

Essentials of Pharmacology for Health Professions

Course Syllabus

Course Description

Pharmacology builds the foundation for understanding medications and their administration. In the first part of this course, students will learn pharmacologic principles, drug sources and uses, and dosage calculations. The second part focuses on the characteristics of common medications in the major drug classifications.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Identify commonly used medications and compare and contrast their characteristics.
- Summarize the sources, mechanism of action, and indications for specific drug therapies.
- Calculate the appropriate dosage for a given drug.
- List the factors that influence the absorption and effectiveness of drugs.
- Develop safety instructions for both the healthcare practitioner and the patient in administering and taking medications.
- Identify the responsibilities of a healthcare practitioner in addressing and treating drug abuse.

Course Outline and Objectives

Part I – Introduction to Pharmacologic Principles

Chapter 1: Consumer Safety and Drug Regulations

1. Explain what is meant by drug standards.
2. Name the first drug law passed in the United States for consumer safety and give the year it was passed.
3. Summarize the provisions of the Federal Food, Drug, and Cosmetic Act of 1938, and identify the government agency that enforces the act.
4. Interpret what is meant by USP/NF.
5. Summarize the provisions of the Controlled Substances Act of 1970.
6. Explain what is meant by a DEA number and the NDC Directory.
7. Define schedules of controlled substances and differentiate between C-I through C-V schedules.
8. State several responsibilities you have in administering medications as a direct result of the three major drug laws described in this chapter.

Chapter 2: Drug Names and References

1. Describe drug classification systems.
2. Differentiate among the following drug names: generic name, official name, trade name, and chemical name.
3. Explain what is indicated by a number included in a drug trade name.
4. Contrast generic and brand name drugs.
5. Define and explain the restrictions of drug sales implied by the following: over-the-counter (OTC) drug, legend drug, and controlled substance.

6. Discuss the various terms indicating drug actions contained in reference sources.
7. List and describe at least two drug references available today.
8. Discuss several characteristics that you consider important in choosing the best drug reference.
9. Describe how to evaluate drug information websites.

Chapter 3: Sources and Bodily Effects of Drugs

1. Identify the five sources of drugs.
2. Differentiate among the following: drug actions and drug effects, systemic effects and local effects, loading dose and maintenance dose, and toxic dose and lethal dose.
3. Define the following processes as they relate to the passage of drugs through the body and state conditions that may decrease the effectiveness of each: absorption, distribution, metabolism, and excretion.
4. Define the following terms: selective distribution, toxicity, placebo, synergism, potentiation, and antagonism.
5. List several variables that may affect the action of drugs.
6. Identify and contrast the various routes of drug administration.
7. Define adverse drug reactions.

Chapter 4: Medication Preparations and Supplies

1. Differentiate between various oral and rectal drug forms.
2. Describe the various injectable drug forms.
3. Define the following types of injections and explain how they differ in administration and absorption rate: intravenous (IV), intramuscular (IM), and intradermal (ID).
4. Compare the IV injections referred to as IV push, IV infusion, and IV piggyback.
5. Contrast the various topical drug forms.
6. Explain the advantages of administering drugs via a transdermal patch.
7. Describe inhalable drug forms.
8. Identify various supplies used in the preparation of medications.

Chapter 5: Abbreviations and Systems of Measurement

1. Identify common abbreviations and symbols used for medication orders.
2. List the six parts of a medication order and the two additional items required on a prescription blank.
3. Describe the responsibilities of a health care professional regarding verbal and telephone orders for medications.
4. Interpret medication orders correctly.
5. Compare and contrast the three systems of measurement.
6. Convert dosages from one system to another by use of the tables for metric and household equivalents.
7. Describe appropriate patient education for those who will be measuring and administering their own medications.

Chapter 6: Safe Dosage Calculations

1. Identify the three steps for calculation of the dosage ordered when it differs from the dose on hand.
2. Write the formula for each of the two methods of dosage calculation presented in this chapter.
3. Convert from one system of measurement to another using the ratio and proportion method.

4. Solve dosage problems using the basic calculation and the ratio and proportion methods.
5. List the cautions with the basic calculation and the ratio and proportion methods.
6. Calculate safe dosages for infants and children.
7. List the variables when assessing geriatric patients for safe dosage.
8. List five steps to reduce medication errors.

Chapter 7: Responsibilities and Principles of Drug Administration

1. Describe four responsibilities of the health care provider in safe administration of medications.
2. List the Six Rights of Medication Administration.
3. Explain moral, ethical, and legal responsibilities regarding medication errors.
4. Cite three instances of medication administration that require documentation.
5. Explain the rights of the health care professional to question or refuse to administer medications.

Chapter 8: Administrations by the Gastrointestinal Route

1. Describe the advantages and disadvantages of administering medications orally, by nasogastric or gastrostomy tube, and rectally.
2. Explain the appropriate action to be taken when patient is NPO (ordered to have nothing by mouth), has dysphagia, refuses medication, vomits medication, or has allergies.
3. List the special precautions to be followed in the preparation of sustained-release capsules, enteric-coated tablets, and oral suspensions.
4. Demonstrate the measurement of liquid medications using medicine cup and syringe.
5. Demonstrate the proficiency in administering medications orally, by nasogastric or gastric tube, and rectally.
6. Satisfactorily complete all of the activities listed on the checklists.

Chapter 9: Administration by the Parenteral Route

1. Name four parenteral routes with systemic effects.
2. Explain administration via the sublingual and buccal routes, including instructions to the patient.
3. Demonstrate application of nitroglycerin ointment and the transdermal patch.
4. Identify three conditions treated with transcutaneous delivery systems.
5. Compare and contrast the advantages and disadvantages of the inhalation route.
6. Describe patient education for those receiving inhalation therapy with hand-held nebulizers.
7. Contrast small-volume nebulizers (SVNs), metered-dose inhalers (MDIs), and dry-powder inhalers (DPIs).
8. Identify the three parts of the syringe and the three parts of the needle.
9. Select appropriate-length and correct-gauge needles for various types of injections.
10. List the three types of syringes and a purpose for each.
11. Demonstrate drawing up medications from a vial and an ampule.
12. Describe and demonstrate intradermal injection and subcutaneous injections.
13. Describe three sites for intramuscular (IM) injection and demonstrate IM injection.
14. Give the purpose and a demonstration of Z-track injection.
15. List the two types of IV administration and various types of IV fluids that can be prescribed.
16. List four types of administration for local effects.

Chapter 10: Poison Control

1. Identify four routes by which poisons may be taken into the body.
2. List five conditions in which vomiting, after the ingestion of poisons, could be injurious to the patient.
3. Describe the first step to take in the event of any poisoning and the procedure to follow.
4. Explain the purpose of activated charcoal and when it is given.
5. Name three clinical procedures required when caring for patients who have been poisoned.
6. Describe appropriate therapy for poisoning by inhalation, external poison, and insect sting.
7. Identify two groups of people at risk for poisoning.
8. List 10 recommendations for patient education to help prevent poisoning.

Part II – Drug Classifications

Chapter 11: Vitamins, Minerals, and Herbs

1. Categorize vitamins as water soluble or fat soluble.
2. List vitamins and their sources, functions, signs of deficiency, and symptoms of overdose if known.
3. Describe common electrolytes in the body and list their normal blood chemistry values.
4. Identify vitamins by name and letter.
5. List minerals and their sources, functions, and signs of deficiency.
6. Identify the chemical symbol for each mineral.
7. Describe conditions that may require vitamin or mineral supplements.
8. Explain the role of antioxidants in nutrition therapy.
9. Describe why and how consumers should be more vigilant in the use of herbal products.

Chapter 12: Skin Medications

1. Describe application procedures for various skin medications.
2. Identify indication, side effects, and precautions or contraindications of the nine major categories of skin medications.
3. Compare and contrast scabicides and pediculicides.
4. Explain the factors that influence the absorption of skin medications.
5. Classify drugs according to their action: antipruritic, emollient, keratolytic, enzymatic, antifungal, anti-infective, or agents to treat burns and acne.
6. List five possible side effects of long-term topical corticosteroid therapy.

Chapter 13: Autonomic Nervous System Drugs

1. Compare and contrast characteristics of the four categories of autonomic nervous system drugs.
2. List the most frequently used (key) drugs in each of the four categories and the purpose of their administration.
3. Describe the possible side effects of each of the key drugs.

Chapter 14: Antineoplastic Drugs

1. Name three characteristics associated with the administration of antineoplastic drugs.
2. Describe the major groups of antineoplastic agents and list the side effects common to most of the antineoplastic agents.

3. Describe appropriate interventions in caring for patients receiving antineoplastic agents.
4. Explain precautions in caring for those receiving radioactive isotopes.
5. Describe the responsibilities of those caring for patients receiving chemotherapy.
6. Explain appropriate education for the patient and family when antineoplastic agents are administered.
7. List safety factors for those who care for patients receiving cytotoxic drugs.

Chapter 15: Urinary System Drugs

1. Compare and contrast the four types of diuretics for uses, side effects, precautions and contraindications, and interactions and give examples of each type.
2. Identify and describe medications given for acute and chronic gout to include side effects, precautions and contraindications, and drug interactions.
3. Explain the role of certain antispasmodics used to reduce contractions of the urinary bladder.
4. Identify the actions, uses, side effects, and precautions and contraindications for urinary analgesics to treat pain and cholinergic agents to stimulate bladder contraction.
5. Describe the three different treatments for benign prostatic hyperplasia (BPH).

Chapter 16: Gastrointestinal Drugs

1. Describe uses, side effects, precautions and contraindications, and interactions of antacids; antiulcer and agents for gastroesophageal reflux disease (GERD); agents for irritable bowel syndrome (IBS); antidiarrheal agents; antiflatulents; cathartics and laxatives; and antiemetics.
2. Compare and contrast the seven types of laxatives according to use, side effects, precautions and contraindications, and interactions.
3. Identify examples of drugs from each of the eight categories of gastrointestinal (GI) drugs.
4. Differentiate causes and treatment of *Helicobacter pylori* and *Clostridium difficile* infections.

Chapter 17: Anti-Infective Drugs

1. Identify indications, side effects, precautions and contraindications, and interactions common to each category of anti-infectives.
2. Explain the unique features of patient education appropriate for each category of anti-infectives.
3. Explain the mechanism for resistant organism development and its significance.

Chapter 18: Eye and Ear Medications

1. Demonstrate the administration technique for instillation of ophthalmic medication to reduce systemic absorption.
2. List and describe the five categories of ophthalmic medication.
3. Identify side effects, precautions and contraindications, and interactions for each category of ophthalmic medication.
4. Explain appropriate patient education necessary for each category of eye medication.
5. Demonstrate the administration technique for instillation of otic medication.
6. Explain necessary patient education for otic medication administration.

Chapter 19: Analgesics, Sedatives, and Hypnotics

1. Compare and contrast the indications and actions of nonopioid, opioid, and adjuvant analgesics, sedatives, and hypnotics.
2. List the side effects of the major analgesics, sedatives, and hypnotics.
3. Explain the precautions and contraindications to administration of the central nervous system (CNS) depressants mentioned in this chapter.
4. Describe actions recently taken by the FDA and manufacturers and the associated impacts on the analgesic drug category.

Chapter 20: Psychotropic Medications, Alcohol, and Drug Abuse

1. Categorize the most commonly used psychotropic medications according to the following classifications: central nervous system (CNS) stimulants for promoting wakefulness and treating attention-deficit hyperactivity disorder (ADHD), antidepressants, antimanic agents for bipolar disorders, anxiolytics, and antipsychotic medications and tranquilizers.
2. List the purposes, actions, side effects, interactions, and precautions and contraindications for psychotropic medications in common use.
3. Explain the treatment of acute and chronic alcoholism.
4. Compare and contrast drug addiction and habituation.
5. List the responsibilities of a health care professional in combating drug abuse.

Chapter 21: Musculoskeletal and Anti-Inflammatory Drugs

1. Describe the side effects expected with common muscle relaxants.
2. List the drugs that can interact with the muscle relaxants and cause serious potentiation of effect.
3. Differentiate among the anti-inflammatory drugs and anti-rheumatic drugs.
4. Explain the serious side effects of nonsteroidal anti-inflammatory drugs (NSAIDs).
5. Explain patient education and drug interactions for NSAIDs.
6. Describe medications for osteoporosis prevention and treatment.
7. Compare and contrast a cyclooxygenase-2 (COX-2) inhibitor and other NSAIDs.

Chapter 22: Anticonvulsants, Antiparkinsonian Drugs, and Agents for Alzheimer's Disease

1. Compare and contrast different types of seizures.
2. List the medications used for each type of epilepsy and common side effects.
3. Describe the drug therapy for febrile seizures.
4. List the drugs used and common side effects, as well as patient education for parkinsonism.
5. Describe the drug therapy for the treatment of restless legs syndrome.
6. Describe the drugs for the treatment of Alzheimer's disease.

Chapter 23: Endocrine System Drugs

1. Identify the hormones secreted by these four endocrine glands: pituitary, adrenals, thyroid, and pancreas.
2. Describe at least five conditions that can be treated with corticosteroids.
3. List at least four serious potential side effects of long-term steroid therapy.
4. Compare and contrast medications given for hypothyroidism and hyperthyroidism.
5. Identify the symptoms of hypoglycemia and hyperglycemia and appropriate interventions.
6. Explain the uses and side effects of oral and injectable noninsulin antidiabetics.
7. Compare and contrast insulins according to their action (rapid, intermediate, and long-acting), naming the onset, peak, and duration of each category.

Chapter 24: Reproductive System Drugs

1. Identify the uses, side effects, and precautions/contraindications for androgens, estrogens, and progestins.
2. Compare and contrast contraceptives.
3. Describe the use of oxytocics and the precautions to be observed.
4. Explain the uses of terbutaline, prostaglandins, and magnesium sulfate.
5. Describe the uses of GnRH analogs.

Chapter 25: Cardiovascular Drugs

1. Describe the indication, action, and effects/side effects of digoxin.
2. Identify the different types of antiarrhythmics and their general indications, side effects, and associated patient education.
3. Identify the most commonly used antihypertensives and their side effects and required patient education.
4. Describe the different types of coronary vasodilators with cautions, side effects, and patient education.
5. Name the six antilipemic categories and describe their actions, common drugs, and patient education.
6. Compare and contrast the three categories of antithrombotic agents in terms of administration, action, typical drugs, and antidotes.

Chapter 26: Respiratory System Drugs and Antihistamines

1. Describe the uses of and precautions necessary with oxygen therapy.
2. List the medications used as smoking-cessation aids and precautions for their use.
3. Classify a list of respiratory system drugs according to their action.
4. List the uses, side effects, and precautions or contraindications for bronchodilators and antitussives.
5. Describe the limitations for use and safety concerns associated with combination cough-cold-allergy products.

Chapter 27: Drugs and Older Adults

1. List several drugs that are inappropriate for older adults and understand how to access updated information.
2. Describe four factors that may lead to cumulative effects in older adults.
3. Name at least five categories of drugs that frequently cause adverse side effects in older adults.
4. Describe the dangers and side effects associated with NSAID therapy.
5. List the side effects and cautions for gastrointestinal (GI) drugs.
6. Explain the impact of polypharmacy on older adults.
7. List the responsibilities of health care professionals in preventing complications of drug therapy in older adults.

Completion and Accreditation

Students who pass the chapter tests with an overall average of 70% or higher will receive a certificate of completion and 6.6 Continuing Education Units (CEUs). One CEU is equivalent to 10 hours of class time.

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