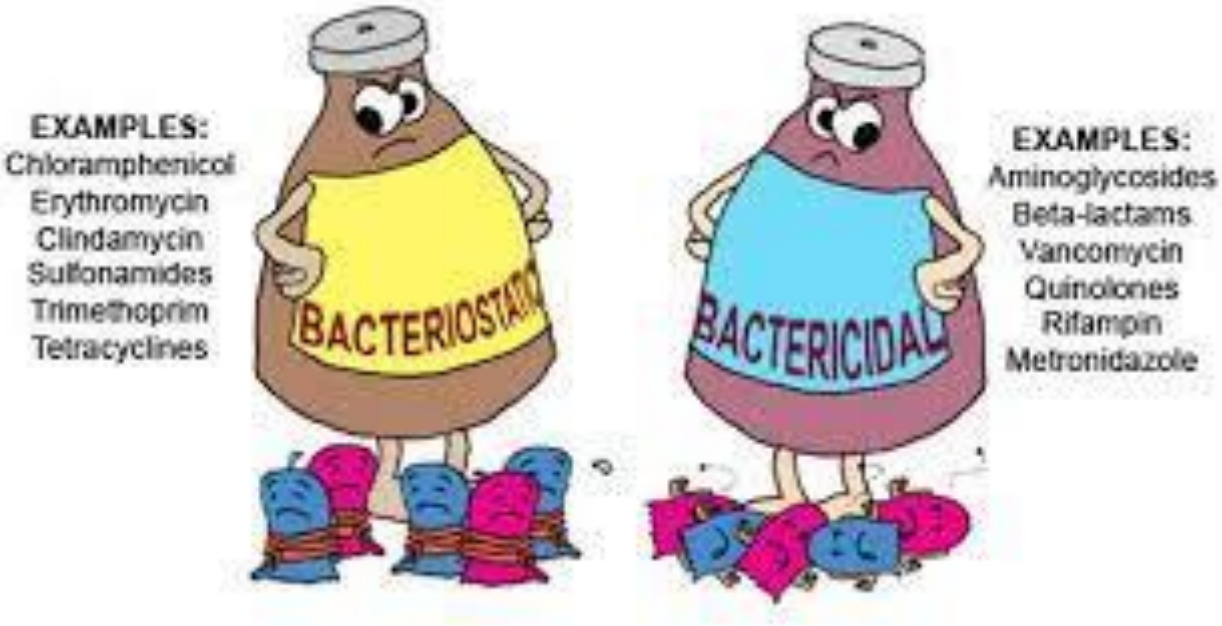
Introduction to Clinical Pharmacology

Chapter 6
Antibacterial Drugs: Sulfonamides

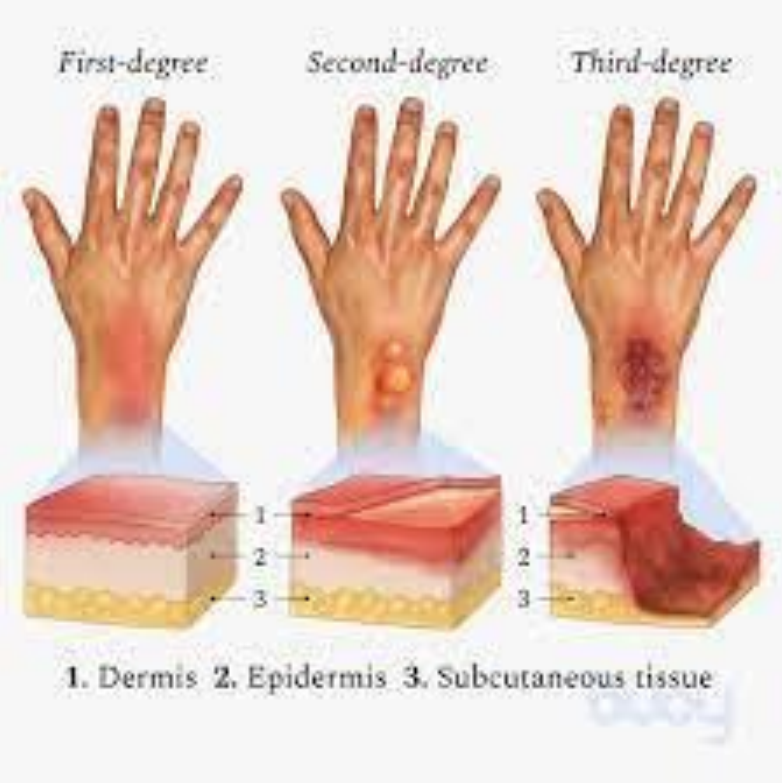
Introduction to Sulfonamides

- Effective antibiotic drugs against infections
- Antibacterial agent: bacteriostatic (slow growing): active against bacteria vs. bactericidal



Actions and Uses

- Inhibit the activity of folic acid in bacterial cell metabolism
- Slow the rate of bacterial multiplication
- Control urinary tract infections caused by both gram-negative and gram-positive bacteria
- Treat infections caused by second- and third-degree burns



Adverse Reactions #1

- Common reactions: anorexia, nausea, vomiting, diarrhea, abdominal pain, chills, fever, stomatitis
- Urine and skin take on an orange-yellow color: this is not abnormal
- Crystalluria: increase fluid intake
- Photosensitivity: wear protective clothing or sunscreen

Adverse Reactions #2

- Hypersensitivity reactions:
  - Pruritus (itching)
  - Urticaria (hives)
  - Generalized skin eruptions
  - Severe reactions leading to potentially lethal conditions such as toxic epidermal necrolysis or Stevens--Johnson syndrome

Nursing Alert: TEN and Stevens–Johnson Syndrome

- Be alert for the additional signs of lesions
- Notify primary health care provider and withhold next dose
- Exercise care to prevent injury
- Observe for hematologic changes during prolonged sulfonamide therapy
  - Thrombocytopenia; aplastic anemia; leukopenia
    - Thrombo-platelets; -penia-low; leuko-white;
    - -emia-blood; erythr/o-red; cytes-cells
    - (need to start learning Lab Values)

Contraindications and Precautions

- Patients with hypersensitivity to sulfonamides
- During lactation; near the end of pregnancy; in children younger than 2 years old
- Infections caused by group A beta-hemolytic streptococci
- Use cautiously for renal impairment, hepatic impairment, and bronchial asthma

Interactions

Interactant Drug	Effect of Interaction
Oral anticoagulants	Increased action of the anticoagulant
Methotrexate (Rheumatrex)	Increased bone marrow suppression
Hydantoins (e.g., phenytoin [Dilantin])	Increased serum hydantoin level

Chronic Care and Health Supplement Alert

- Diabetic patients: assess for hypoglycemic reaction
- Cranberries/cranberry juice: prevents and relieves symptoms of UTIs
- Combination of cranberries with antibiotics: long-term suppression of UTIs
- Extremely large doses of cranberries: produce gastrointestinal disturbances

Nursing Process: The Patient Receiving a Sulfonamide #1

- Preadministration assessment
  - Assess patient's general appearance, general health history, allergies; take and record the vital signs
  - Obtain information: symptoms experienced by patient and duration of symptoms
  - Review results of tests

Nursing Process: The Patient Receiving a Sulfonamide #2

- Ongoing assessment
  - Evaluate at periodic intervals: relief of symptoms, decrease in temperature, occurrence of adverse reactions
  - Monitor temperature, pulse, respiratory rate, blood pressure
  - Observe for relief/intensification of symptoms
  - Report adverse reactions

Nursing Process: The Patient Receiving a Sulfonamide #3

- Nursing diagnoses
  - **Impaired Urinary Elimination**—related to effect on the bladder from the sulfonamides
  - **Impaired Skin Integrity**—related to burns, photosensitivity, or severe allergic reaction to the sulfonamides
  - **Risk for Secondary Infection**—related to lowered white blood cell count resulting from sulfonamide therapy

Nursing Process: The Patient Receiving a Sulfonamide #4

- Planning
  - Expected patient outcomes depend on the reason for administration of the sulfonamide but may include:
    - An optimal response to drug therapy
    - Management of adverse drug reactions
    - An understanding of and compliance with the prescribed treatment regimen

Nursing Process: The Patient Receiving a Sulfonamide #5

- Implementation
  - Dosage: empty stomach—1 hour before or 2 hours after meals
    - Exception: primary health care provider's orders
- Gastrointestinal irritation: give sulfasalazine with food or immediately after meals; drink at least eight large glasses of water each day

Impaired Urinary Elimination

- Adverse effect of sulfonamide drug: altered elimination patterns
- Help patient maintain adequate fluid intake and output: prevent crystalluria and stone (calculi) formation in genitourinary tract
- Patient's intake and output: measure and record every 8 hours
- Notify primary health care provider: urinary output decreases or the patient fails to increase his or her oral intake

Gerontologic Alert

- Renal impairment: common in older adults—administer sulfonamides with great caution
- Renal impairment already present: increased danger of the sulfonamides causing additional renal damage
- Increase fluid intake up to 2000 mL: decreased risk of crystal and stone formation in urinary tract
- Patient hesitant to increase oral fluid intake—fear of incontinence: assess for this fear

Impaired Skin Integrity: Burn Injury

- Mafenide or silver sulfadiazine: used in treating burns—treatment regimen outlined by the primary health care provider or the personnel in the burn treatment unit
- Burn treatment regimens: debridement, special dressings, and cleansing of the burned area
- Treatment regimen depends on extent of the burned area, degree of the burns, physical condition, and age of the patient

Treatment: Burn Injury

- When instructed: clean and removes debris from surface of the skin; apply mafenide or silver sulfadiazine with a sterile gloved hand
- Drug applied approximately 1/16 in thick

- Keep patient away from draft of air as slightest movement of air across the burned area can cause pain
- Warn patient: stinging or burning during and for a short time after application of mafenide; burning also noted with silver sulfadiazine

Impaired Skin Integrity: Photosensitivity

- Skin: more sensitive to sunlight when taking sulfonamides
- Sunscreens recommended: should not be used in place of protective clothing
- Inspect skin for signs of sores or blisters
- Skin and mucous membranes: inspect for up to 14 days

Risk for Secondary Infection

- Leukopenia: signs and symptoms of an infection, such as fever, sore throat, and cough
- Thrombocytopenia: easy bruising and unusual bleeding after moderate to slight trauma to the skin
- Encourage patient to use a soft-bristled toothbrush
- Report signs of thrombocytopenia immediately: indication to stop drug therapy

Educating the Patient and Family

- Emphasize the importance of completing the prescribed course
- Develop a teaching plan to include:
  - Keep all follow-up appointments
  - Drink at least eight to ten 8-ounce glasses of fluid every day
  - When going outside, cover exposed areas of the skin or apply a protective sunscreen to exposed areas

Evaluation #1

- The therapeutic drug effect is achieved
- No evidence of infection
- The patient's fluid intake is at least 2000 milliliters and output is at least 1200 milliliters daily while taking a sulfonamide
- The skin is intact and free of inflammation, irritation, or ulcerations

Evaluation #2

- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through appropriate nursing interventions
- The patient verbalizes the importance of complying with the prescribed treatment regimen
- The patient and family demonstrate an understanding of the drug regimen

Question #1

- Is the following statement true or false?
- Sulfonamides treat infections caused by first-degree burns.

Answer to Question #1

- False
- Sulfonamides treat infections caused by second- and third-degree burns, not first-degree burns.

Question #2

Persons taking sulfonamides need to increase fluid intake to how many mL per day?

A. 500 mL

B. 1000 mL

C. 1500 mL

D. 2000 mL

Answer to Question #2

- D
- Persons taking sulfonamides need to increase fluid intake to at least 2000 mL to prevent genitourinary problems caused by the drug. Because kidney function diminishes as we age, there is an increased danger of renal damage and fluid increase is even more important with the elderly.

Question #3

- Is the following statement true or false?
- Photosensitivity is an adverse reaction of sulfonamides; people taking these drugs should increase outdoor activities.

Answer to Question #3

- False
- Photosensitivity is an adverse reaction of sulfonamides; people taking these drugs should lessen outdoor activities or take care to protect their skin while outdoors.