Introduction

- Discuss medications used in treatment of
  - Bacterial Infections
  - Viruses
  - Fungi
  - Tuberculosis

Lecture Objectives

1. Discuss the general principles of antibiotic, antitubercular, antiviral and antifungal therapy.
2. Identify the various antibiotic, antitubercular, antiviral, & antifungal agents.
3. Describe the therapeutic actions, indications, pharmacokinetics, contraindications, most common adverse reactions, and important drug-drug interactions associated with each of the classes of antibiotics, antitubercular, antiviral and antifungal agents.
4. Describe appropriate nursing interventions for patients receiving antibiotic, antitubercular, antiviral, or antifungal therapy.
5. Identify appropriate patient teaching needs for patient receiving antibiotic, antitubercular, antiviral, & antifungal therapy.

Development of Anti-Infective Therapy

- 1920's – Paul Ehrlich worked on developing a synthetic chemical effective against infection-causing cells only.
- Scientists discovered penicillin in a mold sample.
- 1935 – The sulfonamides were introduced

Principles of Antibiotic Therapy

- Mechanisms of Action of Bacteria
  - Interfere with biosynthesis of the bacterial cell wall.
  - Prevent the cells of the invading organism from using substances essential to their growth & development.
  - Interfere with steps involved in protein synthesis.
  - Interfere with DNA synthesis
  - Alter the permeability of the cell membrane to allow essential cellular components to leak out.

- Anti-infective Activity

  - Bacteriocidal Antibiotics
    - Kill bacteria
  - Bacteriostatic Antibiotics
    - Don't kill bacteria but slow their growth so that body's natural defenses can dispose of the microorganisms.
Principles of Antibiotic Therapy

- Narrow Spectrum Antibiotics
  - Effective against only one or a restricted group of microorganisms.

- Broad Spectrum Antibiotics
  - Effective against a wide variety of different microorganisms.

Factors Affecting Antibiotic Use
- Human Immune Response
- Resistance
- Identification of the pathogen
- Sensitivity of the pathogen
- Adverse reactions
- Superinfections

Common Categories of Antibiotics
- Aminoglycosides
- Cephalosporins
- Fluoroquinolones
- Macrolides
- Sulfonamides
- Penicillins
- Tetracyclines
- Other miscellaneous agents

Aminoglycosides

Therapeutic Uses & Indications
- Mostly used to treat gram-negative infections
- May be used when penicillin is contraindicated
- Usually used in combination with other antibiotics

Pharmacokinetics
- Poor oral absorption
- Rapid IM absorption
- Excreted through the kidney
  - Toxic to kidney

Contraindications
- Known drug allergy
- Not favored for long-term use due to ototoxicity & nephrotoxicity.
Aminoglycosides

- Side Effects/Adverse Effects
  - Most noted toxic effects
    - Ototoxicity
    - Nephrotoxicity
  - Other undesirable side effects
    - GI effects like nausea, vomiting & diarrhea
    - Cardiac effects like palpitations, hypotension
    - Headache
    - Neuromuscular blockade
    - Fever
    - Superinfections

- Drug-Drug Interactions
  - Increased risk for ototoxicity, neurotoxicity & nephrotoxicity with
    - Potent diuretics
  - Increased risk of neuromuscular blockade when given with
    - Anesthetics
  - Synergistic effect when given with
    - Penicillins
    - Cephalosporins
    - Carbenicillin
    - Ticarcillin
  - Increased oral anticoagulant activity