Chapter 02: Basic Principles of Drug Action and Drug Interactions
Clayton/Willihnganz: Basic Pharmacology for Nurses, 17th Edition

MULTIPLE CHOICE

1. The nurse assesses hives in a patient started on a new medication. What is the nurse's priority action?
   a. Notify physician of allergic reaction.
   b. Notify physician of idiosyncratic reaction.
   c. Notify physician of potential teratogenicity.
   d. Notify physician of potential tolerance.

   ANS: A
   An allergic reaction is indicative of hypersensitivity and manifests with hives and/or urticaria, which are easily identified. An idiosyncratic reaction occurs when something unusual or abnormal happens when a drug is first administered. A teratogenic reaction refers to the occurrence of birth defects related to administration of the drug. Tolerance refers to the body's requirement for increasing dosages to achieve the same effects that a lower dose once did.

   DIF: Cognitive Level: Application REF: Page 17 OBJ: 4
   TOP: Nursing Process Step: Assessment
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Clinical Judgment; Safety

2. The nurse administers an initial dose of a steroid to a patient with asthma. Thirty minutes after administration, the nurse finds the patient agitated and stating that "everyone is out to get me." What is the term for this unusual reaction?
   a. Desired action
   b. Adverse effect
   c. Idiosyncratic reaction
   d. Allergic reaction

   ANS: C
   Idiosyncratic reactions are unusual, abnormal reactions that occur when a drug is first administered. Patients typically exhibit an overresponsiveness to a medication related to diminished metabolism. These reactions are believed to be related to genetic enzyme deficiencies. Desired actions are expected responses to a medication. Adverse effects are reactions that occur in another system of the body; they are usually predictable. Allergic reactions appear after repeated medication dosages.

   DIF: Cognitive Level: Knowledge REF: Page 18 OBJ: 4
   TOP: Nursing Process Step: Evaluation
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Patient Education; Clinical Judgment; Caregiving; Safety; Sensory Perception

3. Which is the best description of when drug interactions occur?
   a. On administration of toxic dosages of a drug
   b. On an increase in the pharmacodynamics of bound drugs
   c. On the alteration of the effect of one drug by another drug
   d. On increase of drug excretion

ANS: C
Drug interactions may be characterized by an increase or decrease in the effectiveness of one or both of the drugs. Toxicity of one drug may or may not affect the metabolism of another one. Drug interactions may result from either increased or decreased pharmacodynamics. Drug interactions may result from either increased or decreased excretion.

DIF: Cognitive Level: Comprehension REF: Page 18 OBJ: 5
TOP: Nursing Process Step: Assessment
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Safety; Patient Education; Clinical Judgment

4. What occurs when two drugs compete for the same receptor site, resulting in increased activity of the first drug?
   a. Desired action
   b. Synergistic effect
   c. Carcinogenicity
   d. Displacement

   ANS: D
   The displacement of the first drug from receptor sites by a second drug increases the amount of the first drug because more unbound drug is available. An expected response of a drug is the desired action. A synergistic effect is the effect of two drugs being greater than the effect of each chemical individually or the sum of the individual effects. Carcinogenicity is the ability of a drug to cause cells to mutate and become cancerous.

   DIF: Cognitive Level: Comprehension REF: Page 19 OBJ: 6
   TOP: Nursing Process Step: Implementation
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Safety; Patient Education

5. What do drug blood levels indicate?
   a. They confirm if the patient is taking a generic form of a drug.
   b. They determine if the patient has sufficient body fat to metabolize the drug.
   c. They verify if the patient is taking someone else's medications.
   d. They determine if the amount of drug in the body is in a therapeutic range.

   ANS: D
   The amount of drug present may vary over time and the blood level must remain in a therapeutic range in order to obtain the desired result. Generic drugs do not necessarily produce a different drug blood level than proprietary medications. Body fat is not measured by drug blood levels. Drug blood levels only measure the amount of drug in the body; they do not determine the source of the medication.

   DIF: Cognitive Level: Comprehension REF: Page 17 OBJ: 4
   TOP: Nursing Process Step: Evaluation
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Clinical Judgment; Safety

6. What is the process by which a drug is transported by circulating body fluids to receptor sites?
   a. Osmosis
   b. Distribution
   c. Absorption

d. Biotransformation

ANS: B
Distribution refers to the ways in which drugs are transported by the circulating body fluids to the sites of action (receptors), metabolism, and excretion. Osmosis is the process of moving solution across a semipermeable membrane to equalize the dilution on each side. Absorption is the process by which a drug is transferred from its site of entry into the body to the circulating fluids for distribution. Biotransformation, also called metabolism, is the process by which the body inactivates drugs.

DIF: Cognitive Level: Comprehension REF: Page 15 OBJ: 3
TOP: Nursing Process Step: Planning
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

7. The nurse assesses which blood level to determine the amount of circulating medication in a patient?
   a. Peak
   b. Trough
   c. Drug
   d. Therapeutic

ANS: C
When a drug is circulating in the blood, a blood sample may be drawn and assayed to determine the amount of drug present; this is known as the drug blood level. Peak levels are only those drug blood levels that are at their maximum before metabolism starts to decrease the amount of circulating drug. Trough levels are only those drug blood levels that are at their minimum when metabolism has decreased the amount of circulating drug and before an increase caused by a subsequent dose of the medication. Therapeutic levels are only those within a prescribed range of blood levels determined to bring about effective action of the medication.

DIF: Cognitive Level: Comprehension REF: Page 17 OBJ: 3
TOP: Nursing Process Step: Evaluation
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

8. The nurse administers 50 mg of a drug at 6:00 AM that has a half-life of 8 hours. What time will it be when 25 mg of the drug has been eliminated from the body?
   a. 8:00 AM
   b. 11:00 AM
   c. 2:00 PM
   d. 6:00 PM

ANS: C
Fifty percent of the medication, or 25 mg, will be eliminated in 8 hours, or at 2:00 PM. 8:00 AM is 2 hours after administration; the half-life is 8 hours. 11:00 AM is 4 hours after administration; the half-life is 8 hours. 6:00 PM is 12 hours after administration; the half-life is 8 hours.

DIF: Cognitive Level: Analysis REF: Page 15 OBJ: 2
TOP: Nursing Process Step: Evaluation

MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Clinical Judgment; Safety; Elimination; Health Promotion

9. What will the nurse need to determine first in order to mix two drugs in the same syringe?
   a. Absorption rate of the drugs
   b. Compatibility of the drugs
   c. Drug blood level of each drug
   d. Medication adverse effects

   ANS: B
   Knowledge of absorption is important but not in order to mix drugs. In order to mix two drugs, compatibility is determined so there is no deterioration when the drugs are mixed in the same syringe. Drug level does not indicate if it is acceptable to mix medications in the same syringe. Adverse effects are important for the nurse to know, but not in order to mix drugs.

   DIF: Cognitive Level: Application REF: Page 19 OBJ: 6
   TOP: Nursing Process Step: Implementation
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Clinical Judgment; Safety

10. A patient developed hives and itching after receiving a drug for the first time. Which instruction by the nurse is accurate?
    a. Stop the medication and encourage the patient to wear a medical alert bracelet that explains the allergy.
    b. Explain to the patient that these are signs and symptoms of an anaphylactic reaction.
    c. Emphasize to the patient the importance to inform medical personnel that in the future a lower dosage of this drug is necessary.
    d. Instruct the patient that it would be safe to take the drug again because this instance was a mild reaction.

    ANS: A
    This initial allergic reaction is mild, and the patient is more likely to have an anaphylactic reaction at the next exposure; a medical alert bracelet is necessary to explain the reaction. Signs and symptoms of an anaphylactic reaction are respiratory distress and cardiovascular collapse. A more severe reaction will occur at the next exposure, and the patient should not receive the drug again.

    DIF: Cognitive Level: Application REF: Page 18 OBJ: 4
    TOP: Nursing Process Step: Implementation
    MSC: NCLEX Client Needs Category: Physiological Integrity
    NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

11. When obtaining a patient’s health history, which assessment data would the nurse identify as having the most effect on drug metabolism?
    a. History of liver disease
    b. Intake of a vegetarian diet
    c. Sedentary lifestyle
    d. Teacher as an occupation

    ANS: A

Liver enzyme systems are the primary site for metabolism of drugs. Intake of a vegetarian diet may affect absorption but not metabolism. Sedentary lifestyle and occupations could affect metabolism (exposure to environmental pollutants), but these do not have the most significant effect on metabolism.

DIF: Cognitive Level: Application REF: Page 16 OBJ: 3
TOP: Nursing Process Step: Assessment
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

12. A physician's order indicates to administer a medication to the patient via the percutaneous route. The nurse can anticipate that the patient will receive this medication
    a. intramuscularly.
    b. subcutaneously.
    c. topically.
    d. rectally.

    ANS: C
    The percutaneous route refers to drugs that are absorbed through the skin and mucous membranes. Methods of the percutaneous route include inhalation, sublingual (under the tongue), or topical (on the skin) administration. The parenteral route bypasses the gastrointestinal (GI) tract by using subcutaneous (subcut), intramuscular (IM), or intravenous (IV) injection. The parenteral route bypasses the GI tract by using subcut, IM, or IV injection. In the enteral route, the drug is administered directly into the GI tract by the oral, rectal, or nasogastric route.

    DIF: Cognitive Level: Application REF: Page 14 OBJ: 1
    TOP: Nursing Process Step: Implementation
    MSC: NCLEX Client Needs Category: Physiological Integrity
    NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

13. A nurse is preparing to administer tetracycline to a patient diagnosed with an infection. Which medication should not be administered with tetracycline?
    a. Ativan
    b. Tylenol
    c. Colace
    d. Mylanta

    ANS: D
    Administering tetracycline with Mylanta can provide an antagonistic effect that will result in decreased absorption of the tetracycline. Ativan, Tylenol, and Colace are not contraindicated to administer with tetracycline.

    DIF: Cognitive Level: Application REF: Page 18 OBJ: 5 | 6
    TOP: Nursing Process Step: Implementation
    MSC: NCLEX Client Needs Category: Physiological Integrity
    NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

MULTIPLE RESPONSE

1. Which statement(s) about liberation of drugs is/are true? (*Select all that apply*.)

a. A drug must be dissolved in body fluids before it can be absorbed into body tissues.
b. A solid drug taken orally must disintegrate and dissolve in GI fluids to allow for absorption into the bloodstream for transport to the site of action.
c. The process of converting the drug into a soluble form can be controlled to a certain degree by the dosage form.
d. Converting the drug to a soluble form can be influenced by administering the drug with or without food in the patient's stomach.
e. Elixirs take longer to be liberated from the dosage form.

ANS: A, B, C, D
Regardless of the route of administration, a drug must be dissolved in body fluids before it can be absorbed into body tissues. Before a solid drug taken orally can be absorbed into the bloodstream for transport to the site of action, it must disintegrate and dissolve in the GI fluids and be transported across the stomach or intestinal lining into the blood. The process of converting a drug into a soluble form can be partially controlled by the pharmaceutical dosage form used (e.g., solution, suspension, capsules, and tablets with various coatings). The conversion process can also be influenced by administering the drug with or without food in the patient's stomach. Elixirs are already drugs dissolved in a liquid and do not need to be liberated from the dosage form.

DIF: Cognitive Level: Comprehension REF: Page 14 OBJ: 3
TOP: Nursing Process Step: Implementation
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

2. Which are routes of drug excretion? (*Select all that apply*.)
a. GI tract; feces
b. Genitourinary (GU) tract; urine
c. Lymphatic system
d. Circulatory system; blood/plasma
e. Respiratory system; exhalation

ANS: A, B, E
The GI system is a primary route for drug excretion. The GU and the respiratory systems do function in the excretion of drugs. The lymphatic and circulatory systems are involved with drug distribution, not drug excretion.

DIF: Cognitive Level: Knowledge REF: Page 15 OBJ: 3
TOP: Nursing Process Step: Assessment
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety; Elimination

3. Which route(s) enable(s) drug absorption more rapidly than the subcut route? (*Select all that apply*.)
a. IV route
b. IM route
c. Inhalation/sublingual
d. Intradermal route
e. Enteral route

ANS: A, B, C

IV route of administration enables drug absorption more rapidly than the subcut route. IM route of administration enables drug absorption more rapidly because of greater blood flow per unit weight of muscle. Inhalation/sublingual route of administration enables drug absorption more rapidly than the subcut route. Intradermally administered drugs are absorbed more slowly because of the limited available blood supply in the dermis. Enterally administered drugs are absorbed more slowly because of the biotransformation process.

DIF: Cognitive Level: Comprehension REF: Page 14 OBJ: 1 | 3
TOP: Nursing Process Step: Evaluation
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

4. The nurse recognizes that which factor(s) would contribute to digoxin toxicity in a 92-year-old patient? (*Select all that apply*.)
   a. Taking the medication with meals
   b. Prolonged half-life of the drug digoxin
   c. Impaired renal function
   d. Diminished mental capacity

   ANS: B, C
   Impaired renal and hepatic function in older adults impairs metabolism and excretion of drugs, thus prolonging the half-life of a medication. Food would decrease the absorption of the drug. Diminished mental capacity does not contribute to drug toxicity unless it is due to administration errors.

   DIF: Cognitive Level: Application REF: Page 15 OBJ: 2 | 3 | 7
   TOP: Nursing Process Step: Assessment
   MSC: NCLEX Client Needs Category: Health Promotion and Maintenance
   NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

5. Which statement(s) about variables that influence drug action is/are true? (*Select all that apply*.)
   a. An older adult will require increased dosage of a drug to achieve the same therapeutic effect as that seen in a younger person.
   b. Body weight can affect the therapeutic response of a medication.
   c. Chronic smokers may metabolize drugs more rapidly than nonsmokers.
   d. A patient's attitude and expectations affect the response to medication.
   e. Reduced circulation causes drugs to absorb more rapidly.

   ANS: B, C, D
   Body weight can affect response to medications; typically, obese patients require an increase in dosage and underweight patients a decrease in dosage. Chronic smoking enhances metabolism of drugs. Attitudes and expectations play a major role in an individual's response to drugs. Older adults require decreased dosages of drugs to achieve a therapeutic effect. Decreased circulation causes drugs to absorb more slowly.

   DIF: Cognitive Level: Comprehension REF: Page 16 | Page 17
   OBJ: 5 | 6 | 7 TOP: Nursing Process Step: Implementation
   MSC: NCLEX Client Needs Category: Physiological Integrity
   NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

6. Which factor(s) affect(s) drug actions? (*Select all that apply*.)

a. Teratogenicity
b. Age
c. Body weight
d. Metabolic rate
e. Illness

ANS: B, C, D, E
Age, body weight, metabolic rate, and illness may contribute to a variable response to a medication. Teratogenicity does not contribute to a variable response to a medication.

DIF: Cognitive Level: Comprehension REF: Page 16 | Page 17
OBJ: 7 TOP: Nursing Process Step: Assessment
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Patient Education; Clinical Judgment; Safety

COMPLETION

1. A patient receives 200 mg of a medication that has a half-life of 12 hours. How many mg of the drug would remain in the patient's body after 24 hours?

ANS:
50

The half-life is defined as the amount of time required for 50% of the drug to be eliminated from the body. If a patient is given 200 mg of a drug that has a half-life of 12 hours, then 50 mg of the drug would remain in the body after 24 hours.

DIF: Cognitive Level: Analysis REF: Page 15 OBJ: 2 | 3
TOP: Nursing Process Step: Evaluation
MSC: NCLEX Client Needs Category: Physiological Integrity
NOT: CONCEPT(S): Clinical Judgment; Safety