Preface

The health care field today is in critical need of skilled professionals to care for patients who require intravenous (IV) therapy for diagnostic and therapeutic purposes. *Intravenous Therapy for Health Care Personnel* is your one-of-a-kind, just-in-time resource for the theory and basics of IV therapy, including entry-level skills such as IV preparation, monitoring, and maintenance and IV initiation and discontinuation. Whatever nursing or allied health profession you are interested in, you will find that this easy-to-use text/workbook/CD has the content to meet your professional needs. This resource accommodates self-paced study, traditional classroom use, or distance learning and is presented in multiple learning styles to ensure that your journey through *Intravenous Therapy for Health Care Personnel* will be a perfect fit.

The text/workbook/CD is divided into eight chapters.

- Chapter 1, Practices of Intravenous Therapy, introduces you to the field of IV therapy and discusses roles, responsibilities, organizations, and laws related to IV therapy. You also learn the reasons for and types of IV therapy.
- Chapter 2, Safety and Infection Control, addresses the standards that are set for IV therapy, including safe-needle and needleless devices. In addition, this chapter describes the necessary practices to prevent infection.
- In Chapter 3, Intravenous Therapy Supplies and Equipment, you learn about the various supplies and equipment needed for IV therapy, including catheters and access devices, administration equipment, and IV regulators.
- Chapter 4, Intravenous Fluids, Components, and Compatibility, introduces you to the types of fluids and additives that are part of IV therapy, including IV medications. Compatibility of these fluids and additives is another essential topic of this chapter.
- Chapter 5, Preparation and Patient Communication, helps you develop the knowledge and skills necessary for preparing the patient, the supplies, and the equipment for IV therapy. Also addressed are site selection, patient identification, considerations for special populations, and the theory and procedure for initiating an IV.
- Chapter 6, Monitoring and Maintaining Intravenous Therapy, explains the labeling process and the procedure for site dressing changes. You also learn about the complications and risks of IV therapy as well as common problems and solutions.

- The essential skills of documenting IV therapy is covered in detail in Chapter 7, Documenting and Discontinuation, including documentation after IV initiation, during IV therapy, and after discontinuation. Monitoring IV therapy, maintaining fluid balance, and discontinuing an IV are other topics presented in this chapter.
- The final chapter, Intravenous Therapy Calculations, presents the knowledge you need for calculating and adjusting flow rates and for understanding infusion time and volume as well as intermittent infusions and medications.

Features of the Text/Workbook/CD

- **Key Terms, Glossary, and Audio Glossary:** Key terms are identified at the beginning of each chapter. These terms are in **bold** type within the chapter and are defined both in the chapter and in the glossary at the end of the book. Open the student CD to hear the pronunciation of each key term, and practice learning the term with the Key Term Concentration game.
- **Checkpoint Questions:** At the end of each main heading in the chapter are short-answer Checkpoint Questions. Answer these questions to make sure you have learned the basic concepts presented.
- **CD Activities:** After you have finished the Checkpoint Questions, you are sent to the interactive student CD activity to further your review and practice of the concepts presented in each section. Be sure to complete the activities on the CD before you continue to the next section.
- **Troubleshooting:** The troubleshooting feature identifies problems and situations that may arise when you are caring for patients or performing a procedure. At the end of this feature, you are asked a question to answer in your own words.
- **Safety and Infection Control:** You are responsible for providing safe care and preventing the spread of infection. This feature presents tips and techniques to help you practice these important skills relative to IV therapy.
- **Patient Education and Communication:** Patient interaction and education and intrateam communication are integral parts of health care. As part of your daily duties, you must communicate effectively both orally and in writing and must provide patient education. Use this feature to learn ways to perform these tasks.
- **HIPAA, Law, and Ethics:** When working in health care, you must be conscious of the regulations of HIPAA (Health Insurance Portability and Accountability Act) and understand your legal responsibilities and the implications of your actions. You must perform duties within established ethical practices. This feature helps you gain insight into how HIPAA, law, and ethics relate to the performance of your duties.
- **Chapter Summary and Review:** Once you have completed each chapter, take time to read the summary and complete the chapter review questions, which are presented in a variety of formats. These questions help you understand the content presented in each chapter.

- **Get Connected and the Online Learning Center:** The Get Connected activity directs you to the Online Learning Center (OLC) that accompanies the text/workbook. The OLC provides links for you to complete research and activities relative to the information presented in the chapter. You will also find other review activities and materials on the OLC to assist you in learning IV therapy.
- **Chapter Test:** Open the student CD to take a final test of your knowledge relative to each chapter. Review the material again with the Spin the Wheel game and then take the chapter test. You can print or e-mail your score to your instructor.

Instructor's Manual and Instructor CD

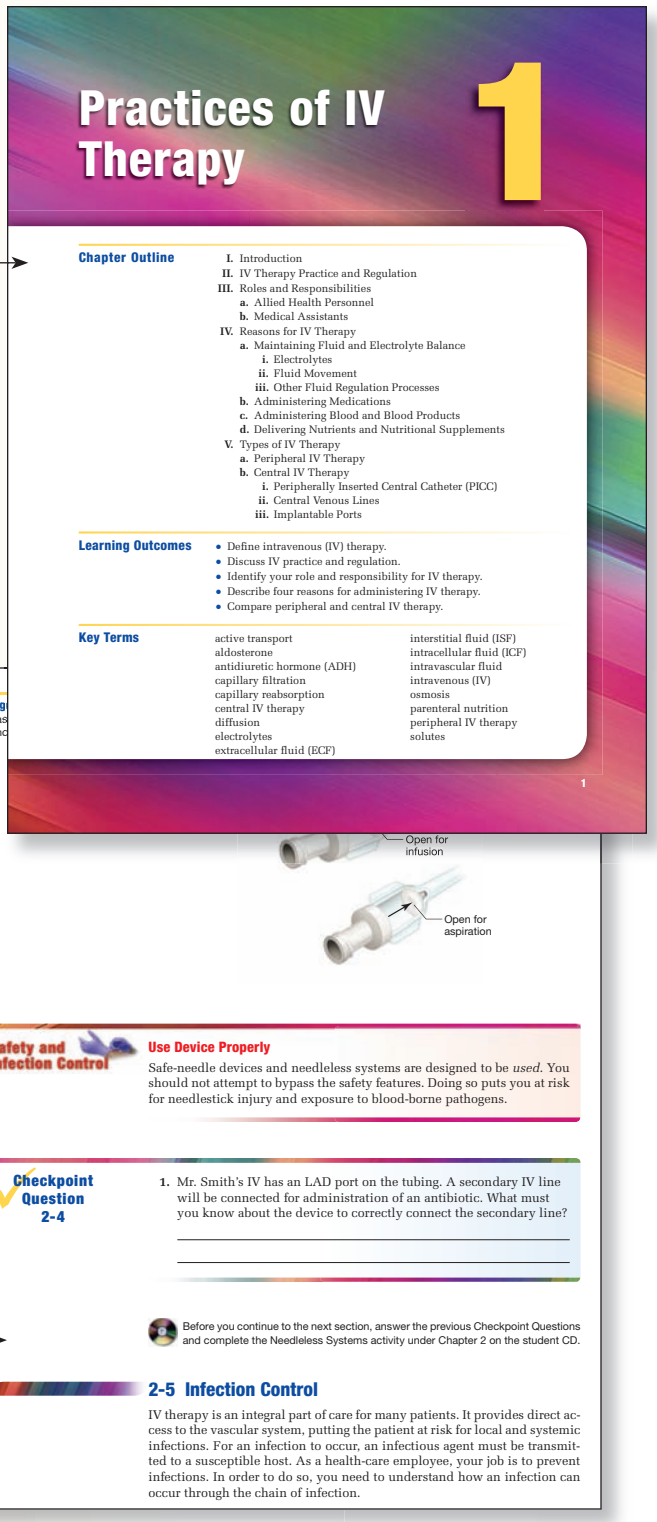
Look to the Instructor's Manual and the Instructor CD for multiple resources to use while teaching *Intravenous Therapy for Health Care Personnel*. PowerPoint presentations for each chapter have Apply Your Knowledge questions at the end of each section and can be used for classroom presentation and discussion. An *EasyTest* test bank that contains a variety of questions with graphics allows you to simply and easily create your own final or chapter exam. Also available are suggested classroom activities that will increase the interest level and comprehension of the text/workbook/CD material. Anticipatory set activities for each chapter help stimulate and enhance student learning as you begin each new topic. Curriculum suggestions provide information on how to use the materials based on your course length and depth. All media on the student CD are conveniently provided on the instructor CD for classroom presentations.

Guided Tour

Chapter Outlines, Learning Outcomes, Key Terms, and an Introduction begin each chapter to introduce you to the chapter and help prepare you for the information that will be presented.

Checkpoint questions are provided at the end of each section in the chapter to help you understand the information you just read.

CD-ROM references direct you to the interactive CD activity to further your review and practice the concepts presented in each section.



Practices of IV Therapy 1

Chapter Outline

I. Introduction
II. IV Therapy Practice and Regulation
III. Roles and Responsibilities
  a. Allied Health Personnel
  b. Medical Assistants
IV. Reasons for IV Therapy
  a. Maintaining Fluid and Electrolyte Balance
    i. Electrolytes
    ii. Fluid Movement
    iii. Other Fluid Regulation Processes
  b. Administering Medications
  c. Administering Blood and Blood Products
  d. Delivering Nutrients and Nutritional Supplements
V. Types of IV Therapy
  a. Peripheral IV Therapy
  b. Central IV Therapy
    i. Peripherally Inserted Central Catheter (PICC)
    ii. Central Venous Lines
    iii. Implantable Ports

Learning Outcomes

- Define intravenous (IV) therapy.
- Discuss IV practice and regulation.
- Identify your role and responsibility for IV therapy.
- Describe four reasons for administering IV therapy.
- Compare peripheral and central IV therapy.

Key Terms

active transport
aldosterone
antidiuretic hormone (ADH)
capillary filtration
capillary reabsorption
central IV therapy
diffusion
electrolytes
extracellular fluid (ECF)
interstitial fluid (ISF)
intracellular fluid (ICF)
intravascular fluid
intravenous (IV)
osmosis
parenteral nutrition
peripheral IV therapy
solutes

1

Open for infusion

Open for aspiration

Safety and Infection Control

Use Device Properly

Safe-needle devices and needleless systems are designed to be *used*. You should not attempt to bypass the safety features. Doing so puts you at risk for needlestick injury and exposure to blood-borne pathogens.

Checkpoint Question 2-4

1. Mr. Smith's IV has an LAD port on the tubing. A secondary IV line will be connected for administration of an antibiotic. What must you know about the device to correctly connect the secondary line?

Before you continue to the next section, answer the previous Checkpoint Questions and complete the Needleless Systems activity under Chapter 2 on the student CD.

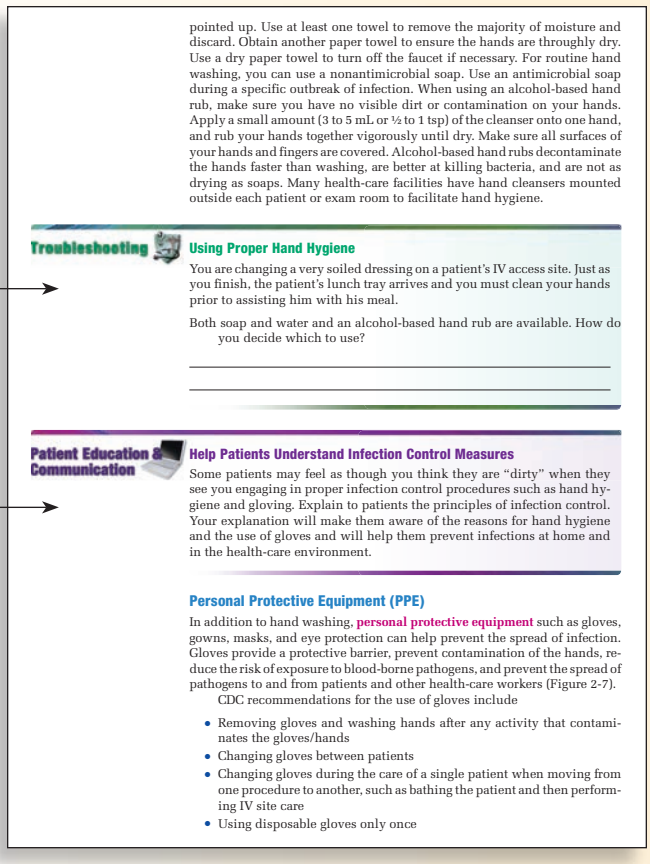
2-5 Infection Control

IV therapy is an integral part of care for many patients. It provides direct access to the vascular system, putting the patient at risk for local and systemic infections. For an infection to occur, an infectious agent must be transmitted to a susceptible host. As a health-care employee, your job is to prevent infections. In order to do so, you need to understand how an infection can occur through the chain of infection.

Troubleshooting exercises identify problems and situations that may arise on the job. You may be asked to answer a question about the situation.

Patient Education and Communication boxes give you helpful information communicating effectively—both orally and written—with patients.

"I felt the chapters were well organized and very comprehensive and I actually learned some factual information myself from reviewing the contents."—Gerry Brasin, CMA, AS, CPC—Premier Education Group



pointed up. Use at least one towel to remove the majority of moisture and discard. Obtain another paper towel to ensure the hands are throughly dry. Use a dry paper towel to turn off the faucet if necessary. For routine hand washing, you can use a nonantimicrobial soap. Use an antimicrobial soap during a specific outbreak of infection. When using an alcohol-based hand rub, make sure you have no visible dirt or contamination on your hands. Apply a small amount (3 to 5 mL or ½ to 1 tsp) of the cleanser onto one hand, and rub your hands together vigorously until dry. Make sure all surfaces of your hands and fingers are covered. Alcohol-based hand rubs decontaminate the hands faster than washing, are better at killing bacteria, and are not as drying as soaps. Many health-care facilities have hand cleansers mounted outside each patient or exam room to facilitate hand hygiene.

Troubleshooting

Using Proper Hand Hygiene

You are changing a very soiled dressing on a patient's IV access site. Just as you finish, the patient's lunch tray arrives and you must clean your hands prior to assisting him with his meal.

Both soap and water and an alcohol-based hand rub are available. How do you decide which to use?

Patient Education & Communication

Help Patients Understand Infection Control Measures

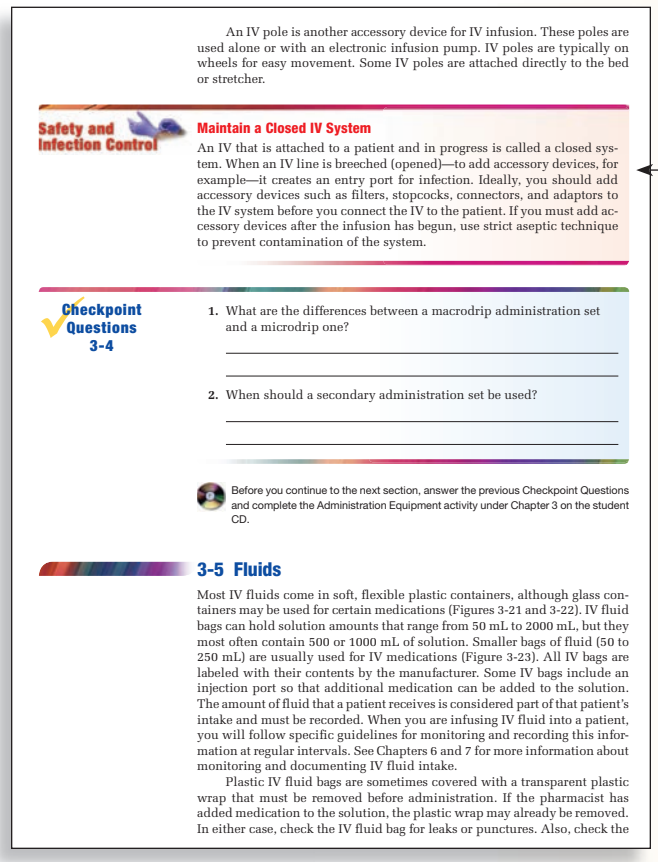
Some patients may feel as though you think they are "dirty" when they see you engaging in proper infection control procedures such as hand hygiene and gloving. Explain to patients the principles of infection control. Your explanation will make them aware of the reasons for hand hygiene and the use of gloves and will help them prevent infections at home and in the health-care environment.

Personal Protective Equipment (PPE)

In addition to hand washing, **personal protective equipment** such as gloves, gowns, masks, and eye protection can help prevent the spread of infection. Gloves provide a protective barrier, prevent contamination of the hands, reduce the risk of exposure to blood-borne pathogens, and prevent the spread of pathogens to and from patients and other health-care workers (Figure 2-7).

CDC recommendations for the use of gloves include

- Removing gloves and washing hands after any activity that contaminates the gloves/hands
- Changing gloves between patients
- Changing gloves during the care of a single patient when moving from one procedure to another, such as bathing the patient and then performing IV site care
- Using disposable gloves only once



An IV pole is another accessory device for IV infusion. These poles are used alone or with an electronic infusion pump. IV poles are typically on wheels for easy movement. Some IV poles are attached directly to the bed or stretcher.

Safety and Infection Control

Maintain a Closed IV System

An IV that is attached to a patient and in progress is called a closed system. When an IV line is breeched (opened)—to add accessory devices, for example—it creates an entry port for infection. Ideally, you should add accessory devices such as filters, stopcocks, connectors, and adaptors to the IV system before you connect the IV to the patient. If you must add accessory devices after the infusion has begun, use strict aseptic technique to prevent contamination of the system.

Checkpoint Questions 3-4

1. What are the differences between a macrodrip administration set and a microdrip one?

2. When should a secondary administration set be used?

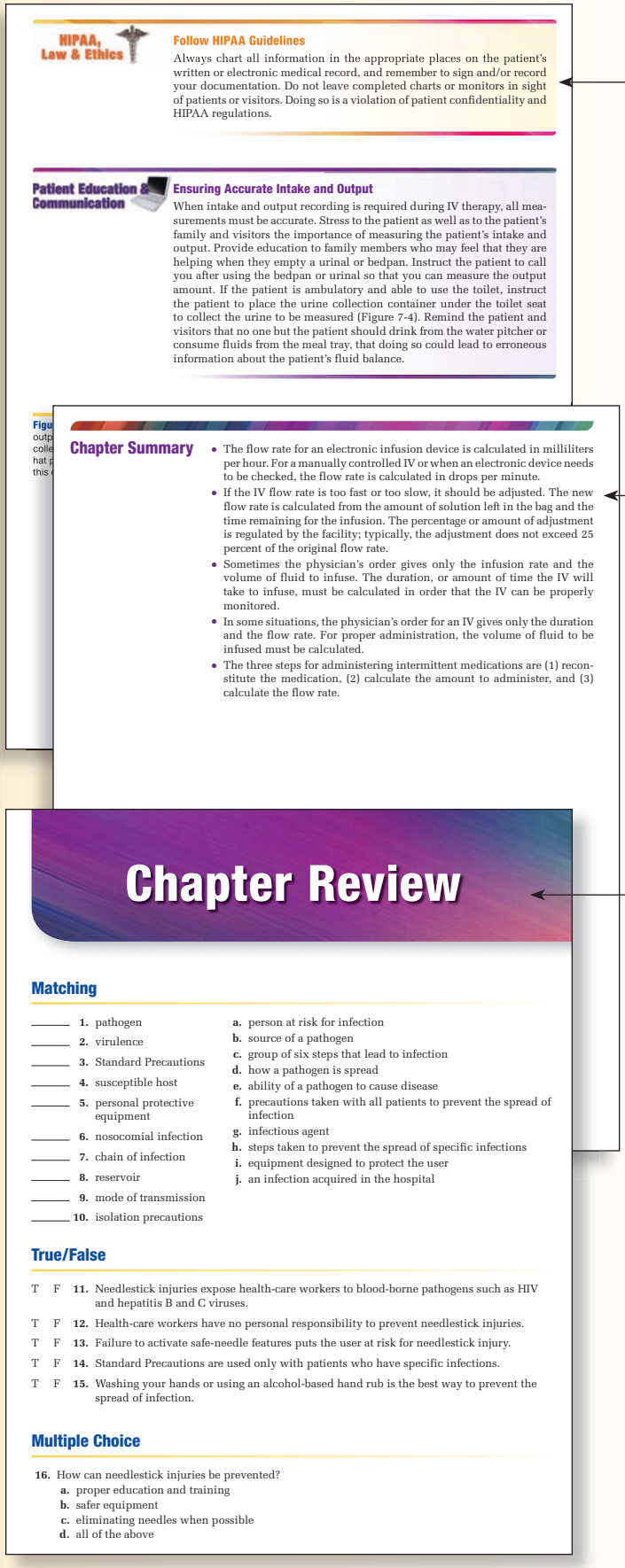
Before you continue to the next section, answer the previous Checkpoint Questions and complete the Administration Equipment activity under Chapter 3 on the student CD.

3-5 Fluids

Most IV fluids come in soft, flexible plastic containers, although glass containers may be used for certain medications (Figures 3-21 and 3-22). IV fluid bags can hold solution amounts that range from 50 mL to 2000 mL, but they most often contain 500 or 1000 mL of solution. Smaller bags of fluid (50 to 250 mL) are usually used for IV medications (Figure 3-23). All IV bags are labeled with their contents by the manufacturer. Some IV bags include an injection port so that additional medication can be added to the solution. The amount of fluid that a patient receives is considered part of that patient's intake and must be recorded. When you are infusing IV fluid into a patient, you will follow specific guidelines for monitoring and recording this information at regular intervals. See Chapters 6 and 7 for more information about monitoring and documenting IV fluid intake.

Plastic IV fluid bags are sometimes covered with a transparent plastic wrap that must be removed before administration. If the pharmacist has added medication to the solution, the plastic wrap may already be removed. In either case, check the IV fluid bag for leaks or punctures. Also, check the

Safety and Infection Control boxes present tips and techniques for you to apply on the job.



HIPAA, Law & Ethics

Follow HIPAA Guidelines

Always chart all information in the appropriate places on the patient's written or electronic medical record, and remember to sign and/or record your documentation. Do not leave completed charts or monitors in sight of patients or visitors. Doing so is a violation of patient confidentiality and HIPAA regulations.

Patient Education & Communication

Ensuring Accurate Intake and Output

When intake and output recording is required during IV therapy, all measurements must be accurate. Stress to the patient as well as to the patient's family and visitors the importance of measuring the patient's intake and output. Provide education to family members who may feel that they are helping when they empty a urinal or bedpan. Instruct the patient to call you after using the bedpan or urinal so that you can measure the output amount. If the patient is ambulatory and able to use the toilet, instruct the patient to place the urine collection container under the toilet seat to collect the urine to be measured (Figure 7-4). Remind the patient and visitors that no one but the patient should drink from the water pitcher or consume fluids from the meal tray, that doing so could lead to erroneous information about the patient's fluid balance.

Chapter Summary

- The flow rate for an electronic infusion device is calculated in milliliters per hour. For a manually controlled IV or when an electronic device needs to be checked, the flow rate is calculated in drops per minute.
- If the IV flow rate is too fast or too slow, it should be adjusted. The new flow rate is calculated from the amount of solution left in the bag and the time remaining for the infusion. The percentage or amount of adjustment is regulated by the facility; typically, the adjustment does not exceed 25 percent of the original flow rate.
- Sometimes the physician's order gives only the infusion rate and the volume of fluid to infuse. The duration, or amount of time the IV will take to infuse, must be calculated in order that the IV can be properly monitored.
- In some situations, the physician's order for an IV gives only the duration and the flow rate. For proper administration, the volume of fluid to be infused must be calculated.
- The three steps for administering intermittent medications are (1) reconstitute the medication, (2) calculate the amount to administer, and (3) calculate the flow rate.

Chapter Review

Matching

_____ 1. pathogen
_____ 2. virulence
_____ 3. Standard Precautions
_____ 4. susceptible host
_____ 5. personal protective equipment
_____ 6. nosocomial infection
_____ 7. chain of infection
_____ 8. reservoir
_____ 9. mode of transmission
_____ 10. isolation precautions

a. person at risk for infection
b. source of a pathogen
c. group of six steps that lead to infection
d. how a pathogen is spread
e. ability of a pathogen to cause disease
f. precautions taken with all patients to prevent the spread of infection
g. infectious agent
h. steps taken to prevent the spread of specific infections
i. equipment designed to protect the user
j. an infection acquired in the hospital

True/False

T F 11. Needlestick injuries expose health-care workers to blood-borne pathogens such as HIV and hepatitis B and C viruses.
T F 12. Health-care workers have no personal responsibility to prevent needlestick injuries.
T F 13. Failure to activate safe-needle features puts the user at risk for needlestick injury.
T F 14. Standard Precautions are used only with patients who have specific infections.
T F 15. Washing your hands or using an alcohol-based hand rub is the best way to prevent the spread of infection.

Multiple Choice

16. How can needlestick injuries be prevented?
a. proper education and training
b. safer equipment
c. eliminating needles when possible
d. all of the above

HIPAA, Law, and Ethics boxes help you gain insight into necessary information related to the performance of your duties.

Key points in the Chapter Summaries help you review what was just learned.

Chapter Reviews consist of various methods of quizzing you. True/False, Multiple Choice, Matching, and Critical Thinking questions appeal to all types of learners.

At the end of each chapter, you will be directed to visit the Internet and the student CD to experience more interactive activities about the information you just learned.

"This is a great introductory text for our Medical Assisting program. It covers all the aspects of IV therapy at a level that our students could comprehend."—David Rice, AA, BA—Career College of Northern Nevada

Acknowledgments

Many thanks to the consultants Susan, Roberta, and Patti and reviewers who helped make this project complete. Their time, efforts, and expertise are greatly appreciated. A special thanks to Connie Kuhl, for the hard work and positive attitude. She is truly the nucleus of this project and a pleasure to work with as always. To Lori Hancock for dealing with the figure changes and Sheila Frank who kept the project going even with our delivery issues.

Consultants

Susan Hurley Findley, RN, MSN
Houston, TX

Roberta Pavy Ramont Ed.D, R.N
Seal Beach, CA

Patricia Dai Tos, RN, MSN, WPD
Fairfax, VA

Reviewers

Jason Amich, MSc, Medical Program
Indiana Business College, Fort Wayne, IN

Gerry Brasin, CMA, AS, CPC
Premier Education Group, Springfield, MA

Karen Brown, RN, EdD, Associate Dean of Instruction
Kirtland Community College, Roscommon, MI

Christina Rauberts Conklin, AA, RMA
Florida Metropolitan University Tampa, FL

Mary Dey, CMA-AC
Kalamazoo Valley Community College, Kalamazoo, MI

Carol Dravet
Brown Mackie College, Merrillville, IN

Melissa L. Dulaney
MedVance Institute of Baton Rouge, Baton Rouge, LA

Lynn M. Egler, RMA, AHI
Virginia Career Institute, Virginia Beach, VA

Tammy Gant, CMA, RHIT, CAHI
Surry Community College, Dobson, NC

Kathleen L. Garza, RN, MS, FNP
Hocking College, Nelsonville, OH

Cheri Goretti
Quinebaug Valley Community College, Danielson, CT

Jonathan Greenwald
Arapahoe Community College, Littleton, CO

Kris Hardy, CMA
Brevard Community College, Cocoa, FL

Chris Hollander, CMA, MA
Westwood College-Denver North, Denver, CO

Carol Lee Jarrell, MLT, AHI
Brown Mackie College, Merrillville, IN

Cathy Kelley-Arney, BSHS, CMA
National College of Business and Technology, Bluefield, VA

Robin Kerns, R.N., BSN, Medical Assisting Program Director
Moultrie Technical College, Moultrie, GA

Karmon L. Kingsley, CMA, CHI
Cleveland State Community College, Cleveland, TN

David O. Martinez
Southwest Career Institute, El Paso, TX

David Rice, AA, BA
Career College of Northern Nevada, Reno, NV

Sara Jones Wallace, C.RS
Miller-Motte Technical College, Wilmington, NC

Jay Wilborn
National Park Community College, Hot Springs, AR