Chapter 3: Drug Regulation, Development, Names, and Information
Test Bank

MULTIPLE CHOICE

1. A nurse educator is conducting a continuing education class on pharmacology. To evaluate the learning of the nurses in the class, the nurse educator asks, "Which drug name is a generic drug name?" Which is the correct response?
   a. Acetaminophen
   b. Tylenol
   c. Cipro
   d. Motrin

   ANS: A
   Acetaminophen is the generic name. Tylenol, Cipro, and Motrin are all trade names.

   DIF: Cognitive Level: Comprehension REF: Table 3-3: The Three Types of Drug Names
   TOP: Nursing Process: Diagnosis
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

2. The FDA Amendments Act (FDAAA) was passed in 2007 to address which aspect of drug safety?
   a. Allowing pharmaceutical companies to identify off-label uses of medications approved for other uses
   b. Evaluating drug safety information that emerges after a drug has been approved and is in use
   c. Expediting the approval process of the U.S. Food and Drug Administration (FDA) so that needed drugs can get to market more quickly
   d. Requiring manufacturers to notify patients before removing a drug from the market

   ANS: B
   The FDAAA was passed to enable the Food and Drug Administration to continue oversight of a drug after granting it approval so that changes in labeling could be made as necessary and postmarketing risks could be tracked and identified. A provision of the FDA Modernization Act (FDAMA), passed in 1997, allows drug companies to promote their products for off-label uses as long as they promise to conduct studies to support their claims. Regulations to permit accelerated approval of drugs for life-threatening diseases were adopted in 1992 by the FDA. The requirement that drug companies notify patients 6 months before removing a drug from the market is a provision of the FDAMA.

   DIF: Cognitive Level: Comprehension REF: Landmark Drug Legislation
   TOP: Nursing Process: Evaluation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

3. A nursing student asks a nurse about pharmaceutical research and wants to know the purpose of randomization in drug trials. The nurse explains that randomization is used to:
   a. ensure that differences in outcomes are the result of treatment and not differences in subjects.
   b. compare the outcome caused by the treatment to the outcome caused by no treatment.

c. make sure that researchers are unaware of which subjects are in which group.
d. prevent subjects from knowing which group they are in and prevent preconception bias.

ANS: A
Randomization helps prevent allocation bias, which can occur when researchers place subjects with desired characteristics in the study group and other subjects in the control group so that differences in outcome are actually the result of differences in subjects and not treatment. Comparing treatment outcome to no treatment outcome is the definition of a controlled study. The last two options describe the use of blinding in studies; blinding ensures that researchers or subjects (or both) are unaware of which subjects are in which group so that preconceptions about benefits and risks cannot bias the results.

DIF: Cognitive Level: Comprehension REF: The Randomized Drug Trial
TOP: Nursing Process: Implementation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

4. Someone asks a nurse about a new drug that is in preclinical testing and wants to know why it cannot be used to treat a friend's illness. Which statement by the nurse is correct?
a. "A drug at this stage of development can be used only in patients with serious disease."
b. "At this stage of drug development, the safety and usefulness of the medication is unknown."
c. "Clinical trials must be completed to make sure the drug is safe to use in humans."
d. "Until postmarketing surveillance data are available, the drug cannot be used."

ANS: B
Preclinical testing must be completed before drugs can be tested in humans. In this stage, drugs are evaluated for toxicities, pharmacokinetic properties, and potentially useful effects. Some drugs can be used in patients before completion of Phase III studies, but this is after preclinical testing is complete. Clinical trials proceed in stages, and each stage has guidelines defining how a new drug may be used and which patients may receive it. Postmarketing surveillance takes place after a drug is in general use.

DIF: Cognitive Level: Comprehension
REF: Landmark Drug Legislation | Stages of Drug Development
TOP: Nursing Process: Implementation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

5. A patient asks a nurse why drugs that have been approved by the FDA still have unknown side effects. The nurse tell the patient that:
a. testing for all side effects of a medication would be prohibitively expensive.
b. patients in drug trials often are biased by their preconceptions of a drug's benefits.
c. researchers tend to conduct studies that will prove the benefits of their new drugs.
d. subjects in drug trials do not always represent the full spectrum of possible patients.

ANS: D

All drug trials are limited by a relatively small group of subjects who may not have all the characteristics of people who will be using the drug; therefore, some side effects go undetected until the drug is in use. Although drug trials are very expensive, this is only an indirect reason they do not detect all side effects before approval. In theory, well-designed drug trials, using blinded studies, minimize or eliminate subject bias. Designing studies to prove desired results is unethical.

DIF: Cognitive Level: Analysis REF: Failure to Detect All Adverse Effects
TOP: Nursing Process: Implementation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

6. A nurse is teaching nursing students about the use of nonproprietary names for drugs. The nurse tells them which fact about nonproprietary names?
   a. They are approved by the FDA and are easy to remember.
   b. They are assigned by the U.S. Adopted Names Council.
   c. They clearly identify the drug's pharmacological classification.
   d. They imply the efficacy of the drug and are less complex.

   ANS: B
   Nonproprietary, or generic, names are assigned by the U.S. Adopted Names Council, which ensures that each drug has only one name. Trade names, or brand names, are approved by the FDA and are easier to remember. Some nonproprietary names contain syllables that identify the classification, although not all do. Drug names are not supposed to identify the use for the drug, although some brand names do so.

   DIF: Cognitive Level: Comprehension REF: Drug Names: The Three Types of Drug Names
   TOP: Nursing Process: Diagnosis
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

Chapter 4: Pharmacokinetics
Test Bank

MULTIPLE CHOICE

1. A patient tells the nurse that the oral drug that has been prescribed has caused a lot of stomach discomfort in the past. What will the nurse ask the prescriber?
   a. Whether a sublingual form of the medication can be given
   b. Whether the medication can be given by a parenteral route instead
   c. To order an enteric-coated form of the drug
   d. Whether the patient can receive a sustained-release preparation of the drug

   ANS: C
   Enteric-coated drugs are preparations that have been coated with a material that dissolves in the intestines, not the stomach. This coating is used either to protect the drug from stomach acid and pepsin or to protect the stomach from a drug that can cause gastric upset. Sublingual forms often are used for drugs that undergo rapid inactivation during the first pass through the hepatic circulation so that the drug can be absorbed directly into the systemic circulation. Parenteral routes are more costly and less safe than oral administration and should not be used unless necessary. A sustained-release preparation is used to release the drug into the body over a specific period to reduce the number of daily doses required to sustain therapeutic drug levels.

   DIF: Cognitive Level: Application
   REF: Comparing Oral Administration with Parenteral Administration
   TOP: Nursing Process: Implementation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

2. A patient claims to get better effects with a tablet of Brand X of a drug than with a tablet of Brand Y of the same drug. Both brands contain the same amount of the active ingredient. What does the nurse know to be most likely?
   a. Advertising by pharmaceutical companies can enhance patient expectations of one brand over another, leading to a placebo effect.
   b. Because the drug preparations are chemically equivalent, the effects of the two brands must be identical.
   c. Tablets can differ in composition and can have differing rates of disintegration and dissolution, which can alter the drug's effects in the body.
   d. The bioavailability of a drug is determined by the amount of the drug in each dose.

   ANS: C
   Even if two brands of a drug are chemically equivalent (i.e., they have identical amounts of the same chemical compound), they can have different effects in the body if they differ in bioavailability. Tablets made by different manufacturers contain different binders and fillers, which disintegrate and dissolve at different rates and affect the bioavailability of the drug. Two brands may be chemically equivalent and still differ in bioavailability, which is not determined by the amount of drug in the dose.

   DIF: Cognitive Level: Application
   REF: Pharmaceutical Preparations for Oral Administration TOP: Nursing Process: Diagnosis
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

3. A patient receives a drug that has a narrow therapeutic range. The nurse administering this medication will expect to do what?
   a. Administer the drug at intervals longer than the drug half-life.
   b. Administer this medication intravenously.
   c. Monitor plasma drug levels.
   d. Teach the patient that maximum drug effects will occur within a short period.

   ANS: C
   A drug with a narrow therapeutic range is more difficult to administer safely, because the difference between the minimum effective concentration and the toxic concentration is small. Patients taking these medications must have their plasma drug levels monitored closely to ensure that they are getting an effective dose that is not toxic. Administering medications at longer intervals only increases the time required to reach effective plasma drug levels. Drugs that have a narrow therapeutic range may be given by any route and do not differ from other medications in the amount of time it takes to take effect, which is a function of a drug's half-life and dosing frequency.

   DIF: Cognitive Level: Application REF: Drug Half-Life
   TOP: Nursing Process: Evaluation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

4. A patient is given a prescription for azithromycin (Zithromax) and asks the nurse why the dose on the first day is twice the amount of the dose on the next 4 days. Which reply by the nurse is correct?
   a. "A large initial dose helps to get the drug to optimal levels in the body faster."
   b. "The first dose is larger to minimize the first pass effect of the liver."
   c. "The four smaller doses help the body taper the amount of drug more gradually."
   d. "Tubular reabsorption is faster with initial doses, so more is needed at first."

   ANS: A
   A large initial dose is often used as a loading dose to help get serum drug levels to plateau levels more quickly. Larger doses do not prevent first pass effects in drugs susceptible to this type of metabolism. Tapering of doses sometimes is used to prevent rebound or withdrawal effects and is done by stepping down the amount of drug with each dose. Tubular reabsorption is a process that allows drugs to be reabsorbed from the urine into the blood.

   DIF: Cognitive Level: Application
   REF: Drug Half-Life | Loading Doses versus Maintenance Doses
   TOP: Nursing Process: Implementation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

5. A nurse is giving an enteral medication. The patient asks why this method is preferable for this drug. How will the nurse reply?
   a. "This route allows more rapid absorption of the drug."
   b. "This route is safer, less expensive, and more convenient."
   c. "This route is the best way to control serum drug levels."
   d. "This route prevents inactivation of the drug by digestive enzymes."

   ANS: B

Parenteral routes include the intravenous, intramuscular, and subcutaneous routes. Enteral routes include oral administration, including pills and liquid suspensions. Enteral routes are safer, cheaper, and easier to use. Parenteral routes are used when rapid absorption, precise control of plasma drug levels, and prevention of digestive inactivation are important.

DIF: Cognitive Level: Comprehension
REF: Comparing Oral Administration with Parenteral Administration
TOP: Nursing Process: Implementation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

6. The nurse is preparing to administer penicillin G intramuscularly to a child. The child's parents ask why the drug cannot be given in an oral liquid form. What is the nurse's reply?
   a. "This drug causes severe gastric upset if given orally."
   b. "This drug has a narrow therapeutic range, and the dose must be tightly controlled."
   c. "This drug is absorbed much too quickly in an oral form."
   d. "This drug would be inactivated by enzymes in the stomach."

   ANS: D
   Penicillin G is inactivated by digestive enzymes in the stomach and cannot be given orally. It does not have a narrow therapeutic range.

   DIF: Cognitive Level: Application
   REF: Characteristics of Commonly Used Routes of Administration: Intramuscular and Oral
   TOP: Nursing Process: Implementation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

7. A prescriber has written an order for a medication: drug X 100 mg PO every 6 hours. The half-life for the drug is approximately 6 hours. The nurse is preparing to administer the first dose at 8:00 AM on Tuesday. On Wednesday, when will the serum drug level reach plateau?
   a. 2:00 AM
   b. 8:00 AM
   c. 2:00 PM
   d. 8:00 PM

   ANS: B
   It takes four half-lives for a drug to reach plateau. Total body stores reach their peak at the beginning of the fifth dose of a drug if all doses are equal in amount; in this case, this will be at 8:00 AM the following day.

   DIF: Cognitive Level: Application REF: Drug Half-Life: Time to Plateau
   TOP: Nursing Process: Planning
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

8. An adult male patient is 1 day postoperative from a total hip replacement. On a pain scale of 0 to 10, with 10 being the greatest pain, the patient reports a pain level of 10. Which medication would be most appropriate for the nurse to administer to this patient?
   a. 60 mg morphine sulfate PO
   b. 75 mg meperidine (Demerol) intramuscularly
   c. 6 mg morphine sulfate intravenously
   d. Fentanyl (Duragesic) patch 50 mcg transdermally

ANS: C
The intravenous route is the fastest route of absorption and the one most appropriate for a patient in extreme pain. With the oral route, the medication would take at least 45 minutes to be effective, too long for a patient in extreme pain. With the intramuscular route, the medication would take at least 15 minutes to be effective; although faster than the oral route, this is not as fast as the intravenous route. A Duragesic patch would be the most inappropriate route because of the long drug half-life. This is a more appropriate route for long-term use.

DIF: Cognitive Level: Application
REF: Comparing Oral Administration with Parenteral Administration
TOP: Nursing Process: Implementation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

9. A nurse is explaining drug metabolism to a nursing student who asks about glucuronidation. The nurse knows that this is a process that allows drugs to be:
   a. excreted in hydrolyzed form in the feces to reduce drug toxicity.
   b. reabsorbed from the urine into the renal circulation to minimize drug loss.
   c. recycled via the enterohepatic recirculation to remain in the body longer.
   d. transported across the renal tubules to be excreted in the urine.

   ANS: C
   Glucuronidation of some drugs in the liver allows drugs to enter the bile, pass into the duodenum, and then be hydrolyzed to release the free drug. This is a repeating cycle of enterohepatic recirculation, which allows drugs to remain in the body longer. Glucuronidated drugs that are more resistant to hydrolysis are excreted in the feces. Glucuronidation occurs in the enterohepatic circulation and not in the renal circulation.

   DIF: Cognitive Level: Comprehension REF: Enterohepatic Recirculation
   TOP: Nursing Process: Planning
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

10. A patient is receiving intravenous gentamicin. A serum drug test reveals toxic levels. The dosing is correct, and this medication has been tolerated by this patient in the past. Which could be a probable cause of the test result?
    a. A loading dose was not given.
    b. The drug was not completely dissolved in the IV solution.
    c. The patient is taking another medication that binds to serum albumin.
    d. The medication is being given at a frequency that is longer than its half-life.

    ANS: C
    Gentamicin binds to albumin, but only weakly and, in the presence of another drug that binds to albumin, can rise to toxic levels in blood serum. A loading dose increases the initial amount of a drug and is used to bring drug levels to the desired plateau more quickly. A drug that is not completely dissolved carries a risk of causing embolism. A drug given at a frequency longer than the drug half-life will likely be at subtherapeutic levels and not at toxic levels.

    DIF: Cognitive Level: Analysis REF: Protein Binding
    TOP: Nursing Process: Evaluation
    MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

MULTIPLE RESPONSE

1. When administering medications to infants, it is important to remember which of the following? (Select all that apply.)
   a. Breast-feeding infants are more likely to develop toxicity when given lipid-soluble drugs.
   b. Immaturity of renal function in infancy causes infants to excrete drugs less efficiently.
   c. Infants have immature livers, which slows drug metabolism.
   d. Infants are more sensitive to medications that act on the central nervous system (CNS).
   e. Oral medications are contraindicated in infants, because PO administration requires a cooperative patient.

   ANS: B, C, D
   Immature renal function causes infants to excrete drugs more slowly, and infants are at risk for toxicity until renal function is well developed. Infants' livers are not completely developed, and they are less able to metabolize drugs efficiently. Because the blood-brain barrier is not well developed in infants, caution must be used when administering CNS drugs. Lipid-soluble drugs may be excreted in breast milk if the mother is taking them, but breast-feeding does not affect medications given directly to the infant. Oral medications may be given safely to infants as long as they are awake and can swallow the drug.

   DIF: Cognitive Level: Comprehension
   REF: The Blood-Brain Barrier, Special Considerations in Drug Metabolism
   TOP: Nursing Process: Assessment
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

Chapter 5: Pharmacodynamics
Test Bank

MULTIPLE CHOICE

1. A patient is receiving digoxin twice daily. When assessing the patient before giving a dose, the nurse counts a pulse of 60 beats per minute and learns that the patient is experiencing nausea. The nurse consults a drug manual and verifies that the ordered dose is correct. What will the nurse do?
   a. Contact the prescriber to report the symptoms.
   b. Delay the dose so the drug can clear from receptor sites.
   c. Give the medication as ordered, because the dose is correct.
   d. Request an antinausea medication from the prescriber.

   ANS: A
   The symptoms indicate toxicity, and even though the dose is safe and effective in most cases, an individual patient may have toxic effects with a standard dose. The nurse should contact the prescriber to discuss the next steps. Delaying a dose without a change in order is not within the scope of practice for a nurse. The nurse should not give a dose of a medication when toxicity is suspected, because additional drug will compound the symptoms. Antiemetics are useful for counteracting drug side effects, but they should not be used when the patient's symptoms indicate toxicity.

   DIF: Cognitive Level: Application REF: Interpatient Variability in Drug Responses
   TOP: Nursing Process: Evaluation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

2. A patient reports becoming "immune" to a medication because it no longer works to alleviate symptoms. The nurse recognizes that this decreased effectiveness is likely caused by:
   a. antagonists produced by the body that compete with the drug for receptor sites.
   b. decreased selectivity of receptor sites, resulting in a variety of effects.
   c. desensitization of receptor sites by continual exposure to the drug.
   d. synthesis of more receptor sites in response to the medication.

   ANS: C
   Continual exposure to an agonist would cause the cell to become less responsive or desensitized. The body does not produce antagonists as a response to a medication. Receptor site selectivity is determined by physiologic factors and not by the substances that bind to them. Medications do not cause more receptors to be produced.

   DIF: Cognitive Level: Analysis REF: Regulation of Receptor Sensitivity
   TOP: Nursing Process: Diagnosis
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

3. A patient has been receiving an antibiotic with a small therapeutic index for 10 days. Upon assessment, the nurse suspects that the patient may be experiencing toxicity. What would be the nurse's priority action?
   a. Call the prescriber and have the antibiotic changed.
   b. Suspect an allergic reaction and administer a PRN antihistamine.
   c. Ask the prescriber to order a plasma drug level test.

d. Set up oxygen and obtain an order for an antagonist.

ANS: C
A drug with a narrow therapeutic index indicates that a drug is relatively unsafe and should be monitored closely. The nurse should have a blood level drawn to confirm suspicions of toxicity. The nurse would not have the antibiotic changed, because there is no cause at this time. The patient is unlikely to be experiencing an allergic reaction, because the antibiotic has been in the system for 10 days. The patient shows no signs of anaphylaxis, so oxygen and an antagonist are not indicated.

DIF: Cognitive Level: Application REF: The Therapeutic Index
TOP: Nursing Process: Evaluation
MSC: NCLEX Client Needs Category: Physiologic Integrity: Reduction of Risk Potential

4. A patient who is taking morphine for pain asks the nurse how a pain medication can also cause constipation. What does the nurse know about morphine?
   a. It binds to different types of receptors in the body.
   b. It can cause constipation in toxic doses.
   c. It causes only one type of response, and the constipation is coincidental.
   d. It is selective to receptors that regulate more than one body process.

   ANS: D
   Morphine is a medication that is selective to receptor type that regulates more than one process. Because it is selective to receptor type, it does not bind to different types of receptors. Constipation is a normal side effect and is not significant for toxicity.

   DIF: Cognitive Level: Analysis REF: Receptors and Selectivity of Drug Action
   TOP: Nursing Process: Implementation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies

5. A patient asks why albuterol causes a feeling of jitteriness when it is used to treat wheezing. The nurse knows that albuterol is a beta-adrenergic agonist that acts on $beta_2$ receptor sites to cause smooth muscle dilation in the bronchioles of the lungs, but that it also can sometimes act on $beta_1$ receptor sites in skeletal muscles to cause tremors. To explain this to the patient, the nurse will rely on knowledge of:
   a. drug selectivity.
   b. modified occupancy theory.
   c. relative potency.
   d. reversible effects.

   ANS: A
   The ability of a drug to be selective for receptor sites in a patient determines the types of effects it can have on the body. This drug can bind to two different types of receptors that cause different reactions. The modified occupancy theory addresses the strength of an attraction between a drug and a receptor and the drug's ability to activate the receptor. Relative potency describes the amount of drug needed to produce a specific effect. Most drugs remain bound to receptors permanently, causing the effects to be reversible.

   DIF: Cognitive Level: Application REF: Receptors and Selectivity of Drug Action
   TOP: Nursing Process: Implementation
   MSC: NCLEX Client Needs Category: Physiologic Integrity: Pharmacologic and Parenteral Therapies