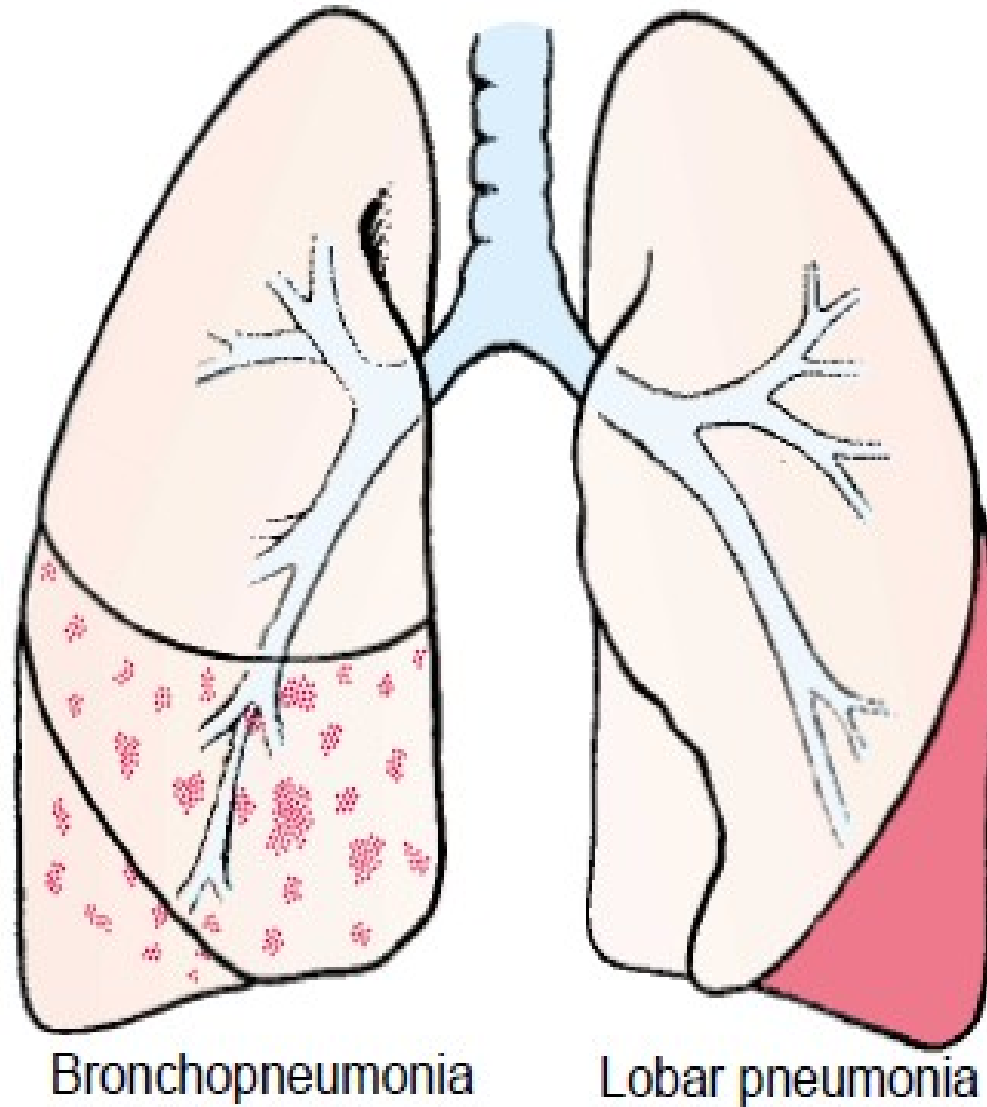


Bronchopneumonia



Lobar pneumonia

Pneumonia cont'd...



Pneumonia cont'd...

- ▶ According to the setting or clinical and environmental
 - ◆ Community-acquired pneumonia
 - ◆ Hospital-acquired pneumonia
 - ◆ Aspiration pneumonia,
 - ◆ pneumonia in immuno-compromised host

Pneumonia cont'd...

Community-acquired pneumonia (CAP)

- Infectious pneumonia in a person who has not recently been hospitalized & within the first 48 hrs after hospitalization.
- Common type of pneumonia.
- Infection usually spread by droplet inhalation.

Pneumonia cont'd...

➤ Risk factors include:

- ✚ Cigarette smoking

- ✚ Alcohol intake

- ✚ Pre-existing lung disease

- ✚ Old age, etc.

Pneumonia cont'd...

Common causes

- ✓ Streptococcus pneumoniae (the most common cause)
- ✓ Viruses
- ✓ The atypical bacteria
- ✓ Haemophilus influenza

Pneumonia cont'd...

Hospital-acquired pneumonia (HAP)

- ✓ Also called **nosocomial** pneumonia, that acquired during or after hospitalization - **at least 48 hours after admission.**
- ✓ Up to 5% of patients admitted to a hospital for other causes subsequently develop pneumonia.

Pneumonia cont'd...

- ▶ Nosocomial pneumonia is the 2nd most common hospital-acquired infections
- ▶ Nosocomial pneumonia is the leading cause of death from hospital-acquired infections

Pneumonia cont'd...

■ Hospitalized patients may have many risk factors for pneumonia:

- Mechanical ventilation
- Prolonged malnutrition
- Underlying heart and lung diseases
- Decreased amounts of stomach acid
- Immune disturbances.

Pneumonia cont'd...

Causative agent

- ✓ More commonly by G(-) organisms, esp.
- ✓ *P. aeruginosa*
- ✓ Enterobacteriaceae (*klebsiella*,
Enterobacter, Serratia) or MRSA.
- ✓ *E.coli*
- ✓ *H. influenza*

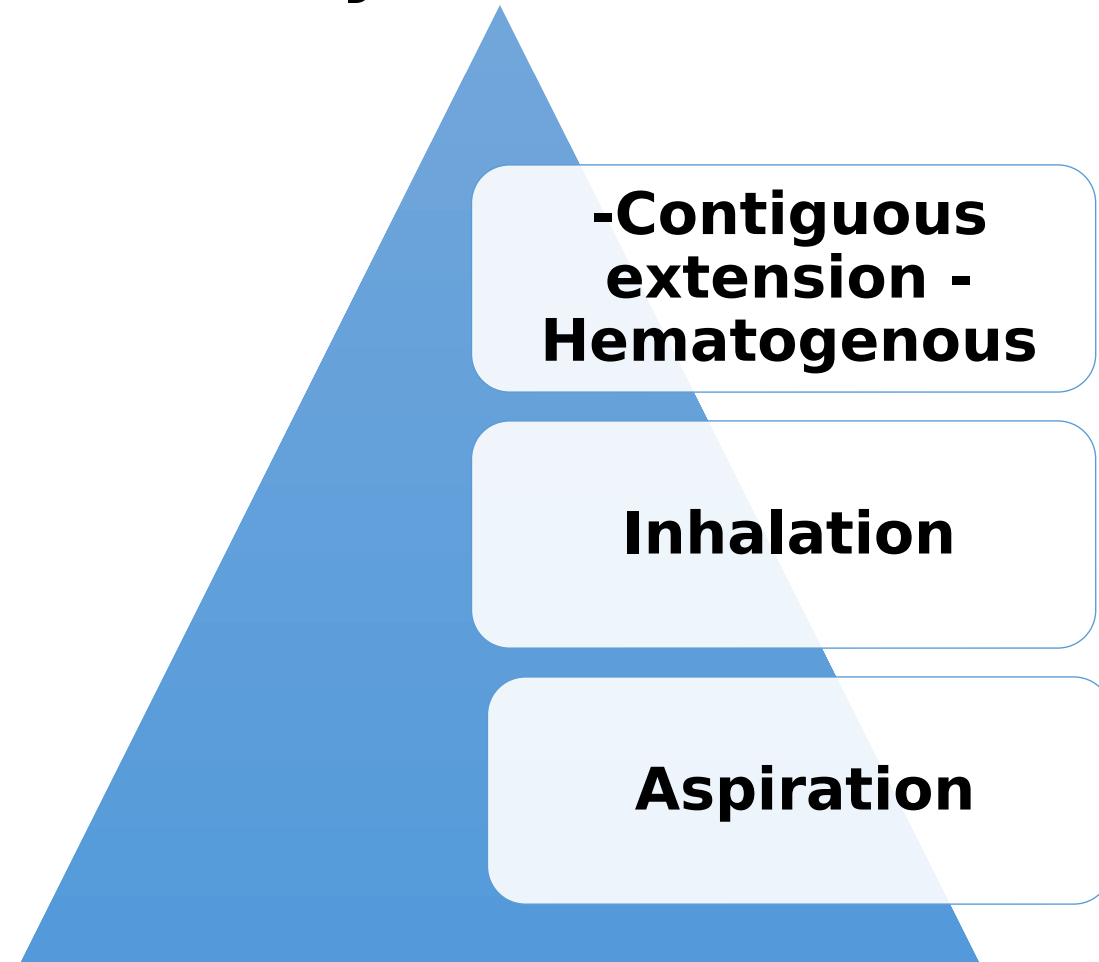
Pneumonia cont'd...

■ **Methicillin-resistant *Staphylococcus aureus* (MRSA)** seen more commonly in patients

- Received corticosteroids
- Undergone mechanical ventilation >5 days
- Presented with chronic lung disease
- Had prior antibiotics therapy

Pathophysiology of Bacterial pneumonia

Port of Entry of bacteria to Lungs



Pneumonia cont'd...

Pathophysiology.....

- ▶ Once inside, bacteria may invade the spaces b/n cells and b/n alveoli through connecting pores.
- ▶ Invasion triggers the **immune system** to send neutrophils
- ▶ Neutrophils & macrophages engulf and kill the offending organisms
- ▶ The alveolar macrophages also initiate the inflammatory response

Pneumonia cont'd...

Pathophysiology.....

- ▶ It releases cytokines, causing a general activation of the immune system.
- ▶ Neutrophils, bacteria and fluid from surrounding blood vessels fill the alveoli
- ▶ Interrupt normal oxygen transportation and venous blood entering the lungs passes through the under ventilated area.

Pneumonia cont'd...

Pathophysiology.....

- ▶ Bacteria often travel from an infected lung into the bloodstream, causing serious or even fatal illness such as **septic shock**
- ▶ Bacteria can also travel to the area between the lungs and the chest wall (the pleural cavity) causing a complication called an **empyema**.

Pneumonia cont'd...

Generally

- ✓ Four stage of pathophysiological change occur due to pneumonia

1. Congestion- occurs during the first 24 hrs

- Out pouring of fluid from tissue to alveoli- b/se of inflammatory process.
- Only a few neutrophils are seen at this

Pneumonia cont'd...

2. Red hepatization - Lungs look like the liver

- ✓ There is massive capillary dilation
- ✓ Characterized microscopically by the presence of many RBC, neutrophils, micro-organisms , fibrins in the alveolar spaces

Pneumonia cont'd...

3. Gray hepatization

- The lung is dry, friable and gray-brown to yellow as a consequence of a persistent fibrinopurulent exudates
- WBC and fibrin consolidate the alveoli and lung
- Second and third stages last for 2 to 3 days each

Pneumonia cont'd...

4. Resolution

- ✓ Characterized by enzymatic digestion of the alveolar exudate;
- ✓ Resorption, phagocytosis or coughing up of the residual debris and
- ✓ Restoration of the pulmonary architecture.

Pneumonia cont'd...

Clinical manifestations

- Cough producing greenish or yellow sputum
- High fever that may be accompanied by shaking chills
- Shortness of breath
- Tachypnea
- Pleuritic chest pain
- Headaches

Pneumonia cont'd...

Clinical manifestations...

- Sweaty and clammy (moist) skin,
- Loss of appetite
- Fatigue
- Blueness of the skin
- Nausea, vomiting
- Mood swings
- Joint pains or muscle aches

Pneumonia cont'd...

Diagnosis

■ History

■ Physical examination

✗ Inspection

- Increase respiratory rate
- cyanosis

✗ Palpation

- Increase vibration of the chest when speaking
- The way of chest expands

Pneumonia cont'd...

✖ Percussion

- Dullness

✖ Auscultation

- ⊕ A lack normal breath sounds
- ⊕ Crackle sounds
- ⊕ Increase loudness of whispered speech
- ⊕ Ego phony

Pneumonia cont'd...

- ◆ Chest x-ray

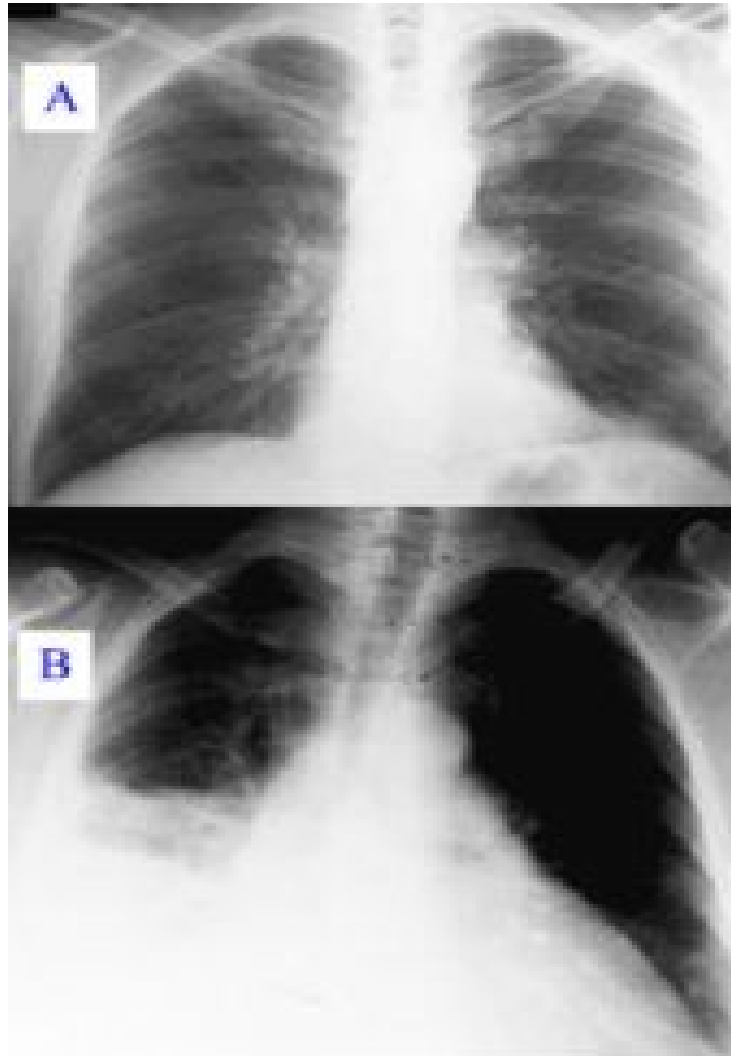
- ❖ Chest x-rays can reveal areas of opacity (seen as white) which represent consolidation.

- ◆ Blood tests- a CBC may show a high WBC count.

- ◆ Sputum cultures

- ◆ Chest CT scan or other tests may be needed to distinguish pneumonia from other illness.

Pneumonia cont'd...



Pneumonia as seen on chest x-ray A: Normal chest x-ray. B: Abnormal chest x-ray

Pneumonia cont'd...

Medical management

- Most cases of pneumonia can be treated without hospitalization.
- Typically, oral antibiotics, rest, fluids and home care are sufficient for complete resolution
- People with pneumonia who are having trouble breathing, other medical problems & the elderly may need more advanced treatment.

Pneumonia cont'd...

Medical management...

E.g. according to DACA

◆ ***For community acquired ambulatory pts (mild pneumonia):-***

- Amoxicillin
OR_
• Erythromycin
OR
• Doxycycline

◆ ***For community acquired hospitalized pts (severe pneumonia):-***

Pneumonia cont'd...

Non-Drug treatment:

- ✚ Bed rest
- ✚ Frequent monitoring of temperature, blood pressure and pulse rate.
- ✚ Give attention to fluid and nutritional replacements.
- ✚ Administer Oxygen
- ✚ Analgesia for chest pain

Pneumonia cont'd...

Drug treatment:

- ▶ Benzyl penicillin PLUS Gentamicin OR Ceftriaxon.
- ➡ Pneumonia due to staphylococcus aureus should be treated as follows:
 - ◆ Cloxacillin 1-2 gm, IV or IM QID for 10-14 days.

Pneumonia cont'd...

HAP (nosocomial pneumonias)

- ▶ Antimicrobials effective against gram-negative & gram-positive should be given combination. Suitable combination is:
 - ▶ Cloxacillin plus Gentamicin OR Ceftriaxon plus Gentamicin
 - ▶ Ciprofloxacin
- Pneumocystis pneumonia responds to Trimethoprin + Sulfamethoxazole

Pneumonia cont'd...

Complications

- ⊕ Shock and respiratory failure
- ⊕ Empyema
- ⊕ Pleural effusion
- ⊕ Atelectasis
- ⊕ Abscess formation
- ⊕ Bacterimia

Nursing management

The nurse should monitor:

- Changes in temperature and pulse
- Amount, odor, and color of secretions
- Frequency and severity of cough
- Degree of tachypnea or shortness of breath
- Changes in physical assessment & chest x-ray findings
- unusual behavior, altered mental status, dehydration, fatigue

Pneumonia cont'd...

Nursing diagnoses

- ✓ Ineffective airway clearance related to copious tracheo-bronchial secretions
- ✓ Activity intolerance related to impaired respiratory function
- ✓ Risk for deficient fluid volume related to fever and dyspnea
- ✓ Imbalanced nutrition: less than body requirements

Pneumonia cont'd...

Nursing intervention

- Encourages hydration
- Lung expansion maneuvers- deep breathing, direct coughing
- Administers oxygen therapy as prescribed.
- Encourage increased fluid intake (at least 2 L/day)
- Limited activity and encourage rest
- Teaching good health habits; such as proper diet and hygiene