Wolters Kluwer
When you have to be right

Introduction to Clinical Pharmacology

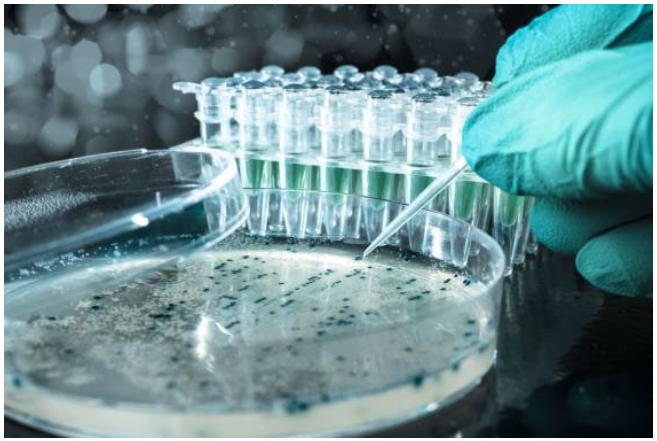
Chapter 6
Antibacterial Drugs: Sulfonamides

Learning Objectives

1. Describe the concept of bacterial sensitivity
2. Explain the uses, general drug actions, and general adverse reactions, contraindications, precautions, and interactions for the sulfonamides
3. Distinguish important preadministration and ongoing assessment activities the nurse should perform on the client taking sulfonamides
4. List nursing diagnoses particular to a client taking sulfonamides
5. Examine ways to promote an optimal response to therapy, how to manage adverse reactions, and important points to keep in mind when educating clients about the use of the sulfonamides
6. Identify the rationale for increasing fluid intake when taking sulfonamides
7. Describe the objective signs indicating that a severe skin reaction, such as Stevens-Johnson syndrome, is present

Introduction to Sulfonamides—Bacterial Sensitivity

- To choose an appropriate drug to treat a bacterial infection, the primary health care provider needs to know if the bacteria will react to the drug
- Antibacterial drugs are either
  - Bacteriostatic (they slow or retard the multiplication of bacteria) or
  - Bactericidal (the destroy the bacteria)
- Culture and sensitivity tests are performed to determine if a bacteria is sensitive to a certain antibiotic drug



Sulfonamides—Actions

- Sulfonamides are primarily bacteriostatic
- Inhibit the activity of folic acid in bacterial cell metabolism
- Slow the rate of bacterial multiplication
- Control infections caused by both gram-negative and gram-positive bacteria
- Effective against
  - *Escherichia coli*
  - *Staphylococcus aureus*
  - *Klebsiella*
  - *Enterobacter*
  - Sulfasalazine interacts with intestinal bacteria and helps inhibit the inflammatory process in ulcerative colitis

Sulfonamides—Uses

- Urinary tract infections (UTIs)
- Acute otitis media (middle ear infection)
- Ulcerative colitis
- Bacterial skin and eye infections
- Topical sulfonamides are used in the treatment and prevention of infections in second- and third-degree burns

Sulfonamides—Adverse Reactions #1

- Common Gastrointestinal System Reactions:
  - Anorexia, nausea, and vomiting
  - Diarrhea and abdominal pain
  - Stomatitis (inflammation of the mouth)
- Other Common Reactions
  - Chills and fever
  - Crystalluria: increase fluid intake
  - Photosensitivity

Sulfonamides—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**
- Observe for hematologic changes during prolonged sulfonamide therapy
  - thrombocytopenia;
  - aplastic anemia;
  - leukopenia

Nursing Alert: TEN and Stevens-Johnson Syndrome

- Be alert for the additional signs of lesions that may indicate toxic epidermal necrolysis (TEN) or Stevens-Johnson syndrome (SJS)
- Notify primary health care provider and withhold next dose
- Exercise care to prevent injury

Sulfonamides—Contraindications

- Sulfonamides should not be administered
  - In clients with hypersensitivity
  - During lactation
  - Near the end of pregnancy
  - In children younger than 2 years old
  - For Infections caused by group A beta-hemolytic streptococci

Sulfonamides—Precautions

- Use cautiously in clients with
  - renal impairment,
  - hepatic impairment, and
  - bronchial asthma
- When used in pregnant women to treat *Toxoplasmosis gondii* infections, the drug can cross the placenta

Sulfonamides—Interactions

Interacting Drug	Common Use	Effect of Interaction
Oral anticoagulants	Blood thinner; prevent clot formation	Increased action of the anticoagulant
Methotrexate	Immunosuppression and chemotherapy	Increased bone marrow suppression
Hydantoins	Anticonvulsants	Increased serum hydantoin level

Nursing Process—Client Receiving a Sulfonamide

- **Preadministration Assessment**
- **Objective Data**
  - General client appearance
  - Affect and orientation (especially in elderly clients)
  - Vital signs
  - Review results of tests (e.g., urinalysis and urine culture)
- **Subjective Data**
  - Type and duration of symptoms
  - Remedies attempted before seeking care

Pharmacology in Practice Exercise #1

- Information from the preassessment can help you determine whether a client's confusion is an ongoing problem or caused by their current illness. Which data item makes you think a client's confusion is caused by an infection?

a) The client had trouble telling you what day it is today.

b) The client's urine is amber and cloudy.

c) The client smells like urine.

d) The urinalysis shows 3+ bacteria and white blood cells.

Nursing Process—Client Receiving a Sulfonamide #1

- Ongoing Assessment
  - Observe for relief/intensification of symptoms
  - Evaluate at periodic intervals:
    - relief of symptoms,
    - decrease in temperature,
    - occurrence of adverse reactions
  - Monitor temperature, pulse, respiratory rate, blood pressure
  - If being used for burns, inspect burns every 1-2 hours to make sure the mafenide or silver sulfadiazine ointment is covering the burns
  - Report adverse reactions

Nursing Process—Client Receiving a Sulfonamide #2

- Nursing Diagnoses
  - Altered Urinary Elimination related to effect on the bladder from sulfonamides
  - Altered Skin Integrity related to burns
  - Altered Skin Integrity related to photosensitivity or severe allergic reaction to the sulfonamides
  - Infection (Secondary) Risk related to lowered white blood cell count resulting from sulfonamide therapy

Nursing Process—Client Receiving a Sulfonamide #3

- Planning
  - Expected client outcomes depend on the reason for administration of the sulfonamide but may include:
    - An optimal response to drug therapy
    - Meeting client needs related to the management of adverse drug reactions
    - Confidence in an understanding of the prescribed treatment regimen

Nursing Process—Client Receiving a Sulfonamide #4

- Implementation
  - Promoting an optimal response to therapy
    - Dosage: give sulfonamide on an 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
    - **To prevent crystalluria: drink at least eight large glasses of water each day until the drug regimen is finished**
    - Adequate hydration can also help flush microorganisms from the urinary tract system

Nursing Process—Client Receiving a Sulfonamide #5

- Implementation—Monitoring and Managin Client Needs
  - Altered Urinary Elimination
    - An adverse effect of sulfonamide drug: altere elimination patterns
    - **Help client maintain adequate fluid intake a output (2,000 mL or 68 ounces) per day to prevent crystalluria and stone (calculi) formation in genitourinary tract**
    - Measure client's intake and output: measure a record every 8-12 hours
    - Notify primary health care provider if the urinary output decreases or the client fails to increase their oral intake

Pharmacology in Practice Exercise #2

- The client is hesitant to increase their fluid intake. Which of the following reasons should the nurse give them to improve fluid intake? Select all that apply.

a) Removes microorganisms from the urinary system.

b) Allows for easy absorption of the drug in the GI system.

c) Prevents formation of crystals in the urine.

d) Allows for easy excretion by the kidneys.

Nursing Process—Client Receiving a Sulfonamide #6

- Implementation—Monitoring and Managing Client Needs
  - Altered 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 client

BOX 6.1 Steps in Applying Topical Preparations to Burns

1. Clean and remove debris present on the surface of the skin.
2. Apply drug in a layer approximately 1/16 in. thick; thicker application is not recommended.
3. While wound is exposed, minimize air draft because it can cause pain.
4. Warn the client that stinging or burning may be felt during and for a short time after application.

Nursing Process—Client Receiving a Sulfonamide #7

- Implementation—Monitoring and Managing Client Needs
  - **Altered 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— severe allergic reaction
    - Skin and mucous membranes: inspect for up to 14 days

Nursing Process—Client Receiving a Sulfonamide #8

- Implementation—Monitoring and Managing Client Needs
  - **Risk for Secondary Infection**
    - Assess lab results for signs of leukopenia and thrombocytopenia
    - Protect client with leukopenia from other individuals who might have an infection
    - Assess for signs and symptoms of an infection, such as fever, sore throat, and cough
    - Assess for other signs of thrombocytopenia: easy bruising and unusual bleeding after moderate to slight trauma to the skin
    - Encourage client to use a soft-bristled toothbrush
    - Report signs of leukopenia or thrombocytopenia immediately: indication to stop drug therapy

Nursing Process—Client Receiving a Sulfonamide #9

- Implementation—Educating the Client and Family
  - Develop a teaching plan for the client and family to include:
    - The importance of taking every dose, at the prescribed time intervals, and completing the prescribed course
    - Keep all follow-up appointments
    - Drink at least eight to ten 8-ounce glasses of fluid every day
    - Take sulfonamides with food or immediately after a meal
    - When going outside, cover exposed areas of the skin or apply a protective sunscreen to exposed areas
    - Skin or urine may turn orange-yellow and that is normal—soft contact lenses may become stained

Nursing Process—Client Receiving a Sulfonamide #10

- Evaluation
  - Was the therapeutic drug effect achieved?
  - Any adverse reactions? If so, were adverse reactions managed effectively?
  - Is there any further evidence of infection?
  - Is the client's fluid intake at least 2,000 mL and output is at least 1,200 mL daily while taking a sulfonamide?
  - Is the skin intact and free of inflammation, irritation, or ulcerations
  - Do the client and family express confidence and demonstrate an understanding of the drug regimen?

Turn and Talk—Case Study

- A 75-year-old client is diagnosed with an acute exacerbation of chronic bronchitis. The physician would like to prescribe a sulfonamide to treat this exacerbation

1. What information should the nurse obtain from the client before the physician sees them?
2. The physician diagnoses the client with an acute exacerbation of chronic bronchitis. The physician prescribes Bactrim DS one tablet every 12 hours for 14 days. What should the nurse tell the client about the prescription before leaving the physician's office?
3. Two days later, the client calls the physician's office, complaining of a red rash forming on the face, neck, and extremities. What should the nurse tell the client?