



**SNS COLLEGE OF ALLIED HEALTH SCIENCES**

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

**DEPARTMENT OF OPERATION THEATRE AND ANESTHESIA  
TECHNOLOGY**

**COURSE NAME: MEDICINE**

**II YEAR**

UNIT I

**TOPIC 1:PNEUMONIA**



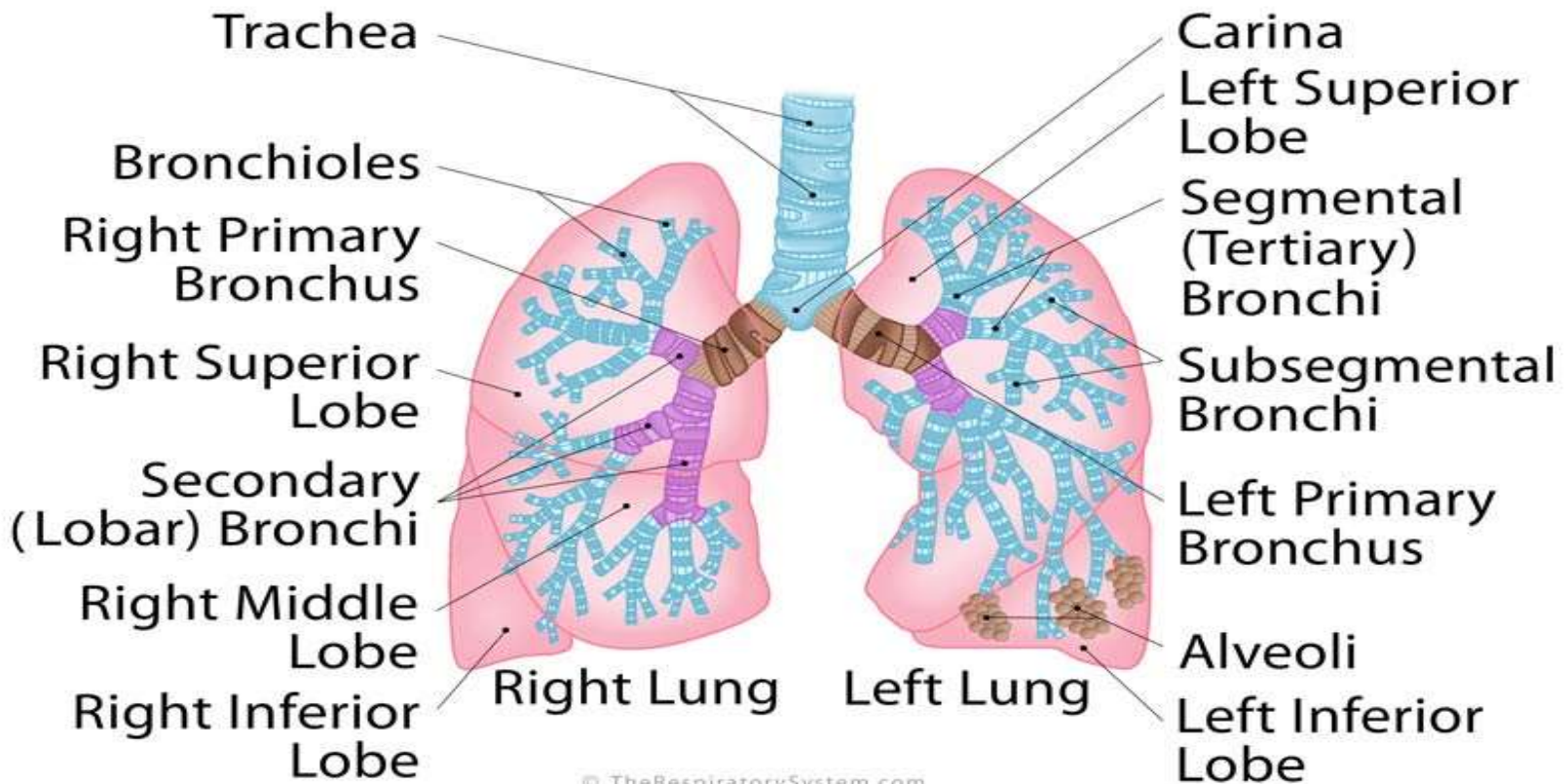
# Case



60 yrs old male smoker with DM presented to OPD with high grade fever , right sided chest pain and cough with rusty sputum for 1 week.

Blood investigations shows elevated wbc count .X-ray shows segmental collapse of the left side.

## Bronchi



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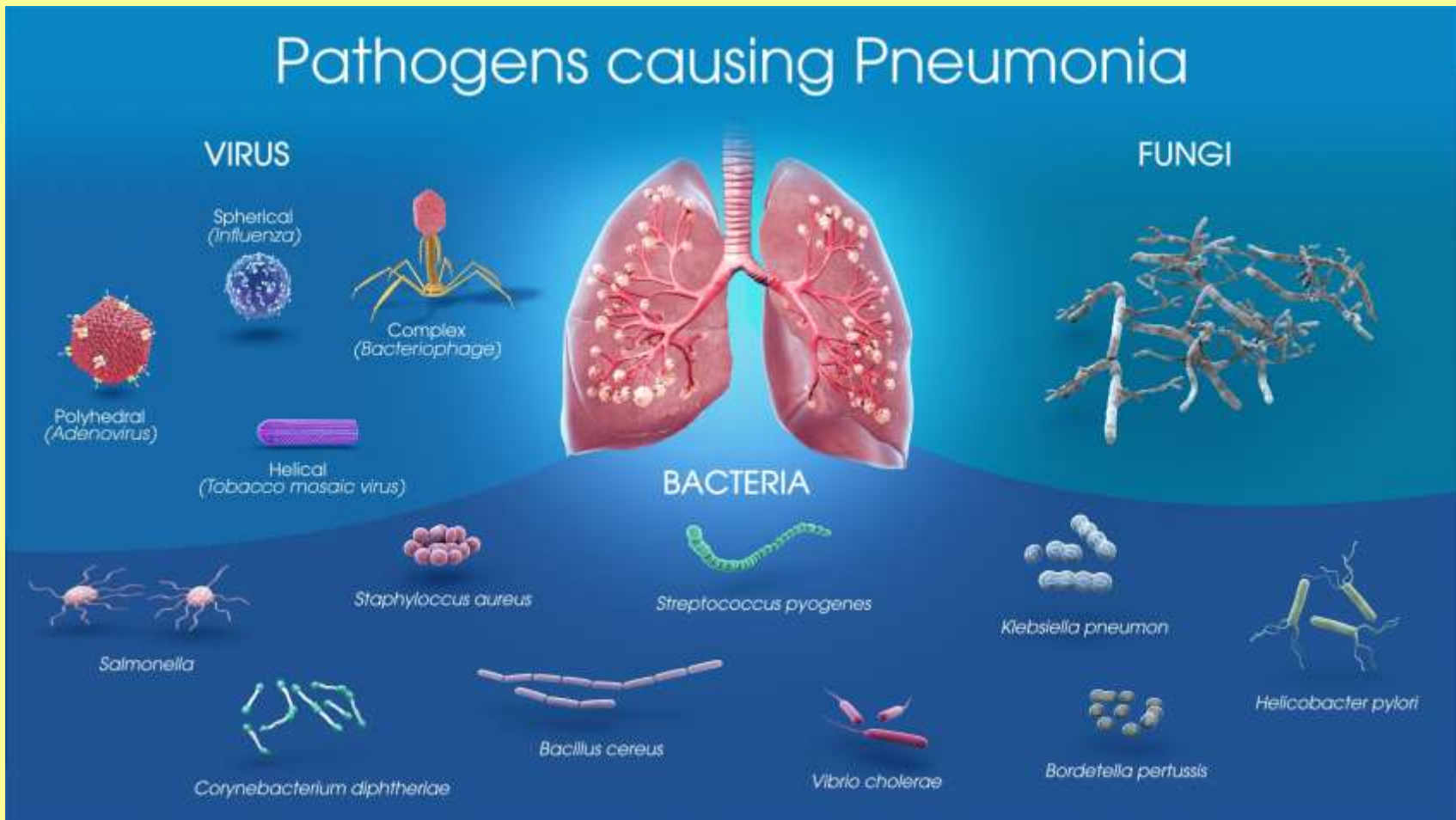
# INTRODUCTION

Pneumonia is an inflammation of the lung parenchyma by various micro-organisms, including bacteria, chlamydia, mycoplasma, fungal, parasites and viruses.



# DEFINITION

- inflammation and consolidation of lung tissue due to an infectious agent”
- **COSOLIDATION** = ‘Inflammatory induration of a normally aerated lung due to the presence of cellular exudative in alveoli’



# RISK FACTORS

## RISK FACTORS



**aged over  
65 years**



**aged under  
5 years**



**smoking**



**chronic  
diseases**



**weakened  
immunity**



# ASSESSMENT



1. Define pneumonia?
2. List out the causative organisms?





# CLASSIFICATION –BY SITE



- **CLASSIFICATION BY SITE**



**INTERSTITIAL  
PNEUMONIA**

**LOBAR  
PNEUMONIA**

**BRONCHO  
PNEUMONIA**



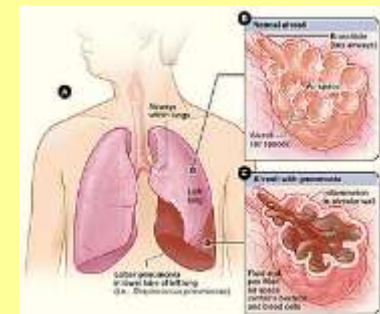
# CLASSIFICATION



- **CLASSIFICATION BY SITE:**

- **ALVEOLAR OR AIR SPACE PNEUMONIA/LOBAR:**

- ❖ **Lobar pneumonia is an infection that only involves a single lobe, or section, of a lung.**
- ❖ **The organism causes an inflammatory exudate**
- ❖ **Segmental boundaries are not preserved, and the bronchi remain patent.**
- ❖ **X-ray shows non segmental consolidation with air bronchograms.**





## INTERSTITIAL PNEUMONIA:

- The inflammation is confined to interalveolar space (involves the areas in between the alveoli)
- X-ray shows reticular pattern

## Causative organisms:

- Mycoplasma Pneumoniae, Pneumocystis jiroveci.



## ✓ BRONCHOPNEUMONIA:

- Inflammation is restricted to the conducting airways, especially the terminal and respiratory bronchioles, and the surrounding alveoli.
- X-ray shows atelectasis and bronchogram is absent.

Eg: Staphylococcal pneumonia





# ASSESSMENT

- How pneumonia is classified based on site of inflammation?



# CLASSIFICATION

- **CLASSIFICATION BY ETIOLOGY**



**PRIMARY  
PNEUMONIA**

**SECONDARY  
PNEUMONIA**

**SUPPURATIVE  
PNEUMONIA**



# CLASSIFICATION

## ✓ PRIMARY PNEUMONIA:

Caused by a specific pathogenic organism

There is no pre-existing abnormality of the respiratory system.

The term **atypical Pneumonia** is used to describe pneumonia caused by the following agents:

Mycoplasma, Legionella, Chlamydia, Coxiella.



# CLASSIFICATION



- **COMMON ORGANISMS:**

Streptococcus Pneumonia( Most common)

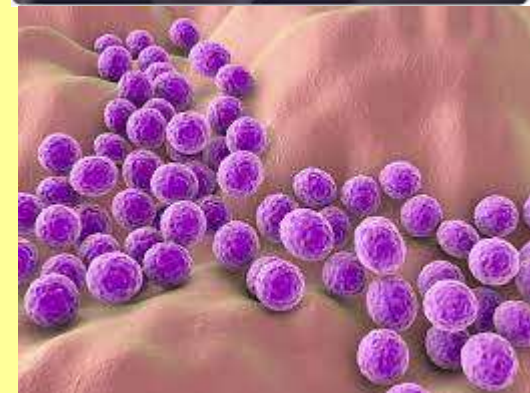
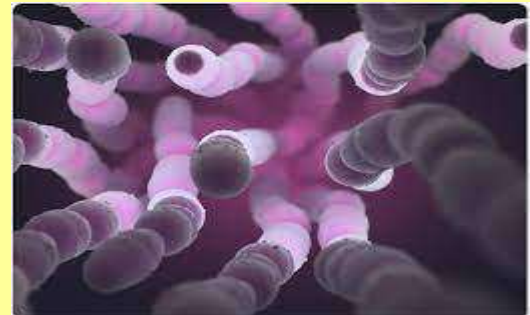
Haemophilus influenza

Staphylococcus aureous

Mycoplasma Pneumonia

Legionella Pneumophilia

Moraxella catarrhalis







- SECONDARY PNEUMONIA(ASPIRATION PNEUMONIA)
- Characterized by absence of any pathogenic organism in sputum and the presence of some pre-existing abnormality of respiratory system.
- The pre-existing abnormality predisposes to The invasion of the lung by organism of low virulence derived from upper resp tract/oropharynx.



# CLASSIFICATION CONT..



- Aspiration of pus from infected nasal sinuses
- Inhalation of septic matter during tonsillectomy or dental procedures
- Vomitus, the contents of a dilated oesophagus may enter the larynx during general anesthesia, coma, or even sleep.
- Aspiration of gastric contents in pts with GERD.



# CLASSIFICATION

In acute bronchitis, bronchiectasis and lung abscess, pus may be carried in to the alveoli

In effective coughing ,and laryngeal paralysis predisposes to aspiration.



# CLASSIFICATION

- **SUPPURATIVE PNEUMONIA/NECROTIZING PNEUMONIA**

In most pneumonias with successful inactivation of the organisms, complete resolution occurs and normal lung structure is restored.

In some cases, **complete healing does not occur**, so there will be **destruction of lung tissue by inflammation, abscess formation**, and subsequent development of fibrosis.

The term suppurative pneumonia is applied.



# ASSESSMENT



- Differentiate primary and secondary pneumonia
- What is suppurative pneumonia?



## CLASS-BY MODE OF ACQUIRING

- **CLASS-BY MODE OF ACQUIRING**



**NOSOCOMIAL  
PNEUMONIA**

**COMMUNITY  
ACQUIRED  
PNEUMONIA**

**PNEMONIA IN  
IMMUNOCOMPROMISED  
HOST**

# CLASS-BY MODE OF ACQUIRING

## COMMUNITY ACQUIRED PNEUMONIA (CAP)

Indicates pneumonia occurring in persons in a community.

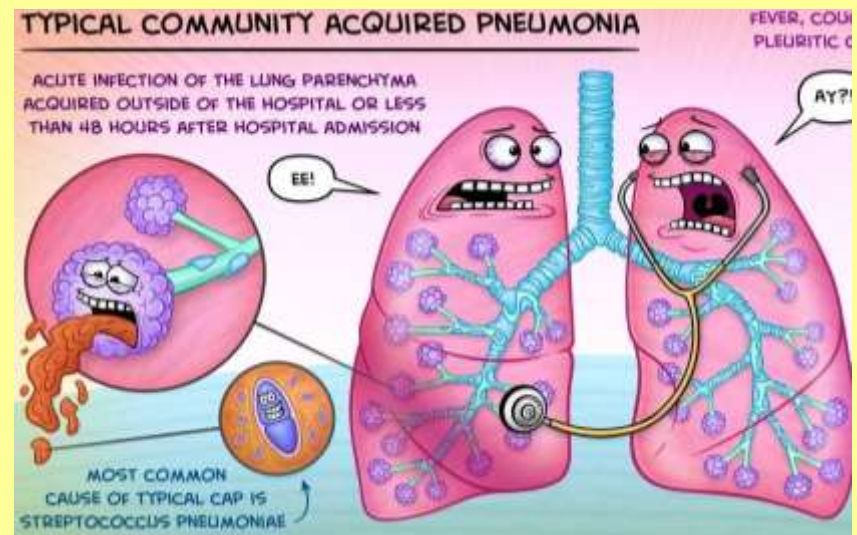
The most common org are:

Streptococcus Pneumonia,

Haemophilus influenza

Mycoplasma Pneumonia

Chlamydia pneumonia



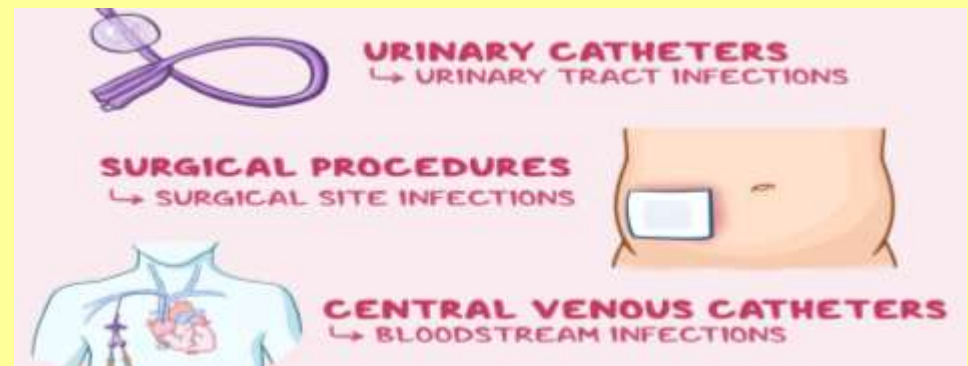


# CLASSIFICATION

- **NOSOCOMIAL PNEUMONIA:**

Indicates the development of pneumonia after 48 hrs of hospitalization.

Highest risk is in the patients on mechanical ventilation( ventilator-associated pneumonia)







# CLASSIFICATION

- **Health Care Associated Pneumonia**
  - Who was hospitalized in an acute care hospital for 2 or more days within 90 days of the infection
  - Resided in a nursing home or long-term care facility
  - Received recent i.v antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current infection
  - Attended a hospital or hemodialysis clinic



# CLASSIFICATION

- PNEMONIA IN IMMUNOCOMPROMISED HOST:**

Seen in immunocompromised patients like neutropenic patients, patients with HIV infection, malignancies and patients on immunosuppressives.

**ORGANISMS RESPONSIBLE:**

**Mycobacterium Tuberculosis.**





# CLASSIFICATION

- **Ventilator Associated Pneumonia:**
- VAP refers to pneumonia that arises more than 48–72 hours after **endotracheal intubation** .

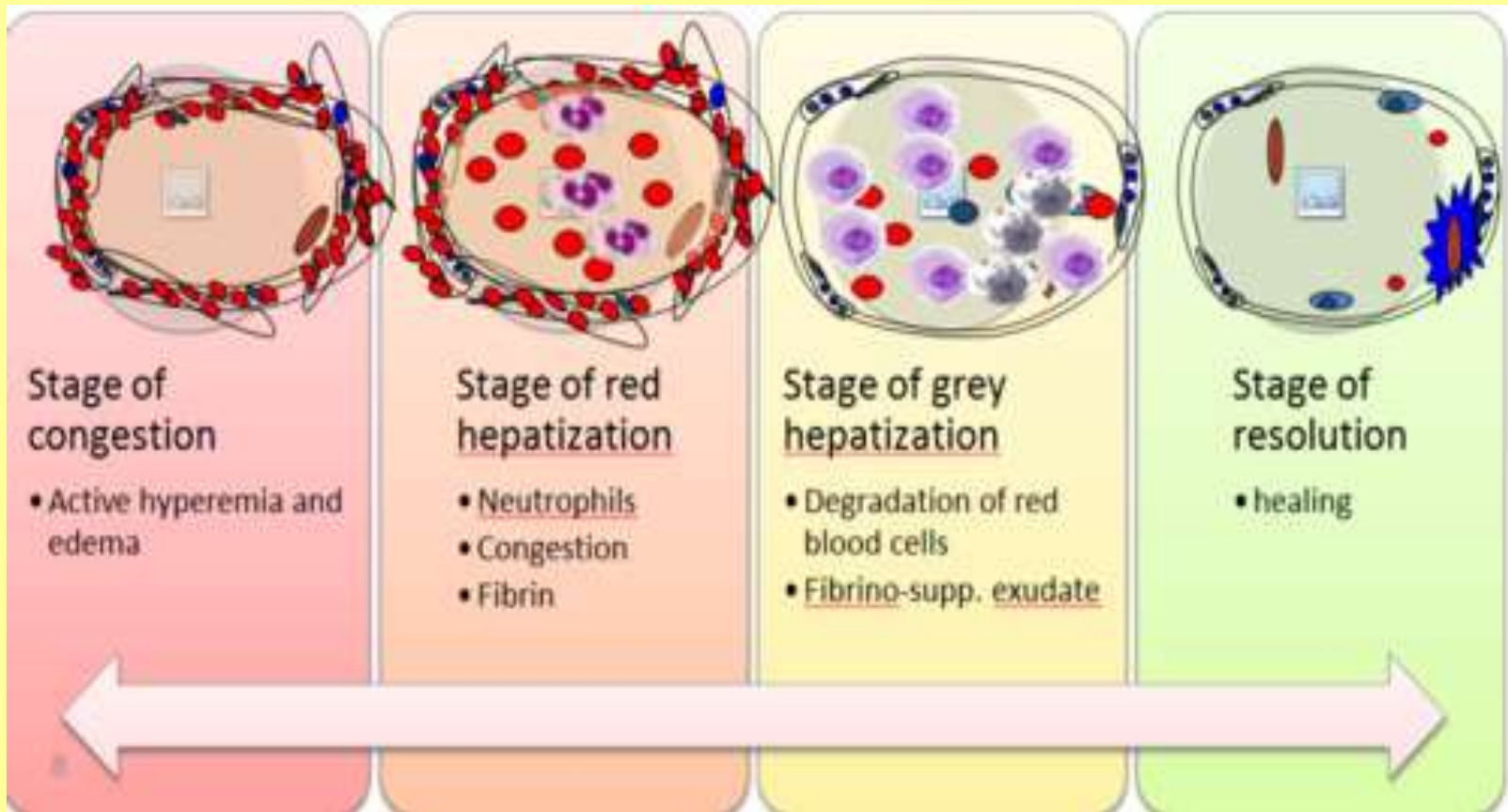




# PATHOLOGICAL STAGES

- **STAGE OF CONGESTION:**
- on auscultation , fine crepitations heard.  
Presence of a proteinaceous exudate and often of bacteria in the alveoli
- **STAGE OF RED HEPATISATION:**  
Tubular bronchial breathing heard.  
Presence of erythrocytes in the cellular intra alveolar exudate  
Neutrophils are also present .  
Bacteria are occasionally seen in cultures of alveolar specimens collected.

# STAGES OF PNEUMONIA





# STAGES OF PNEUMONIA



- **STAGE OF GREY HEPATISATION:**

Tubular bronchial breathing heard. No new erythrocytes are extravasating, and those already present have been lysed and degraded • Neutrophil is the predominant cell • Fibrin deposition is abundant • Bacteria have disappeared •

- **Stage of resolution:**

Coarse crepitations heard. Macrophage is the dominant cell type in the alveolar space, Debris of neutrophils, bacteria, and fibrin has been cleared.



# CLINICAL FEATURES



- **HISTORY:**

The classic features are

**sudden onset of fever,  
pleuritic chest pain,  
cough,**

productive of purulent sputum,  
Haemoptysis.



- **EXTRA PULMONARY FEATURES:**

Myalgia

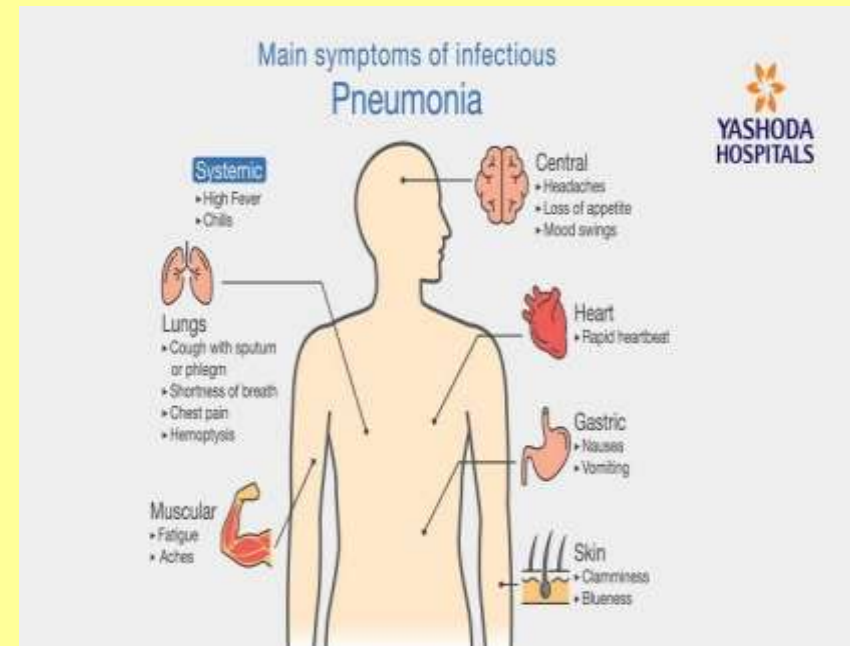
arthralgia

Prominent headache

Mental confusion

abdominal pain

Diarrhoea







# CLINICAL FEATURES



- Respiratory sign is high-Most sensitive sign in elderly
- Tachycardia is common
- Chest examinations reveals crepitations



# INVESTIGATIONS

- BLOOD:

## TC/DC COUNT:

Leucocytosis with high percentage polymorphonuclear leucocytes- **Bacterial pneumonia**

Total leucocyte count is less than 5000/mm<sup>3</sup> -viral /atypical pneumonia



# INVESTIGATIONS

- BLOOD CULTURE:

This may grow the causative organisms

-Pneumococcal pneumonia

## RESPIRATORY SECRETIONS:

should be subjected to microscopic examination.

It includes Gram stain, Zeel Neelson stain



# INVESTIGATIONS

- A freshly obtained sputum collected from the lower respiratory tract is the ideal.
- **CHEST X\_RAY:**

## **ABG ANALYSIS:**

The PaO<sub>2</sub>, PaCO<sub>2</sub>, and H<sup>+</sup> concentrations are important in the management of pneumonia.



# TREATMENT

- **GENERAL MEASURES:**

Check the airway, breathing, circulation

Treat shock with intravenous fluids initially

Correct hypoxia with oxygenation

Treatment of Pleuritic chest pain with mild analgesics- like paracetamol.



# TREATMENT

- **INDICATIONS FOR HOSPITALIZATION:**
- **AGE:** over -65yrs
- **UNDERLYING DISEASE:**
  - Diabetes
  - Congestive heart failure
  - Chronic lung diseases
  - Alcoholism
  - Malignancy



# TREATMENT

- **SIGNS:**

Respiratory rate : > 30/minute

Systolic blood pressure: < 90 mmHg

Diastolic blood pressure : < 60 mmHg

Evidence of extra pulmonary involvement



# TREATMENT

- **LABORATORY PARAMETERS:**

White blood cell count: <4000 or  
>30,000/mm<sup>3</sup>

PaO<sub>2</sub> < 60 mmHg on room air

Renal failure

Multilobar involvement on chest x-ray.





# TREATMENT

- Treatment Patients **without Risk Factors for MDR Pathogens**
- Ceftriaxone (2 g IV q24h) or
- Moxifloxacin (400 mg IV q24h),  
ciprofloxacin (400 mg IV q8h),
- levofloxacin (750 mg IV q24h) or
- Ampicillin/sulbactam (3 g IV q6h)
- or Ertapenem (1 g IV q24h)



# TREATMENT

- **Patients with Risk Factors for MDR Pathogens**
- 1. A  $\beta$ -lactam: Ceftazidime (2 g IV q8h) or cefepime (2 g IV q8–12h) or Piperacillin/tazobactam (4.5 g IV q6h), imipenem (500 mg IV q6h or 1 g IV q8h),
- 2. **A second agent active against gram-negative bacterial pathogens:**
- Gentamicin or tobramycin (7 mg/kg IV q24h) or amikacin (20 mg/kg IV q24h) or
- Ciprofloxacin (400 mg IV q8h) or levofloxacin (750 mg IV q24h) plus
- 3. **An agent active against gram-positive bacterial pathogens:**
- Linezolid (600 mg IV q12h) or
- Vancomycin (15 mg/kg, up to 1 g IV, q12h)



# COMPLICATIONS



- SLAP HER
- S - Septicaemia
- L - Lung abcess
- A - ARDS
- P - Para-pneumonic effusions
- H – Hypotension
- E - Empyema
- R - Respiratory failure /renal failure



# PREVENTION



- Smoking cessation
- Better Nutrition
- Respiratory hygiene measures
- Pneumococcal polysaccharide vaccine
- Inactivated influenza vaccine
- Live attenuated influenza vaccine



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THANKYOU