

Edition

4

*Instructor's Guide and Answer Key
to Accompany*

Pharmacology Clear and Simple

A GUIDE TO DRUG CLASSIFICATIONS AND DOSAGE
CALCULATIONS

Cynthia J. Watkins, RN, MSN, CPN

Pediatric Emergency Department Nurse

Halifax Health

Daytona Beach, Florida



F.A. DAVIS

Philadelphia

F.A. Davis Company
1915 Arch Street
Philadelphia, PA 19103
www.fadavis.com

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CONTENTS

UNIT 1

Introduction to Pharmacology 1

Chapter 1 History of Pharmacology 3
CAAHEP: I.19—Demonstrate respect for diversity in approaching patients and family
ABHES: Analyze the effect of hereditary, cultural, and environmental influences

Chapter 2 Basics of Pharmacology 5
CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care
ABHES: Properly use *PDR*, drug handbook, and other drug references to identify a drug's classification, usual dosage, usual side effects, and contradictions

Chapter 3 Patient Safety in Medication Administration 7
CAAHEP:
• I.19—Demonstrate respect for diversity in approaching patients and family
• IX.1—Respond to issues of confidentiality
ABHES:
• Recognize and identify acceptable medical abbreviations
• Comply with federal, state, and local health laws and regulations

Chapter 4 Regulations 10
CAAHEP:
• IX.1—Respond to issues of confidentiality
• IX.2—Perform within scope of practice
• IX.8—Apply local, state, and federal health-care legislation and regulations appropriate to the medical assisting practice setting

• X.1.—Report illegal and/or unsafe activities and behaviors that affect the health, safety, and welfare of others to proper authorities

ABHES:

• Comply with federal, state, and local health laws and regulations

Chapter 5 Prescriptions and Labels 12

CAAHEP: IX.11—Recognize the importance of local, state, and federal legislation and regulations in the practice setting

ABHES:

• Identify and define common abbreviations that are accepted in prescription writing

• Understand legal aspects of writing prescriptions, including federal and state laws

UNIT 2

Calculations 15

Chapter 6 Basic Review of Mathematics 17

CAAHEP: II.1—Prepare proper dosages of medication for administration

ABHES: Demonstrate accurate occupation math and metric conversions for proper medication administration

Chapter 7 Measurement Systems 23

CAAHEP: II.1—Prepare proper dosages of medications for administration

ABHES: Demonstrate accurate occupation math and metric conversions for proper medication administration

Chapter 8 Dosage Calculations 26

CAAHEP: II.1—Prepare proper dosages of medication for administration

ABHES: Demonstrate accurate occupation math and metric conversions for proper medication administration

■ ■ ■ UNIT 3

Administration of Medications 31

Chapter 9	Enteral Medications and Administration CAAHEP:	33
	<ul style="list-style-type: none"> • I.8—Administer oral medications • I.17—Apply critical thinking skills in performing patient assessment and care • I.18—Use language/verbal skills that enable patient understanding • II.1—Prepare proper dosages of medication for administration <ul style="list-style-type: none"> • II.4—Verify ordered doses/dosages prior to administration • III.2—Practice standard precautions • III.10—Explain the rationale for performance of a procedure to the patient • IV.8—Document patient care • IX.2—Perform within scope of practice 	
	ABHES:	
	<ul style="list-style-type: none"> • Document accurately • Use standard precautions • Prepare and administer oral and parenteral medications as directed by physician 	
Chapter 10	Parenteral Medications and Administration CAAHEP:	35
	<ul style="list-style-type: none"> • I.1—Select proper sites for administering parenteral medication • I.3—Administer parenteral (excluding IV) medications • I.17—Apply critical thinking skills in performing patient assessment and care • I.18—Use language/verbal skills that enable patient understanding • II.1—Prepare proper dosages of medication for administration <ul style="list-style-type: none"> • II.4—Verify ordered doses/dosages prior to administration • III.2—Practice standard precautions • III.10—Explain the rationale for performance of a procedure to the patient • IV.8—Document patient care • IX.2—Perform within scope of practice • XI.5c—Demonstrate the proper use of sharps disposal containers 	

ABHES:

- Document accurately
- Use standard precautions
- Prepare and administer oral and parenteral medications as directed by physician

■ ■ ■ UNIT 4

Classification of Drugs 37

Chapter 11	Integumentary System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	39
Chapter 12	Musculoskeletal System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	41
Chapter 13	Nervous System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	44
Chapter 14	Eye and Ear Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	47
Chapter 15	Endocrine System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	49
Chapter 16	Cardiovascular System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care	52

	ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system		Chapter 20 Reproductive and Urinary System Medications	64
Chapter 17	Immune System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	54		
Chapter 18	Pulmonary System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	58	Chapter 21 Vitamins, Minerals, Herbs, and Complementary and Alternative Medicine	68
Chapter 19	Gastrointestinal System Medications CAAHEP: I.17—Apply critical thinking skills in performing patient assessment and care ABHES: Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	61	CAAHEP: • I.17—Apply critical thinking skills in performing patient assessment and care • I.19—Demonstrate respect for diversity in approaching patients and families ABHES: • Analyze the effect of hereditary, cultural, and environmental influences • Assist physician with the regimen of diagnostic and treatment modalities as they relate to each body system	

INTRODUCTION

Dear Instructor:

Having been involved in the education of students in most areas of allied health and nursing for the past 21 years, I realize that it is important to teach the very basics and then build on those elemental concepts. We should never assume that students already know a concept. All students who will be working with patients someday must master why a medication is being ordered, how to administer that medication safely, and, if unfamiliar with the medication, where to find the information they need to educate themselves and their patients about that medication. Patient safety is dependent on students learning these concepts, and we are foremost patient advocates in the allied health fields. Allow me to highlight a few approaches used in this textbook:

- I kept vocabulary fairly simple. This allows the instructor to test the student's ability to understand pharmacology rather than medical terminology. In addition, if not confronted with terminology that is too advanced, the student may not be as likely to lose heart and give up.
- I used a writing tone that creates an atmosphere of shared learning. Rather than approaching the student as the all-knowing, wise author, I selected words like "we" or "us" to help students feel that I am on a journey of discovery with them.
- I purposely tried to have 21 relatively short chapters. After instructors allow for tests, practicing injections, snow days, and so on, they may find that they can easily cover one to two chapters per class period. Most units are fairly small, at five or fewer chapters, which means that instructors can test frequently and assess comprehension before moving on to more challenging chapters.
- I describe several methods of approaching math problems. Many students are fearful of math. What I have discovered over my years in education is that students come from a variety of backgrounds. Some of them have very basic math skills, learned 20 or more years ago, whereas others have very advanced math skills. Essentially, as the saying goes, there is more than one way to skin a cat, and that applies to math as well. Strategies that work for many students do not work for others and vice versa. However, most students are able to work through this difficulty, and the "aha" moment when the light bulb goes on is very rewarding to see.
- Drugs are discovered, approved, or taken off the market almost daily, so making students memorize specific drugs is a losing battle in most instances. Instead, the exercises attempt to teach students the research methods needed to locate the most current information about drugs.
- Key terms are highlighted in bold print. To facilitate memorization, instructors can ask students to make flash cards of all bold terms, which can then be studied for tests.
- Because this book emphasizes drug research, instructors can use this book year after year. Instructors may require students to obtain a current drug handbook or go to the internet for information on current drugs, but they will not need to adapt lesson plans to changing textbooks.
- The contents of this book match the current standards of the American Association of Medical Assistants (AAMA) for CAAHEP-accredited courses. Be sure to instruct the students to research the top 50 drugs, which are frequently on the Certified Medical Assisting Exam.
- Because the new AAMA standards include "theory of IV therapy," instructors will find that this book integrates IV therapy into chapters on supplies, routes, calculations, and administration. In addition, Appendix J expands on IV therapy for those populations that will be seeing this in their practice.
- Even if your students are not currently involved in IV therapy, they may become more involved in the future in (at the very least) monitoring patients receiving IV therapy. Make sure to emphasize the importance of students' checking state regulations regarding their scope of practice and IV therapy.
- The available online resources for instructors on www.fadavis.com include a test bank with more than 1,000 questions to

help prepare the student for national certification exams as well as PowerPoint presentations for each chapter and an image bank of illustrations from the book for use in the classroom. Printable competencies for procedures listed in the book as well as documentation exercises associated with each competency are also available.

New for this edition is **Davis Edge**, the online Q&A program that builds practice exams, creates quizzes based on personal strengths and weaknesses, and tracks student progress. <https://davisedge.fadavis.com/Home>

Please feel free to contact me for any assistance with regard to this textbook at cwatkins043@gmail.com.

Sincerely,

Cynthia J. Watkins, RN, MSN

GENERAL IDEAS FOR TEACHING THIS COURSE

■ ■ ■ Critical Thinking

One of the key features of this book is encouraging students to think rather than memorize. Whenever possible, include student participation in your lesson plans to encourage them to think critically. For example, instead of teaching them about the effects of a medication, ask them to tell you what they think the effects might be. You may want to propose case studies such as “If an elderly patient with failing kidneys is put on this medication, what implications does it have on his or her care?” For lifelong learning and employability, critical thinking is absolutely necessary for the allied health professional.

■ ■ ■ Internet Research

Students will gain more from internet research than from memorizing a table that has already been collected for them (and in many cases is already outdated). Website exercises have been placed throughout each chapter. At times, the websites may no longer be available, but you can still encourage the students to find their own trustworthy websites for researching the question. These exercises will provide students with the critical life skill of learning how to do research instead of just memorizing research that has been done for them. Consider assigning an internet research project in which the students visit 10 sites and rate them for quality, ease of use, professionalism, currency, and so on. Have them share their findings with others in the class. Another idea is to create a drug scavenger hunt in which you create a list of questions about a variety of drugs and have the students use a drug handbook, *PDR*, and the internet to research these questions. Remember, although many students are already computer literate, some students may be returning to school after years of being away from it and may have never learned to use a computer. You will have to be inventive to assist all students regardless of their level of comfort with computers.

■ ■ ■ Field Trips/Business Connections

One experience you can include in this course is visiting a local pharmacy and talking with the pharmacist about the role of allied health professionals as it relates to pharmacology. Be sure to interview the pharmacist beforehand to ensure that this professional will make supportive comments. You can also have a virtual field trip by asking the students to interview a pharmacist online. Another exciting adventure is inviting an emergency medical technician to visit the class to discuss medications used in an emergency; they usually bring a jump kit filled with the medications they use. You may also consider asking a pharmaceutical representative to come and discuss the rapport between the pharmaceutical representative and allied health professionals. You could assign a paper on the ethics of receiving gifts from pharmaceutical representatives, such as pens, foods, tickets to shows, and so on.

■ ■ ■ Role Play

You can order sample medication packets (including pills, enemas, transdermal patches, vials of “insulin” types, and blister packages) from medical education websites and give the students an order to complete, pointing them toward the full array of medications. Expect the students to find the correct drug, dosage, and form and role-play, giving the drug to the hypothetical patient. Make sure that the students can explain to the hypothetical patient the purpose of each medication. You can also stage an emergency and encourage the students to select the correct medication from a crash cart.

■ ■ ■ Math Issues

To reinforce the importance of dosage calculations throughout the term, introduce the topic early. After presenting the dosage calculations chapter, continue

to review and reinforce it. For example, you could have a short math quiz at the beginning of every class after Chapters 6 through 8 have been introduced. If the students fail the test on Chapters 6 through 8, you may want to allow them to retest later in the term to see whether their math skills have improved. It is also helpful to provide real-life practice and assessment, not just exercises on paper. For example, give students the ordered dosage and have them find the medication from a supply and figure out the amount to administer, as they would in a real medical setting.

■ ■ ■ Term Reports/ Assignments

A long research project is probably not necessary for this course, but suggestions for cumulative papers include the following:

- Researching 10 websites and reporting how good they are
- Picking one system or chapter to present to the rest of the class
- Creating drug cards on the top 50 drugs prescribed last year on www.rxlist.com
- Interviewing a pharmacist
- Writing a research paper on one class of drugs
- Creating a fictitious patient and developing a treatment plan, including medications, for presentation to the class

■ ■ ■ Empathy Building

Order some glasses that simulate sensory deficits or blindfold the students and ask them to try to take pills as a patient would. Ask them to pour out a tablespoon

of medication and then remove the blindfold and see how accurate they were. You may also use noise-cancelling headphones and have one student try to educate the hearing-impaired student in the proper method of taking medication.

■ ■ ■ Audiovisuals

PowerPoint presentations are available for every chapter, which you can adapt to your needs. You may also want to check with your favorite audiovisual company for videos, DVDs, or other media to show how to administer medications. Many websites also provide free animations and videos.

■ ■ ■ Ancillaries

Instructors have access to competency checklists for various procedures included in the book, which are available as an instructor resource on www.fadavis.com. Each competency has associated documentation exercises so that after you assess an individual's competency in a particular procedure, you can assess their documentation skills. Have students practice the competencies first, then use the checklist to evaluate their proficiency on a certain scheduled date. You may choose to repeat the competencies later in the term, if time allows. I have included numerous competencies. Choose those that are appropriate for what is allowed in your state or expected by your accrediting body. You may also choose to use mannequins rather than humans, if that is the standard in your area.

Davis Edge

<https://davisedge.fadavis.com/Home>

The new online Q&A program with 800 questions. Davis Edge allows you to create quizzes in the content areas you choose to focus on, build simulated practice exams, and track student progress every step of the way.

SAMPLE SYLLABUS

■ ■ ■ Pharmacology For Health Occupations

ALHN xxx (*course name and # at your institution*)

Instructor:

Office:

E-mail:

Fax:

Phone:

Office Hours:

COURSE DESCRIPTION

This course is designed to enable allied health students to acquire knowledge about pharmacology. The student will study the pharmacokinetics and pharmacodynamics of drugs by classification, disease entity, and body system.

CREDIT HOURS:

CLASS MEETING TIME:

REQUIRED TEXTBOOK

Watkins, C: *Pharmacology Clear and Simple, ed. 4*. Philadelphia: F.A. Davis, 2022.

INTRODUCTION

Welcome to [Insert Your Class Title Here]. This outline is intended to orient you to the course and provide information related to grading, general course expectations, and class schedule. Please feel free to ask questions at any time. I am available to help make this a valuable learning experience for you.

COURSE OUTCOMES

Upon completion of this course, the students will attain the following outcomes:

Cognitive/Knowledge (what a student should know from studying pharmacology)

1. Define terminology associated with basic pharmacology.
2. Identify the regulatory bodies responsible for drug safety and reporting.
3. Compare and contrast the mechanism of action of, indications for, and side effects of various selected drug agents classified by body system and/or drug function.
4. Identify action, dose ranges, therapeutic uses, adverse effects, and drug interactions of the common classes of drugs.
5. Select the administration route for the common classes of drugs.

Behavior/Skills (what a student should be able to do as a result of studying pharmacology)

1. Use drug references to obtain information on unfamiliar drugs.
2. Calculate drug dosages.
3. Classify drugs according to their action and body system affected.
4. Interpret medication orders.

Values/Attitudes (what additions or changes should the student experience in interests, appreciation, beliefs, and judgments as a result of studying pharmacology)

1. Discuss ethical issues and professional standards related to drug prescriptions, dispensing, and administration.
2. Describe alternative health measures and lifestyle changes that promote health.

COURSE REQUIREMENTS

Success in this class is contingent upon the following:

Complete all reading assignments. (No makeup quizzes will be given.)

Term paper—see below for details and grading criteria.

Homework assignments—see below for details and grading criteria.

COMPETENCY CHECKLISTS

Attendance

Attendance will be established by the completion of the homework assignment titled Syllabus Exercise. If this is not completed by the due date, the student will be marked as “has not attended,” which will affect financial aid.

Grades

Points for Course Grade		Grading Scale	
Syllabus Assignment	5 points	451–485	93–100% = A
Exams	350 points	412–450.5	85–92% = B
Homework	30 points	378–411.5	78–84% = C
Term Paper	50 points	339.5–377.5	70–77% = D
Competencies	50 points*	377 & below	0–69% = F
Total	485		

*Individual competencies are designed to be given a specific point value or scored as pass/fail. Therefore, these points are flexible, according to how the instructor weighs the competencies.

Homework

Students will have six homework assignments to complete over the course of the semester. Check calendar for due dates.

Competencies

Students must complete satisfactory competency checklists by the final exam date to pass this class. Details will be covered during the first class meeting.

Term Paper

Each student will submit a term paper covering the certain drug or class of drugs that will be assigned. Check calendar for due date. Early papers will be accepted. The paper must be typed, double-spaced, and two to four pages long. A minimum of three references should be used to derive the content of the paper. These references can include internet sites, PDR, and drug inserts. *Wikipedia is not an acceptable resource.* The criteria for grading are listed below. You may e-mail papers to me in Word format. Microsoft Works and WordPerfect are not acceptable. **You may attach this sheet to your paper when you submit it to your instructor, but it is not necessary. Use it as a guideline.**

Term Paper Grading Criteria

	Possible Points	Points Earned
Title page with title of paper, name, course, date, instructor's name	5	
Introduction of drug: description of drug, classification (may be more than one); names: generic, brand(s), chemical	5	
Pharmacodynamics: mechanism of action or how the drug works; include how the drug is absorbed, distributed, metabolized, and excreted and whether the drug is fat- or water-soluble	5	
Indications and usage: Who would use this drug? When would the drug be used (on what conditions, etc.)?	5	
Contraindications and warnings/precautions	5	
Adverse reactions/effects: Are any specifically related to the field you are in?	5	
Interactions with other drugs and foods	5	
Dosage and administration	5	
Patient education	5	
Miscellaneous comments	5	
Total	50	

■ ■ ■ Unit 1

Introduction to Pharmacology

Content	Textbook Reading
History of Pharmacology	Chapter 1
Basics of Pharmacology	Chapter 2
Patient Safety in Medication Administration	Chapter 3
Regulations	Chapter 4
Prescriptions and Labels	Chapter 5

OBJECTIVES

At the end of this section, the student will be able to:

- Define key terms.
- List three societies critical to the development and evolution of pharmacology.
- List four sources of drugs.
- List 10 drugs and record their sources.
- Discuss three examples of alternative medicine.
- List the four steps in the drug cycle and their effects on the body.
- Compare and contrast the usefulness of different drug resources.
- Differentiate between a side effect and an adverse reaction.
- List the seven rights of medication administration.
- Explain the various considerations of medication administration.
- Identify common abbreviations used in medication administration.
- Outline special considerations when administering medications to the elderly and children.
- Discuss cultural effects on drug use.
- Name the actions taken with a patient during an emergency.
- Describe the roles of OSHA, FDA, and DEA in patient safety.
- Discuss how drugs are developed.
- Distinguish between brand, generic, and trade names.
- Know the slang names for illegal drugs.
- Discuss why some drugs are controlled more strictly than others.
- Give an example of a drug from each controlled substances schedule and explain its classification.
- Discuss the role of allied health professionals in recognizing and reporting impaired patients and professionals.
- Discuss precautions to ensure patient safety.
- Identify the parts of a legal prescription.
- Differentiate between three different types of medication orders.
- List which health-care providers are able to write prescriptions.
- Define abbreviations used in prescriptions.
- Interpret labels safely.
- Discuss the impact of e-prescribing on health-care consumers.

■ ■ ■ Unit 2

Calculations

Content	Textbook Reading
Basic Review of Mathematics	Chapter 6
Measurement Systems	Chapter 7
Dosage Calculations	Chapter 8

OBJECTIVES

At the end of this section, the student will be able to:

- Define all key terms.
- Discuss numerical relationships.
- Perform calculations involving whole numbers.
- Calculate problems using fractions.
- Find the lowest common denominator.
- Perform calculations involving decimals.
- Calculate percentages, ratios, and proportions.
- Solve problems for an unknown quantity.
- Compare the four systems of measurement used for drug dispensing.

Unit

1

Introduction to Pharmacology



History of Pharmacology

■ ■ ■ Class Activities

MEDICATION SOURCE RESEARCH

This assignment allows students to explore where the drugs they or someone close to them routinely takes originate from. Have the students pick a drug they or someone close to them commonly takes. Have them research this drug using their textbook or any drug handbooks available to them to discover the source of this drug. If they have internet access, they may also use this as a research tool.

■ ■ ■ Answers to Critical Thinking Exercises

- Harold Parker comes to the office complaining of sinus pressure and pain. In the intake interview, you discover that he has been utilizing aromatherapy for the past 3 weeks. What do you do? *You would further explore aromatherapy in an attempt to discover exactly what Mr. Parker is being exposed to and how. Document any information and make sure the physician is aware of any information that you obtain so that he or she can discuss the therapy with Mr. Parker. You SHOULD NOT tell Mr. Parker that he should avoid this type of therapy.*
- If people rely on plants for medication, what effect does the increasing population have on the potential supply of medications? *If we don't develop land that could be used to grow plants, we could lose our ability to make medications from these plants, which will cause them to become scarce.*
- Raymond Harvey comes to his cardiologist with complaints of an irregular heartbeat and dizziness. In talking further with him, you discover he has been seeing a homeopathic healer and has been drinking foxglove tea to improve his circulation. What do you say? *Mr. Harvey is drinking a tea made from foxglove, the plant from which digoxin is obtained, which may be causing cardiac problems. You SHOULD NOT criticize him but should document the information and advise the physician. The physician may ask you to educate the patient about the effects of digoxin and digoxin toxicity, but it is the physician's role to decide the best way to handle this situation.*
- Cows and pigs are good sources of hormones. Do you think animals may be a better hormone source than humans? Why or why not? *Humans are the best source because drugs made from human sources are compatible with other humans. With regard to things such as blood products, we have only limited supplies. If there is a way to make safe substitutes using animals, that would be a good alternative. In addition, we can't control what a human ingests or is exposed to like we can with animals.*
- Muhammed A. is a devout Muslim. He does not eat pork. What is the best choice of insulin for him? Explain your rationale for this choice. *He may have porcine insulin, but it would be against his religious beliefs unless necessary for life. The physician may choose to prescribe synthetic or bovine insulin instead.*
- What are some of the dangers of using toxins as medicine? *The obvious danger would be that use of the toxin could potentially cause the patient to become very ill. Other possible dangers might include a patient avoiding to seek out medical help when they are ill as they are self-medicating.*
- What are some of the ethical issues of genetically engineered drugs? *Are we playing God by creating substances that aren't naturally occurring in nature? Are we playing God by manipulating genes and altering animal cells? Are we being cruel using animals in the synthesis of drugs?*
- Mary L. is adamantly against stem cell research and is refusing to use Humulin insulin. What do you think? How is Humulin insulin created? Explain how Humulin insulin is okay to be used or not used based on Mary's beliefs.

Humulin insulin is manufactured using genetic engineering but does not involve the use of stem cells. It is called Humulin because it very closely resembles human insulin.

9. Identify the following drugs as curative, prophylactic, diagnostic, palliative, replacement, or destructive:

Synthroid—*Replacement hormone*

Diuretic—*Curative, to reduce edema*

Flu vaccine—*Prophylactic, preventative*

Radiopaque dye—*Diagnostic*

Fever reducer—*Palliative; reduces discomfort but does not cure*

Anticancer drugs—*Destructive; destroy cancer cells*

■ ■ ■ Answers to End-of-Chapter Activities

MULTIPLE CHOICE

- A. Lanolin is derived from sheep's wool.
- C. Potassium chloride is derived from minerals.
- B. Digoxin (Lanoxin) is derived from a plant (foxglove).
- E. Barbiturates are made synthetically.
- E. Toxins are used as the source of radioactive iodine.
- C. World War II saw the mass production of penicillin.
- A. Genetic engineering is used to create synthetic drugs.
- D. Cows (bovine) and pigs (porcine) were the sources of insulin before synthetic production began.
- A. Strabismus can be treated by toxins.
- D. Estrogen and Premarin are used to treat menopause and obtained from horses.

SHORT ANSWERS

- Animals may be a good source of medication because their food sources and lifestyle can be better controlled than those of humans. They can also be continuously monitored for disease, but detection is never 100% safe, so they are a good source but possibly not the best.
- The rain forest and rich plant sources are in danger of disappearing because of deforestation.
- World War II was the catalyst for mass production of penicillin to try to prevent the massive death toll caused by infection that occurred in previous wars.
- Alternative medicine should (in my opinion) be used in partnership with traditional medicine if this is the patient's choice. Patients should not be pushed toward or steered away from them. The exception would be if there is a known reason to avoid the alternative medicine in question—for example, massage therapy for a trauma patient when there is the potential for doing further damage.