Definition, etiopathogenesis, clinical manifestations, nonpharmacological and pharmacological management of the diseases associated with Infectious diseases

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Tuberculosis (TB)

Definition:

- Tuberculosis is a chronic infectious disease caused by Mycobacterium tuberculosis, primarily affecting the lungs (pulmonary TB) but can involve any organ (extrapulmonary TB).

Etiopathogenesis:

Causative Agent:

- *Mycobacterium tuberculosis* – acid-fast bacillus, airborne transmission

Transmission:

- Inhalation of airborne droplets from infected individuals (coughing, sneezing)
- Less commonly via hematogenous spread or ingestion (e.g., contaminated milk – *M. bovis*)

Pathophysiology:

- Bacilli reach alveoli → phagocytosed by alveolar macrophages
- Immune response leads to granuloma formation (Ghon focus)
- **Latent TB**: Bacilli dormant, no symptoms
- **Active TB**: Reactivation or primary progressive disease due to impaired immunity

Risk Factors:

- HIV/AIDS
- Malnutrition
- Diabetes
- Smoking
- Close contact with TB patients
- Immunosuppressive therapy (e.g., corticosteroids, TNF-alpha blockers)

Clinical Manifestations:

Pulmonary TB:

- Persistent cough (>3 weeks)

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- Hemoptysis (blood in sputum)
- Fever, night sweats
- Weight loss, fatigue
- Chest pain, breathlessness in advanced disease

Extrapulmonary TB:

- Lymph nodes (scrofula)
- Bones and joints (Pott’s disease)
- CNS (tubercular meningitis)
- Genitourinary system
- Miliary TB (disseminated)

Non-Pharmacological Management:

- **Isolation** during the infectious phase
- **Nutrition support** (high-protein diet)
- **Rest during active phase**
- **Hygiene practices** (covering mouth when coughing, disposal of sputum)
- **Public health notification and contact tracing**
- **BCG vaccination** (for prevention, especially in children)

Pharmacological Management:

Standard anti-TB therapy (First-line – 2HRZE/4HR):

1. **Intensive phase (2 months):**
   - Isoniazid (H)
   - Rifampicin (R)
   - Pyrazinamide (Z)
   - Ethambutol (E)
2. **Continuation phase (4 months):**
   - Isoniazid + Rifampicin

Drug-resistant TB (MDR-TB, XDR-TB):

- Requires second-line drugs (fluoroquinolones, injectable agents) for ≥18–24 months

Monitor for side effects:

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- Hepatotoxicity (INH, RIF, PZA)
- Optic neuritis (ethambutol)
- Peripheral neuropathy (INH – prevent with pyridoxine)

Pneumonia

Definition:

- Pneumonia is an inflammation of the lung parenchyma due to infection, leading to consolidation and impaired gas exchange.

Etiopathogenesis:

Types:

- Community-acquired pneumonia (CAP)
- Hospital-acquired pneumonia (HAP)
- Ventilator-associated pneumonia (VAP)
- Aspiration pneumonia

Common Pathogens:

- **CAP**: *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Mycoplasma pneumoniae*, viruses
- **HAP/VAP**: *Pseudomonas aeruginosa*, *MRSA*, gram-negative bacilli
- **Aspiration**: Anaerobes

Pathogenesis:

- Inhalation or aspiration of pathogens → alveolar inflammation → exudate and consolidation → impaired oxygen exchange

Risk Factors:

- Elderly
- Smokers
- COPD/asthma
- Immunocompromised (HIV, cancer, steroids)
- Prolonged hospitalization

Clinical Manifestations:

- Fever and chills

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- Productive cough with purulent sputum
- Dyspnea
- Pleuritic chest pain
- Tachypnea, tachycardia
- Dullness to percussion, bronchial breath sounds, crepitations

Severe cases:

- Hypoxia
- Confusion (especially in elderly)
- Sepsis, respiratory failure

Non-Pharmacological Management:

- Adequate hydration
- Oxygen therapy (if hypoxic)
- Chest physiotherapy and postural drainage
- Nutrition support
- Smoking cessation
- Pneumococcal and influenza vaccination

Pharmacological Management:

Empirical Antibiotics:

- **CAP (outpatient):** Amoxicillin, doxycycline, or macrolides (azithromycin)
- **CAP (inpatient):** IV ceftriaxone + azithromycin or respiratory fluoroquinolone
- **HAP/VAP:** Broad-spectrum agents (piperacillin-tazobactam, meropenem, linezolid if MRSA suspected)

Supportive care:

- Antipyretics
- Cough suppressants (if needed)
- Bronchodilators (in coexisting COPD/asthma)
- Monitor for complications (pleural effusion, empyema)

Urinary Tract Infections (UTIs)

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Definition:

- UTI is an infection of any part of the urinary tract, most commonly involving the bladder (cystitis) or kidneys (pyelonephritis).

Etiopathogenesis:

Causative organisms:

- *Escherichia coli* (most common)
- *Klebsiella*, *Proteus*, *Enterococcus*, *Staphylococcus saprophyticus*

Risk Factors:

- Female sex (short urethra)
- Poor hygiene
- Sexual activity
- Diabetes mellitus
- Urinary catheterization
- Urinary tract obstruction (stones, BPH)
- Pregnancy

Pathogenesis:

- Ascending infection from urethra → bladder → kidneys
- Inflammation of mucosa → urgency, frequency, dysuria

Clinical Manifestations:

Lower UTI (Cystitis):

- Dysuria (painful urination)
- Increased frequency and urgency
- Suprapubic discomfort
- Cloudy or foul-smelling urine
- Hematuria (sometimes)

Upper UTI (Pyelonephritis):

- Fever with chills
- Flank or back pain
- Nausea, vomiting

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