Lippincott's

Advanced Skills for NURSING ASSISTANTS

A HUMANISTIC APPROACH TO CAREGIVING

Pamela J. Carter
Amy J. Stegen

Wolters Kluwer Health | Lippincott Williams & Wilkins

thePoint

Getting Ready and Finishing Up

Getting Ready

Pre-procedure actions ("Getting Ready" steps) are taken before every patient or resident care procedure. These actions promote efficiency, safety, and respect of the patient's or resident's rights.

Wash your hands and observe standard precautions as necessary.

Gather needed supplies.

Knock and introduce yourself.

Identify the person and greet him or her by name.

Explain the procedure.

Provide privacy.

See to safety.

Finishing Up

Post-procedure actions ("Finishing Up" steps) are taken after every patient or resident care procedure. These actions promote comfort, safety, and communication among members of the health care team.

Confirm comfort and good body alignment.

Leave the call light control within easy reach.

See to safety.

Open the curtain and door.

Wash your hands.

Report and record.

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This text is dedicated to nursing assistants who have accepted the challenge of increasing their knowledge and skills, and applying what they have learned in an advanced care setting. We applaud your professionalism and greatly appreciate the nursing assistants who have worked beside us and those who have taken care of us.

Pam** and **Amy

About the Authors

Amy (*left*) and Pam (*right*).

Pamela Carter is a registered nurse and an award-winning teacher. After receiving her bachelor's degree in nursing from the University of Alabama in Huntsville, Pamela immediately began a career as a perioperative nurse. Over the course of her nursing career, she also worked in a physician's office and as a staff nurse in an intensive care unit.

Pamela started teaching informally while serving as an officer in the United States Air Force Nurse Corps. She formally entered the field of health care education by accepting a position at the Athens Area Technical Institute in Athens, Georgia, where she taught surgical technology. After obtaining a master's degree in adult vocational education from the University of Georgia, Pamela moved to Florida and took a position teaching nursing assisting students. She continued teaching nursing assisting after accepting a position at Davis Applied Technology College in Kaysville, Utah. During her first year at Davis Applied Technology College, Pamela piloted a new "open-entry/open-exit" method of curriculum delivery for the nursing assistant program at the college and was awarded the Superintendent's Award for Outstanding Faculty for her work. She then opened a surgical technology program at the college and has obtained national accreditation from the Commission on Accreditation of Allied Health Education Programs (CAAHEP) for delivery of this program using the "open-entry/open-exit" method. In 2002, Pamela received a National Merit Award for having her program rank in the top 10% in the nation for students passing their national certification exam.

In addition to authoring this textbook, Pamela has also authored *Lippincott's Textbook for Nursing Assistants* as well as *Lippincott's Essentials for Nursing Assistants.* Pamela's writing style reflects her love of teaching and nursing. She is grateful that teaching and writing have given her the opportunity to share her experience and knowledge with those just entering the health care profession as well as to help those who are new to the profession see how they can have a profound effect on the lives of others.

Amy Stegen is an experienced nurse and teacher. Amy obtained her bachelor's degree in nursing from Weber State University in Ogden, Utah, and her master's degree in nursing from the University of Phoenix. Over her career in nursing, Amy has worked as a nursing assistant, a home health aide, a licensed practical nurse, and a registered nurse in a variety of health care settings, including long-term care, hospice, and acute care. In addition, she has served in the Air Force Reserves as a nurse.

Amy has been involved in teaching throughout her nursing career. While completing her bachelor's degree in nursing, Amy taught nursing assistant classes in the long-term care facility where she worked, in addition to working as a staff nurse at the same facility. While working in the hospital, Amy had the opportunity to work with student nurses. This opportunity piqued her interest in pursuing nursing education full-time. Amy accepted a position teaching LPN students at Davis Applied Technology College and was presented with the Rookie of the Year Award that year.

Amy gains a great deal of satisfaction from seeing her students develop into knowledgeable caregivers and finds sharing her love of nursing with those just entering the profession to be a wonderful and fulfilling experience.

Preface

The health care industry has undergone dramatic changes in the past few years. Advances in technology have greatly improved our ability to diagnose and treat conditions that would have surely caused permanent, life-altering disability or death in past years. People who require the services of the health care industry are more acutely ill now than ever before. Shortages in the nursing profession have increased the demands placed on nurses as well as the reliance on unlicensed health care workers to provide skilled care to people in health care settings.

Patients in need of advanced care have traditionally received that care in hospitals. However, with the changes that have affected the delivery of health care and how it is paid for, more and more people who still require advanced nursing care are being discharged from the hospital. People now receive advanced care in rehabilitation facilities, subacute care facilities, long-term care facilities, and in their homes. The nursing assistant has been tasked with learning how to provide care for this growing population in all of these health care settings. Today, many of the duties nursing assistants are expected to perform go beyond those traditionally considered to be within the scope of practice of the nursing assistant.

To meet the needs brought about by the changes that have occurred in the health care system, employers in many health care settings hire nursing assistants who have completed basic nursing assistant training and then train them on the job to do more advanced skills. In some states, students must complete both basic and advanced nursing assistant training before entering the workforce, or as a prerequisite for nursing school.

Lippincott's Advanced Skills for Nursing Assistants was written to provide instructors and students with a resource for this advanced training—to help nursing assistants take the next step in their careers. It builds on the basic concepts and skills that the nursing assistant has already mastered. Recognizing that the students using this text have already completed their basic nursing assisting training and may have already been working in the profession, this text does not repeat information that is part of the basic nursing assistant training. Rather, this textbook is meant to be used in conjunction with, or as a follow-up to, a "basic" nursing assistant textbook, such as *Lippincott's Textbook for Nursing Assistants.*

During the development of this textbook, we carefully considered the topics and skills that should be included, and in what depth. We queried numerous employers in advanced care settings about what knowledge they expect their nursing assistants to have and which skills they require their nursing assistants to perform. We questioned instructors who provide advanced training to nursing assistants about the type and depth of material they felt would be necessary to include in a textbook for their students. We took special care to involve instructors from as many different states as possible in our research.

Perhaps the most challenging aspect of this endeavor was deciding which procedures to include. The procedures that nursing assistants are allowed to perform vary greatly from facility to facility, sometimes even in the same geographical area. In addition, we found that the individual steps of procedures often vary greatly as well, according to facility policy. Because of the variations from facility to facility with regard to *what* procedures are taught, as well as *how* these procedures are taught, we have included only the advanced procedures that nursing assistants are most often required to perform in advanced care settings. In addition, we have provided thorough information about why other procedures would be necessary, along with solid guidelines for performing those additional procedures. It was our goal to provide the student with a basic understanding of the skills and concepts, while allowing the teacher to customize his or her instruction to the needs of the individual facility or program.

Nursing assistants working in advanced care settings must not only possess the technical skills they need to provide competent care, but also the compassion and the communication and critical thinking skills they need to function effectively in an advanced care setting. The nursing assistant must be able to recognize the person within the patient and understand that each person he or she is responsible for caring for is unique and special, with individual needs that are very different from those of the person in the next bed. *Lippincott's Advanced Skills for Nursing Assistants* has been written not only to provide students with the information and skills they need to safely provide care in an advanced care setting, but also to remind them of the importance of taking a humanistic approach to caregiving.

THEMES AND FEATURES

Three key beliefs guided the writing of this textbook:

1. Nursing assistants need a textbook that will prepare them for the "next step" in their careers—one that captures their interest and builds upon the knowledge and skills they have already mastered.
2. Nursing assistants who work in advanced care settings must be able to provide competent, skilled care in a compassionate way.
3. The nursing assistant is a vital member of the health care team in the advanced care setting.

LIPPINCOTT'S ADVANCED SKILLS FOR NURSING ASSISTANTS IS WRITTEN WITH THE STUDENT IN MIND

One of the primary goals in writing this textbook was to present the in-depth information that a student who is learning to perform advanced skills needs to know in an interesting and understandable way. Great care has been taken to present the student with a textbook that is interesting and informative, with a well-developed art program and proven learning aids.

A Student-Focused Writing Style

Educators know that a student can easily understand complex information if it is explained in a way that the student can understand. *Lippincott's Advanced Skills for Nursing Assistants* uses a conversational, yet professional, writing style that respects the student's intelligence. Concepts are presented in a straightforward, accessible way, and the text is enlivened through the frequent use of examples and anecdotes from the authors' own experience in the advanced care setting.

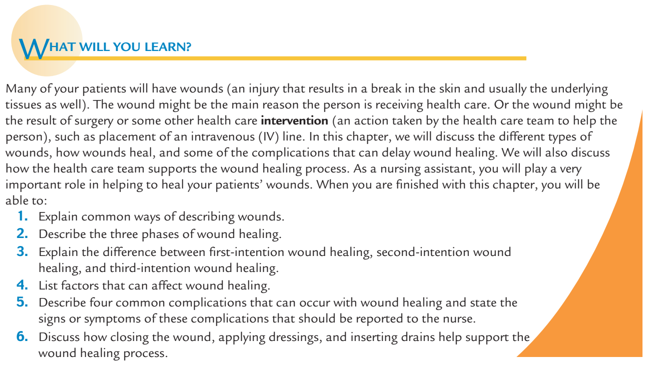
An Art Program Developed Alongside the Text

The purpose of an art program is to reinforce and expand on concepts discussed in the text. To do this effectively, the art must be planned and developed alongside the manuscript. Numerous photographs, both alone and in combination with line art that has been created specifically for this textbook, help students to visualize and remember important concepts.

Proven Learning Aids in Every Chapter

Learning and remembering new information is challenging for many students. To help students meet the challenge of mastering the information in the textbook, we have developed features to assist students with studying and internalizing information:

- **What Will You Learn?** Each chapter begins with a *What Will You Learn?* section that previews the chapter and helps to focus the student's reading. Each *What Will You Learn?* section begins with a paragraph that introduces the topic of the chapter to the student and explains why the topic is important. This introductory paragraph is followed by a list of learning objectives and vocabulary words.

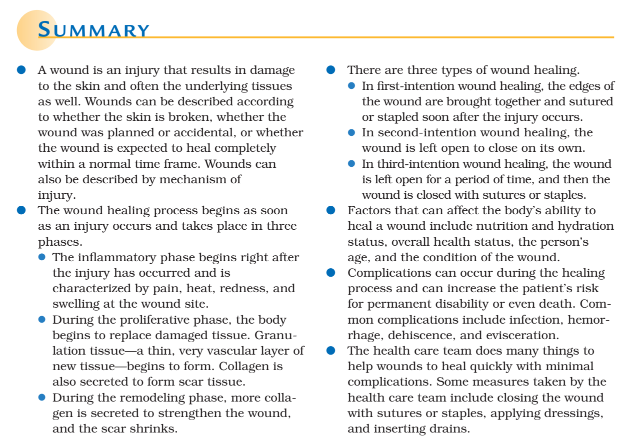

WHAT WILL YOU LEARN?

Many of your patients will have wounds (an injury that results in a break in the skin and usually the underlying tissues as well). The wound might be the main reason the person is receiving health care. Or the wound might be the result of surgery or some other health care **intervention** (an action taken by the health care team to help the person), such as placement of an intravenous (IV) line. In this chapter, we will discuss the different types of wounds, how wounds heal, and some of the complications that can delay wound healing. We will also discuss how the health care team supports the wound healing process. As a nursing assistant, you will play a very important role in helping to heal your patients' wounds. When you are finished with this chapter, you will be able to:

1. Explain common ways of describing wounds.
2. Describe the three phases of wound healing.
3. Explain the difference between first-intention wound healing, second-intention wound healing, and third-intention wound healing.
4. List factors that can affect wound healing.
5. Describe four common complications that can occur with wound healing and state the signs or symptoms of these complications that should be reported to the nurse.
6. Discuss how closing the wound, applying dressings, and inserting drains help support the wound healing process.

What Will You Learn?: Helps students focus their reading.

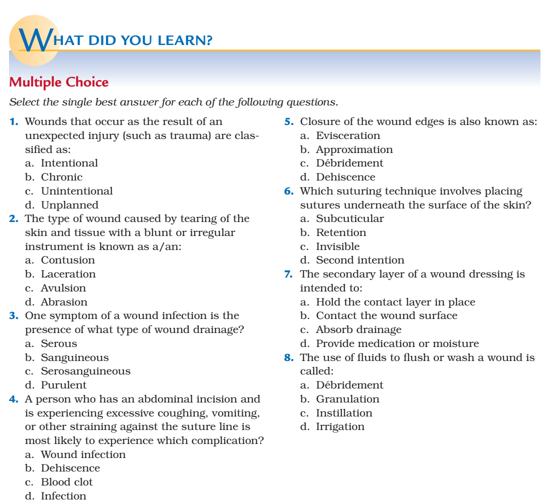
- **Summary.** Each chapter ends with a summary in a unique narrative outline format. This summary helps students to review the key "take home" concepts of the chapter.


SUMMARY

- A wound is an injury that results in damage to the skin and often the underlying tissues as well. Wounds can be described according to whether the skin is broken, whether the wound was planned or accidental, or whether the wound is expected to heal completely within a normal time frame. Wounds can also be described by mechanism of injury.
- The wound healing process begins as soon as an injury occurs and takes place in three phases.
  - The inflammatory phase begins right after the injury has occurred and is characterized by pain, heat, redness, and swelling at the wound site.
  - During the proliferative phase, the body begins to replace damaged tissue. Granulation tissue—a thin, very vascular layer of new tissue—begins to form. Collagen is also secreted to form scar tissue.
  - During the remodeling phase, more collagen is secreted to strengthen the wound, and the scar shrinks.
- There are three types of wound healing.
  - In first-intention wound healing, the edges of the wound are brought together and sutured or stapled soon after the injury occurs.
  - In second-intention wound healing, the wound is left open to close on its own.
  - In third-intention wound healing, the wound is left open for a period of time, and then the wound is closed with sutures or staples.
- Factors that can affect the body's ability to heal a wound include nutrition and hydration status, overall health status, the person's age, and the condition of the wound.
- Complications can occur during the healing process and can increase the patient's risk for permanent disability or even death. Common complications include infection, hemorrhage, dehiscence, and evisceration.
- The health care team does many things to help wounds to heal quickly with minimal complications. Some measures taken by the health care team include closing the wound with sutures or staples, applying dressings, and inserting drains.

Summary: A review of key points for the section.

- **What Did You Learn?** Multiple-choice and matching exercises at the end of each chapter provide students with the opportunity to


WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Wounds that occur as the result of an unexpected injury (such as trauma) are classified as:
   a. Intentional
   b. Chronic
   c. Unintentional
   d. Unplanned
2. The type of wound caused by tearing of the skin and tissue with a blunt or irregular instrument is known as a/an:
   a. Contusion
   b. Laceration
   c. Avulsion
   d. Abrasion
3. One symptom of a wound infection is the presence of what type of wound drainage?
   a. Serous
   b. Sanguineous
   c. Serosanguineous
   d. Purulent
4. A person who has an abdominal incision and is experiencing excessive coughing, vomiting, or other straining against the suture line is most likely to experience which complication?
   a. Wound infection
   b. Dehiscence
   c. Blood clot
   d. Infection
5. Closure of the wound edges is also known as:
   a. Evisceration
   b. Approximation
   c. Débridement
   d. Dehiscence
6. Which suturing technique involves placing sutures underneath the surface of the skin?
   a. Subcuticular
   b. Retention
   c. Invisible
   d. Second intention
7. The secondary layer of a wound dressing is intended to:
   a. Hold the contact layer in place
   b. Contact the wound surface
   c. Absorb drainage
   d. Provide medication or moisture
8. The use of fluids to flush or wash a wound is called:
   a. Débridement
   b. Granulation
   c. Instillation
   d. Irrigation

What Did You Learn?: A tool for self-assessment.

evaluate their understanding of the material they have just studied. Answers to these exercises are given in Appendix A.

- **Highlighted figure, table, and box callouts.** The references to figures, tables, and boxes are highlighted with color in the narrative, helping students to quickly find their place in the text after stopping to look at a figure, table, or box.

LIPPINCOTT'S ADVANCED SKILLS FOR NURSING ASSISTANTS IS DESIGNED TO PREPARE STUDENTS FOR CLINICAL PRACTICE

It is our desire to help prepare students to work in an advanced care setting with the knowledge, skills, and confidence that education and training can provide. Several of the textbook's features were designed specifically to help prepare the student for clinical practice:

- **Procedures.** Certainly a major objective of any nursing assistant training course is to ensure that graduates are able to provide care in a safe and correct manner. Twenty-three of the most common advanced procedures that nursing assistants may be trained to perform are presented in this text. The procedures for each chapter are grouped at the end of the chapter to avoid breaking up the text with lengthy boxes. Each procedure box begins with a *Why You Do It* statement that helps students understand the "why behind the what," an understanding that is the foundation for the development of critical thinking skills. The concepts of privacy, safety, infection control, comfort, and communication are emphasized consistently in every procedure. The *"Getting Ready"* and *"Finishing Up"* steps are referenced in every procedure box to help students remember these very important pre- and post-procedure actions (see p. i for an explanation of the symbols). The steps of the procedure are given using clear and concise language, and photographs and illustrations are provided for additional clarification. Each procedure box concludes with a bulleted list of *What To Document* to help students learn what observations they need to make and record/report while performing each procedure.

CHAPTER 3 PROCEDURES

PROCEDURE 3-1

Cleaning a Wound and Applying a Sterile Dressing

WHY YOU DO IT To help prevent infection, the incision site must be cleaned routinely, and a new dressing must be applied. Cleaning the incision site and changing the dressing also gives you the opportunity to observe the wound for complications.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Sterile gloves
- Sterile drape
- Sterile basin
- Sterile saline (or other cleaning solution, as specified in the person's care plan)
- Sterile bulb syringe (if wound is to be irrigated)
- Sterile dressing set:
  - Sterile scissors
  - Sterile sponge forceps
- Sterile dressings (type and number as specified on the person's care plan)
- Sterile gauze sponges
- Tape
- Plastic bag
- Bed protector
- Bath blanket (if necessary)

Procedure

2. Place the dressing supplies on a clean surface, such as the bedside table.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked.
4. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
5. Help the person to a comfortable position that allows access to the wound.
6. Fanfold the top linens to the foot of the bed. Adjust the person's hospital gown or pajamas as necessary to expose the wound. If necessary, use a bath blanket to provide additional warmth and modesty, leaving only the wound exposed. If necessary, place the bed protector under the wound site to keep the linens dry.

Procedure Box: Step-by-step instructions for key nursing assistant actions.

- **Guidelines Boxes.** These boxes summarize general guidelines for various aspects of the nursing assistant's job in the advanced care setting. The unique *"What You Do / Why You Do It"* format helps students understand why things are done a certain way. Rather than just presenting the student with an endless list of guidelines to memorize, we have provided the student with a tool for remembering why these guidelines are important to follow.

Guidelines Box 2-3 Guidelines for Using Sterile Technique

WHAT YOU DO	*WHY YOU DO IT*
The work surface where a sterile field will be created (for example, an over-bed table) should be clean and dry.	Moisture on the work surface could penetrate thesterile paper or cloth drape, contaminating it.
Create the sterile field as close as possible to the time of the procedure.	Keeping a sterile field set up for an extended period of time increases the chance that dust or other airborne contaminants will settle on it and contaminate it.
Do not cover a sterile field for use at a later time.	It is impossible to remove a covering without risking contamination of the sterile field.
Open envelope-wrapped sterile packages by folding the first flap away from you and the last flap toward you.	Unfolding the flaps in this order prevents you from reaching across the sterile field and contaminating it.
Avoid holding an object that is not sterile over a sterile field.	If you hold an object that is not sterile over the sterile field, you could contaminate the field. Remember that the outside of a sterile package is not sterile (just the inside is sterile).

Guidelines Box: Guidelines and rationales for key nursing assistant actions.

- **Care Alert! Reminders.** These reminders appear throughout the text as appropriate to raise the student's awareness of conditions or situations that could lead to inadvertent injury of the patient while care is being given.

Care Alert!

WHEN catheterizing a patient with a straight or indwelling urinary catheter, never force the catheter if you meet resistance. If you are not able to easily pass the urinary catheter through the urethra, stop the procedure and call for a nurse.

Care Alert! Reminder: Help promote safe patient care.

- **Tell the Nurse! Notes.** A recurrent theme throughout the book is the important role the nursing assistant plays in making observations about a patient's condition and reporting these observations to the nurse. The *Tell the Nurse!* notes highlight and summarize signs and symptoms that a nursing assistant may observe that should be reported to the nurse.

TELL THE NURSE !

When caring for a patient with a wound, be observant for signs and symptoms of complications. Quick action can prevent complications from worsening. Tell the nurse immediately if you observe any of the following:

- The edges of the wound are gapping open between the sutures or staples.
- The sutures or staples have ripped out or broken.
- There is excessive swelling along the incision line.
- There is excessive redness along the incision line.
- The incision line is hot to the touch.
- There is purulent drainage or pus along the incision line.

Tell the Nurse! Note: Observations that need to be reported to the nurse.

- **Stop and Think! Scenarios.** Each chapter concludes with one or more *Stop and Think!* scenarios. These scenarios, which are excellent tools for initiating classroom discussion, encourage students to think critically to solve problems and help students to see that many situations they will encounter in the workplace do not have cut-and-dried answers.

STOP and Think!

1. You are working at the bedside of Mrs. Thomas, preparing to assist the nurse with a sterile dressing change. You have created a sterile field on the over-bed table, and you are arranging the supplies for the nurse to use. Mrs. Thomas is occasionally a bit disoriented as the result of her pain medication. Suddenly, she reaches up to the field and removes a stack of gauze sponges you have just arranged. What should you do? What steps could you take to prevent this from happening in the future?
2. You are checking supplies on the sterile supply cart and find that you need to restock several items. As you are placing the needed items on the cart, you notice that the outer packaging of some of the items looks water stained. Are these items still sterile? What should you do?
3. You are preparing to set up a sterile field and open sterile supplies for a procedure in a patient's room. You plan to arrange your sterile field on the over-bed table. What must you

Stop and Think! Scenario: Situations to promote critical thinking.

- **Helping Hands and a Caring Heart: Focus on Humanistic Health Care Boxes.** These boxes, found throughout the text, encourage students to empathize with those in their care and emphasize the importance of meeting patients' emotional and spiritual needs, as well as their physical needs.

Helping Hands and a Caring Heart

FOCUS ON HUMANISTIC HEALTH CARE

A wound can cause a great deal of emotional stress for a patient as well as the patient's family members. Because many wounds are disturbing to look at and may have a foul odor, the person may worry about how others will react to the wound. The wound may take a long time to heal, and even after it heals, the person may be left with a permanent reminder of the injury in the form of a large scar. As a result, the person may worry that others will no longer find him attractive, even after the wound heals.

Helping Hands and a Caring Heart: Focus on Humanistic Health Care Box: Highlights humanistic, holistic care.

LIPPINCOTT'S ADVANCED SKILLS FOR NURSING ASSISTANTS SEEKS TO PROMOTE PROFESSIONALISM AND TO INSTILL IN STUDENTS PRIDE IN THEMSELVES AND IN THEIR CHOSEN PROFESSION

No one is "just" a nursing assistant. Nursing assistants are often the members of the health care team with the most day-to-day contact with patients in the advanced care setting. In addition, many patients in advanced care settings are acutely ill, and their condition can change rapidly. Because nursing assistants are often in the best position to notice a change in a patient's condition, they bear a large part of the responsibility for the well-being of those in their care. Patients and their family members are also likely to feel frightened, alone, and lost in the maze of modern technology that makes up the advanced health care setting.

To highlight the contributions that nursing assistants make in the advanced care setting, each unit in the textbook concludes with a patient's or family member's first-person account of how a nursing assistant had a positive impact on their lives or the lives of their loved ones. The goal of these *Nursing Assistants Make a Difference!* stories is to help students see that nursing assistants are vital members of the health care team in the advanced care setting. Nursing assistants who feel that they can and do make a difference in the lives of others will go the "extra mile" to ensure that the care they provide is humanistic.

AN OVERVIEW OF *LIPPINCOTT'S ADVANCED SKILLS FOR NURSING ASSISTANTS*

Lippincott's Advanced Skills for Nursing Assistants is a comprehensive textbook that is designed to prepare nursing assistants with the knowledge and skills they need to perform advanced skills in an advanced care setting. The tasks nursing assistants in advanced care settings are expected to perform vary greatly in health care settings across the nation. Many health care settings expect nursing assistants to competently perform procedures that in the past could only be performed by licensed nurses. Other health care settings do not allow nursing assistants to perform these procedures independently, but they do expect nursing assistants to assist other members of the health care team as they perform them. Either way, the more the nursing assistant understands about the care that is being provided, the more useful he or she is to the health care team.

A lifelong interest in learning new information is an important quality for any health care professional to have, as the body of information related to medicine and health care is constantly evolving. A lifelong interest in learning benefits the recipients of care as well as the caregivers themselves. Awareness of career pathways allows the nursing assistant to set goals for career advancement and reach them, receiving higher levels of compensation for higher levels of experience, skills, and responsibilities. This textbook was written as one way to provide the means for such career advancement.

This textbook consists of four units. The following is a brief survey of these units and the information they contain.

UNIT 1: INTRODUCTION TO ADVANCED CARE

Unit 1 consists of one chapter that provides an overview of issues and concepts specific to the advanced care setting. The different types of health care settings where advanced care is provided are discussed, as are the special needs that patients receiving this type of health care have. The importance of knowing and acting within one's scope of practice, as defined by one's job description and facility policy, is emphasized. The nurse's, as well as the nursing assistant's, responsibilities with regard to delegation are reviewed, as are special considerations related to communication within the advanced care setting.

UNIT 2: ADVANCED PATIENT CARE SKILLS

The seven chapters in this unit focus on introducing the student to skills and equipment that are frequently used to provide care for patients in advanced care settings. Chapter 2 covers the principles and skills related to sterile technique. Because many procedures that are performed in the advanced care setting require the use of sterile technique, it is important for students to understand what sterile technique is, why it is used, and how to create and maintain a sterile field. Chapter 3 discusses the types of wounds patients may have, the principles of wound healing, and interventions that are used in the health care setting to promote wound healing. Chapter 4 reviews concepts and skills related to inserting, removing, irrigating, and collecting specimens from urinary catheters. Chapter 5 provides information about enteral nutrition, total parenteral nutrition, and blood glucose monitoring. Chapter 6 reviews interventions that are frequently used in the advanced care setting to ensure that a patient's oxygenation needs are met. In Chapter 7, venipuncture and intravenous therapy are discussed. Unit 2 concludes with Chapter 8, which introduces the nursing assistant to techniques used for advanced cardiovascular monitoring. Because cross-training to become an electrocardiograph technician is a possibility for nursing assistants in many facilities, basic rhythms that may be seen on an electrocardiogram are presented and described.

UNIT 3: SPECIAL CARE CONCERNS

The five chapters that make up Unit 3 provide the student with in-depth information about special populations of people who are cared for in advanced care settings. Chapter 9 reviews basic information related to the principles of rehabilitation, discusses the three phases of the rehabilitation process, and describes specific rehabilitation concerns related to caring for patients with head injuries, spinal cord injuries, strokes, cardiovascular disorders, musculoskeletal injuries, or burns. Chapter 10 covers perioperative care, with special emphasis on the nursing assistant's role in caring for patients before, during, and after surgery. The special environment of the operating room, safety guidelines that must be followed in the surgical suite, and the duties of the different members of the surgical team are described. In Chapter 11, special care considerations related to the pediatric patient are discussed, along with some specific medical conditions that affect children. Chapter 12 discusses the special care required by the obstetric patient and describes the normal processes of labor and delivery. Complications that require advanced care before, during, and after birth are also discussed. Unit 3 concludes with Chapter 13, which introduces the student to special considerations related to the care of patients with psychiatric disorders.

UNIT 4: ASSISTING WITH MEDICATIONS

The two chapters in this final unit introduce the nursing assistant to basic concepts and skills related to the use and administration of medications. Many nursing assistants, especially those who work in assisted-living facilities, are being trained to administer routine medications. However, even if a nursing assistant is not responsible for actually administering medications, basic knowledge about the broad categories of medications that are often used in advanced care settings and how these medications can affect the patient can be very useful. Chapter 14 describes medication administration routes and the six rights of medication administration, along with the skills related to the administration of oral and topical medications. Chapter 15 reviews broad categories of medications that are often used in advanced care settings, with special emphasis on common side effects that the nursing assistant should be especially observant for when caring for a person taking these medications.

APPENDICES AND GLOSSARY

Lippincott's Advanced Skills for Nursing Assistants concludes with three appendices and a comprehensive glossary. Appendix A contains the answers to the *What Did You Learn?* exercises that appear at the end of each chapter. Appendix B describes the nursing assistant's role in caring for organ and tissue donors and recipients, and their families, and answers some frequently asked questions about organ donation. Appendix C is a basic math review.

The glossary provides definitions for all of the vocabulary words in the book in alphabetical order to facilitate quick reference. A precise definition of each vocabulary word is given. The number in parentheses at the end of each entry indicates the chapter in which the vocabulary word is introduced. Extensive cross-references remind students of synonyms and antonyms and help them to differentiate related words. All of the vocabulary words in the glossary are included on the audio glossary found on the CD included with the book, enabling students to hear the words pronounced, defined, and used in a sentence.

A COMPREHENSIVE PACKAGE FOR TEACHING AND LEARNING

To further facilitate teaching and learning, a carefully designed ancillary package is available. In addition to the usual print resources, we are pleased to present multimedia tools that have been developed in conjunction with the text.

RESOURCES FOR STUDENTS

- **Interactive CD-ROM.** Packaged with the textbook at no additional charge, this CD features *Watch and Learn!* video clips derived from *Taylor's Video Guide to Clinical Nursing Skills*. These video clips bring art and concepts described in the book to life for the student. In addition, the CD features *Listen and Learn!* , an interactive glossary that enables students to hear the vocabulary words pronounced and defined, and then quiz themselves using the flashcard feature.
- ***Workbook to Accompany Lippincott's Advanced Skills for Nursing Assistants.*** Developed by an instructional design team, this workbook provides the student with a fun and engaging way of reviewing important concepts and vocabulary. Multiple-choice questions, matching exercises, true or false exercises, labeling exercises, and other types of active-learning tools will appeal to many different learning styles. The workbook also contains procedure checklists for each procedure in the textbook.

RESOURCES FOR INSTRUCTORS

- **Instructor's Resource CD.** The *Instructor's Resource CD* provides—for each chapter—teaching objectives, guided lecture notes, PowerPoint lecture slides, teaching strategies, ideas for classroom activities and assignments, and points for discussion related to the *Stop and Think!* scenarios found in the textbook. In addition, more than 200 multiple-choice questions and the Diploma test generator are included on the *Instructor's Resource CD*, along with an image bank that contains all of the illustrations in the text, as well as many of the photographs, in formats suitable for hard-copy printouts or incorporation into PowerPoint presentations or websites.

ADDITIONAL RESOURCES

- **thePoint (http://thepoint.lww.com).** thePoint is Lippincott's web-based course and content management system that provides every resource instructors and students need in one easy-to-use site. Advanced technology and superior content combine at thePoint to allow instructors to design and deliver on-line and off-line courses, maintain grades and class rosters, and communicate with students. Students can visit thePoint to access supplemental multimedia resources to enhance their learning experience, check the course syllabus, download content, upload assignments, and join an on-line study group. **thePoint** . . . where teaching, learning, and technology click!*

- **Taylor's Video Guide to Clinical Nursing Skills.** This dynamic 17-module video series follows a team of students and their instructor as they perform a range of nursing procedures. The video series is available for institutional purchase and for individual student purchase.

It is with great pleasure that the authors and publisher introduce these resources—the textbook and the ancillary package—to you. One of our primary goals in creating these resources has been to provide students and instructors with the tools and resources they need to succeed. We hope we have achieved that goal, and we welcome your feedback.

Pamela Carter *and* ***Amy Stegen***

*thePoint is a trademark of Wolters Kluwer Health.

To the Student

Welcome, and congratulations on making the decision to take the next step forward in your career! You may be using this book for any number of different reasons. For example, you may be required to complete an advanced course in addition to your basic nursing assistant training before you can enter the workforce or continue on in your education. Or you may be using this textbook to supplement on-the-job training provided in a hospital or other advanced care setting. Regardless of your situation, it is our wish to provide you with a book that contains information that will help you feel more comfortable and confident while caring for people in an advanced care setting.

There is a great deal of variation from state to state, and even from facility to facility, with regard to the more advanced skills that you may be expected to perform. There may be many procedures that we have included in this book that you will not be allowed to do at your facility. However, you may be required to assist nurses as they perform these procedures, and you will also be involved in caring for patients before and after they undergo these procedures. We believe that the more you know about your patients—their needs and the measures taken to care for them—the more competent a member of the health care team you will be.

You may also be trained to do procedures other than the ones included in this book, depending on the facility where you work. Or, your facility may have a specific way of doing a procedure that differs slightly from the way the procedure is described in the book. As always, make sure that you know and follow your facility's policies and procedures. Also, before performing any procedure, make sure that the procedure is included in your written job description, that you have the training and supervision you need to perform the procedure safely, and that you are comfortable performing the procedure. We want you to be confident in your abilities, but not overconfident. Overconfidence and acting outside of your job description can lead to mistakes that are life-threatening for your patient and career-ending for you!

Allowing unlicensed health care workers, such as nursing assistants, to perform advanced procedures (such as those that involve sterile technique or the administration of medications) is controversial. The risk to the patient is higher with these procedures, and many people worry that unlicensed health care workers do not have the necessary educational background or clinical judgment to perform these procedures safely or to recognize a problem if one occurs. If you are being trained to do tasks that are not traditionally within the scope of practice for a nursing assistant, you are being trusted with a significant amount of responsibility. You may need to earn the respect and trust of your coworkers. Always behave in a professional manner. Make sure that you follow the steps of the procedures exactly as you have been taught, and do not take shortcuts. Never hesitate to ask for help from the nurse if you are unsure about any aspect of a patient's care. Following these simple guidelines helps to protect your patients, you, and your employer.

As you advance in your training and your career, always remember the "basics" that you learned in your first nursing assistant course. Remember that although being technically competent at your job is essential, so is the ability to recognize that each patient has emotional and spiritual needs as well as physical needs, and that these needs are very different from those of the patient in the next bed. Taking a humanistic approach to health care is what makes the difference between care that is merely "sufficient" and care that is truly excellent.

Caring for those in need is very important work. Allow us to be among the first to thank you for your interest in advancing your career as a nursing assistant and to wish you luck on your journey.

Sincerely,
Pam and *Amy*

Reviewers

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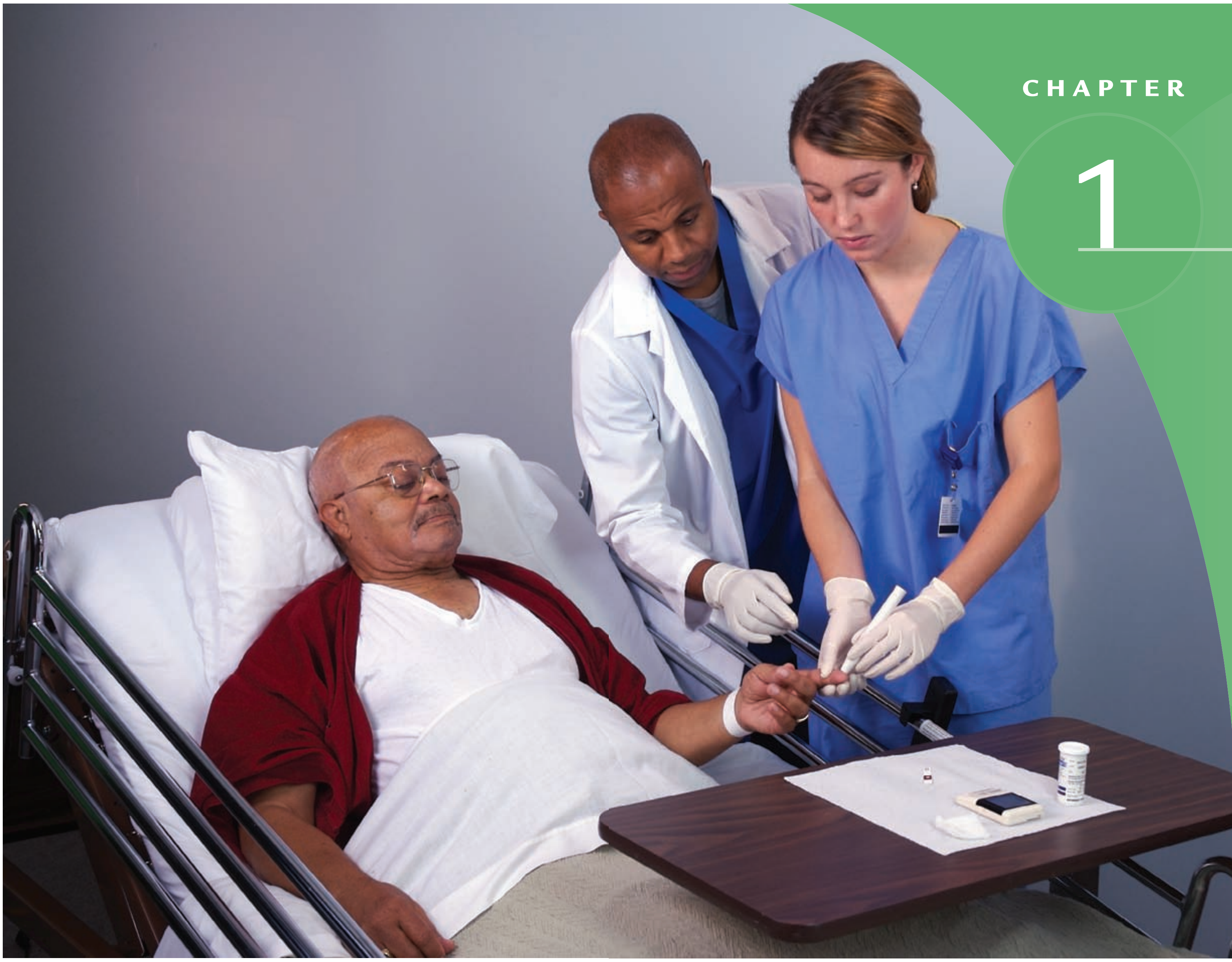
UNIT

1

Introduction to Advanced Care

Changes in the health care industry have opened up many new opportunities for nursing assistants. Employers in many health care settings hire nursing assistants who have completed basic nursing assistant training and then train them on the job to do more advanced skills that are related to the specific situation in which the nursing assistant is working. In some states, nursing assistants must complete both basic and advanced training before entering the workforce. The nursing assistant's role in providing advanced care is the focus of Unit 1.

Photo: The advanced care setting can be a rewarding place to work. (Photographer: Chris Gregerson.)



CHAPTER

1

Working in an Advanced Care Setting

WHAT WILL YOU LEARN?

In many health care organizations, nursing assistants who have received the proper training are permitted to do tasks that traditionally have been done by other members of the health care team. In this chapter, we will review some of the changes in the health care industry that have led to new opportunities for nursing assistants. We will also review how a nursing assistant who has been given more responsibility works with the other members of the health care team to ensure that patients and residents receive safe, high-quality care. When you are finished with this chapter, you will be able to:

Changes in the health care field have led to increased opportunities for nursing assistants. Here, a nursing assistant is performing a blood glucose check while a nurse supervises.

1. List three factors that can put a person in need of advanced (acute) care and describe some of the health care settings where advanced care may be provided.
2. Describe the importance of providing holistic, humanistic care in the advanced care setting.
3. Describe the changes in the health care industry that have led to changes in the way unlicensed health care workers, such as nursing assistants, are being trained and used.
4. Explain the role that the United States government and independent organizations (such as The Joint Commission) play in ensuring quality patient care.
5. List the five rights of delegation and explain how nurses and nursing assistants use the five rights of delegation to ensure that the care provided is safe and legal.
6. Describe nurses' responsibilities regarding delegation.
7. Describe nursing assistants' responsibilities regarding delegation.
8. Describe special considerations regarding communication when working in an advanced care setting.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Advanced (acute) care setting	Assess	Invasive	Unlicensed assistive personnel (UAP)
	Cross-training	Standards of practice	

An acutely ill person is one who has a severe illness or whose condition is unstable. The person may have one or more chronic conditions that complicate treatment and recovery. People who are acutely ill require a high level of care and are usually treated in an **advanced (acute) care setting** (Fig. 1-1). Many people who are in need of advanced care receive that care in a hospital. However, today, advanced care is being provided in many other types of health care settings as well. This is because people are being discharged from the hospital "sooner and sicker," and many of these people still need constant observation and a high level of nursing care. This advanced nursing care may be provided in a sub-acute care unit (skilled nursing unit), a rehabilitation facility, an acute care unit in a long-term care facility, or a person's home.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

As part of your basic nursing assistant training, you learned about the importance of a holistic, humanistic approach to health care. Taking a holistic, humanistic approach to health care is just as important in the advanced care setting as in other health care settings. Remember that when we take a holistic, humanistic approach to health care, we:

- Consider the qualities that make the person unique and use that knowledge to guide the care that we provide.
- Imagine how it would feel to be in the person's situation and act with empathy and compassion.
- Consider the person's emotional, social, and spiritual needs, as well as his or her physical needs.

Sometimes health care workers working in advanced care settings forget about the importance of providing humanistic, holistic care. This can happen for several reasons. The environment itself is very "high tech." Patients may be attached to equipment that beeps and blinks. They may have feeding tubes, catheters, intravenous lines, or other devices attached to or inserted in their bodies. In addition, a patient's stay in an advanced care setting is relatively short compared with the lengths of stays in other settings (such as long-term care facilities). As a result, you will not have a great deal of time to get to know your patients before they are discharged or transferred to another unit or facility. The technology, complex treatments, and fast-paced environment can make it difficult to look past the person's illness or condition and really see the person you are caring for as a unique individual.

However, a humanistic approach to health care is very important in the advanced care setting. Think about how it would feel to be a patient in an advanced care setting. The environment itself is cold, impersonal, frightening, and uncomfortable. There are all kinds of strange noises and smells. You feel ill, and you might be in a great deal of pain. Isolation precautions may be in effect, so you might be lonely. You might have many worries—about your health, now and in the future; about how you will pay for the health care you are receiving; about how your family is doing at home without you. You may feel like you have no control over your situation.

Now imagine that someone was caring for you who took the time to get to know you better. Imagine that this person talked with you while he or she was providing care and made an effort to meet your emotional and spiritual needs as well as your physical needs. Imagine that this person was not afraid to touch you despite all of the tubes in your body and the high-tech equipment surrounding you. Imagine that this person asked you about your likes and dislikes and made an effort to accommodate your preferences. Would this help you to feel better? Also remember what you learned in your basic nursing assistant training about taking factors such as a person's culture and age into consideration when you are caring for that person. Acting with compassion, kindness, and respect for the unique qualities of each person in your care is at the heart of providing humanistic care.

Figure 1-1
People in need of advanced (acute) care usually have a serious illness, or their conditions are unstable. Often, they also have chronic conditions that complicate the acute problem. As a result, they require close monitoring and a high level of care. (*AP Photo/Rich Pedroncelli.*)

RESPONSIBILITIES OF NURSING ASSISTANTS IN THE ADVANCED CARE SETTING

As a nursing assistant, you already know how to provide basic care. This training will serve you well no matter what type of health care setting you work in. However, depending on your state's or facility's requirements, you may need to learn more advanced care skills, such as how to insert and remove a urinary catheter, how to do a sterile dressing change, or how to provide tracheostomy care. These skills are not usually within the scope of practice for **unlicensed assistive personnel (UAP)**. UAPs are health care workers (such as nursing assistants) who are not required to obtain a license to practice their profession and who work under the direction of a licensed professional, such as a nurse. However, changes in the health care industry have led to changes in the way health care is delivered, and many health care organizations are starting to train UAPs, such as nursing assistants, to do more advanced skills.

Several factors have contributed to the changes being seen in health care delivery today:

- The cost of health care is increasing. In an attempt to control these costs, insurance companies and federally funded insurance plans (such as Medicare) have set limits on how much money health care organizations receive for each service they provide. As a result, administrators of health care organizations have looked for ways to reduce their costs. One way to reduce costs is to do the same amount of work with fewer people. This has created a need for **cross-training** (teaching employees how to do skills that are not usually within their scope of practice). For example, a nurse or a nursing assistant might be taught how to collect a blood sample, a job that is traditionally done by a specialist called a phlebotomist.

- In the United States today, there is a nursing shortage. As a result, hospitals and other types of advanced care settings rely more on nursing assistants to round out the nursing team. Nursing assistants help nurses by performing basic nursing functions so that nurses have more time to spend on more complex patient care tasks. However, in many cases, nursing assistants also receive additional training so they can perform more advanced nursing skills. Nurses and nursing assistants work together to ensure that the nursing care provided to patients is safe and of high quality.

Nursing assistants who work in advanced care settings may have many different titles. They may be called "nursing assistants" "UAPs," "health care assistants (HCAs)," "patient care assistants (PCAs)," "patient care technicians (PCTs)," or a variety of other titles. In this book, we refer to nursing assistants who work in advanced care settings as "nursing assistants" and the people they care for as "patients."

If your state permits nursing assistants to work in advanced care settings, you may have the opportunity to work in many different areas of the organization. For example, as a nursing assistant, you may be hired to work in a medical-surgical unit, labor and delivery unit, rehabilitation unit, psychiatric unit, dialysis unit, or operating room. In some health care facilities, nursing assistants are allowed to work in some of these units but not others.

The skills you will be allowed to do will vary greatly, according to state regulations and your facility's policy. The skills you are allowed to do might even differ from one unit to another in the same facility. Your job description will list the skills that you are responsible for performing. If you ever have a question about whether you are allowed to perform a skill, check your job description or ask your supervisor. The wrong time to discover that you are not allowed to perform a skill is after you have already done it, especially if a patient was harmed as the result of your actions. Ultimately, it is your responsibility to know what duties you are responsible for and to make sure that you are able to perform these duties competently.

Your employer will expect you to know how to do the skills you learned during your basic nursing assistant training. In addition, you may be expected to learn more advanced skills that are specific to the unit where you are working. A nurse may teach you how to do these skills, or your facility may provide formal training for groups of new nursing assistants (Fig. 1-2). Regardless of

Figure 1-2
Many facilities provide formal classroom training for nursing assistants who are required to learn advanced skills.

where and how you receive your training to perform advanced skills, you must receive it!

Your initial training in these advanced skills is only the beginning. Continuing education is necessary so you can keep your knowledge up to date. Ask questions, read nursing journals, and take advantage of any in-service education that is offered by your facility, as appropriate. Learning new things benefits both you and your patients.

Allowing unlicensed health care workers, such as nursing assistants, to do tasks that only licensed health care workers were formerly allowed to do is controversial. Many of these tasks are **invasive**, which means that they involve inserting equipment into the patient's body or breaking the skin. As a result, they carry a higher risk of infection and other problems for the patient. Many people worry that UAPs do not have the necessary educational background or clinical judgment to do these procedures safely or to recognize a problem if one occurs. If you have been trusted with the responsibility of performing more advanced skills, you may need to earn the respect of your coworkers. Always act professionally. Make sure that you have been trained thoroughly in the advanced care skills listed in your job description and that you are comfortable performing them. Ask for assistance when you need it. Make sure to report to the nurse promptly any observations that may indicate a change in a patient's condition. These actions demonstrate to other members of the health care team that you are conscientious and that you take your responsibilities seriously, which in turn will help them to gain confidence in your abilities. Be available to assist nurses with skills you may not be responsible for and express an interest in the care being given. Doing this demonstrates to others that you are motivated to keep learning and growing as a professional.

QUALITY CONTROL IN THE ADVANCED CARE SETTING

As you learned as part of your basic training, the United States government has established regulations that protect the entire community by making sure that health care workers are properly trained and competent, health care facilities meet standards of cleanliness and quality, and quality health care is available to everyone. Several independent organizations also exist to help ensure that facilities provide quality health care.

The largest and best-known of these independent organizations is The Joint Commission, known in the past as The Joint Commission on Accreditation of Healthcare Organizations (JCAHO, pronounced "jay-co"). The Joint Commission, established in 1951, sets national standards for all types of health care organizations and officially recognizes (accredits) organizations that meet these standards. The standards establish expectations for how the organization carries out certain activities, especially activities that affect patient safety and the quality of patient care. For example, The Joint Commission has established standards for safe medication administration, infection control, the use of restraints, the use of abbreviations in documentation, staffing levels and staff education, and responding to emergencies.

Accreditation through The Joint Commission is a voluntary status sought by health care organizations. The Joint Commission's Gold Seal of Approval™ is displayed by accredited health care organizations and is recognized nationwide as a symbol of quality (Fig. 1-3). After receiving accreditation status, a health care organization

Figure 1-3
Health care facilities that comply with the standards set by The Joint Commission are allowed to display the Joint Commission's Gold Seal of Approval™.

must continue to provide proof that it meets the standards of quality. The organization must also demonstrate a commitment to continuously improving its performance.

Unannounced onsite survey visits were implemented by The Joint Commission in 2006 as a way to enhance the credibility of the accreditation process. During an on-site survey, the surveyor team speaks with staff members and observes how they do their jobs. If you are involved in an on-site survey, honestly answer any questions you are asked. And, as always, make sure that you know and follow all of your facility's policies.

DELEGATION

To ensure that the nursing team functions efficiently, nurses have the authority to delegate selected tasks to nursing assistants. Delegated tasks are the responsibility of both the nurse and the nursing assistant and must be carried out without causing harm to the patient. As part of your basic nursing assistant training, you learned about the five rights of delegation (Fig. 1-4). These guidelines help nurses decide which tasks to delegate. They also help nursing assistants decide which delegated tasks to accept.

THE NURSE'S RESPONSIBILITY

Nurses are responsible for making good decisions about which tasks to delegate and for providing adequate supervision. Before delegating a task, nurses consider four major factors:

- **State laws.** Each state has laws that govern nursing practice in the state. These laws form the basis of the state's **standards of practice** for nursing. Standards of practice establish a minimal acceptable level of nursing practice for each level of nursing licensure. Their purpose is to make sure that the care provided is of high quality and to ensure accountability and responsibility on the part of the licensed nurse. In some states, the standards of practice specify what tasks cannot be delegated to UAPs, such as nursing assistants. In other states, the standards of practice describe what criteria must be met before a task can be delegated to UAPs. Before delegating a task, the nurse must know whether or not delegating the task is permitted by state law, the state's standards of practice for nursing, or both.
- **Facility policy.** Every health care facility has written policies about delegation. Before delegating a task, the nurse must make sure that the task is one that can be delegated, per facility policy. The nurse also must make sure that the nursing assistant to whom he plans to delegate the task has received the necessary training, per facility policy.
- **The nursing assistant.** Before delegating a task, the nurse should consider the abilities and training of the nursing assistant. For example, a nursing assistant who has done a skill successfully many times in the past may need less hands-on supervision than a nursing assistant who has just learned the skill.
- **The patient.** Whether or not a task can be delegated may depend on the patient's medical condition rather than the task itself. If the patient is unstable, the nurse may perform procedures that are normally within the nursing assistant's scope of practice, in addition to more advanced procedures. This is because the nurse needs to **assess** the patient's condition while he is providing care. The act of assessing a patient involves gathering information about the patient's condition and then interpreting what that information means. Although nursing assistants play an important role in gathering information, interpreting the information is out of nursing assistants' scope of practice. If the patient's condition is unstable, it is often more appropriate for the nurse to gather the information first-hand rather than relying on secondhand reports from the nursing assistant. This is why the nurse may choose not to delegate a task even if it is a task that nursing assistants are usually permitted to do.

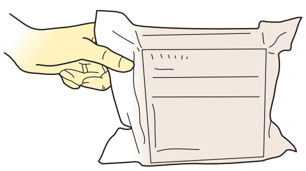
THE NURSING ASSISTANT'S RESPONSIBILITY

You are responsible for recognizing which delegated tasks are within your scope of practice and range of abilities and using this knowledge as a basis for either accepting or refusing assignments.

Figure 1-4
The five rights of delegation were developed by the National Council of State Boards of Nursing (NCSBN) to help nurses make good decisions about what tasks to delegate and to whom. Nursing assistants should also consider the five rights of delegation when deciding whether or not to accept a delegated task.

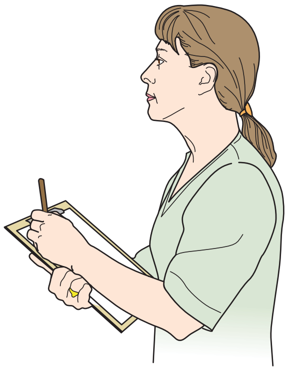
The right supervision

• Will the nurse be available to supervise or answer questions?



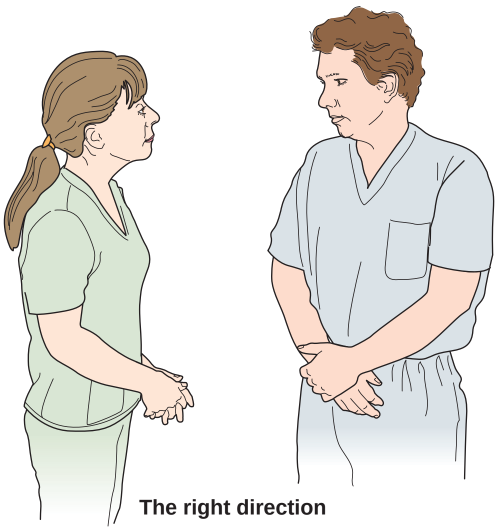
The right task

• Is this a task that can be delegated?
• Does the nurse practice act allow the nurse to delegate the task?
• Is the task in the job description for the nursing assistant?



The right person

• Does the nursing assistant have the right training and experience to safely complete the task?



The right direction

• Will the nurse be able to give the nursing assistant clear direction regarding how to perform the task?
• Will he or she be able to convey to the nursing assistant what is expected?

The right circumstance

• What is the patient's condition?
• Is the patient stable?
• What are the needs of the patient at this time?

You are also responsible for communicating well with nurses:

- If you are worried about performing a particular skill or believe you need close supervision to ensure that you perform the skill correctly, share your concerns with the nurse so that he can provide the necessary help and supervision.
- If you feel that you cannot do a task that has been assigned to you, be sure to explain to the nurse why you are refusing the assignment. If the problem is a lack of time or a lack of confidence in your abilities, the nurse can help you. If you are refusing the task because it is out of your scope of practice or you have not received the proper training, then the nurse also needs to know this so that he can make other arrangements to ensure that the patient receives the necessary care.
- Finally, after you have completed a delegated task, be sure to report back to the nurse. The nurse needs to know that the task was completed, and he will also need to know about any observations you may have made while completing the task.

COMMUNICATION IN THE ADVANCED CARE SETTING

As part of your basic nursing assistant training, you learned that the ability to communicate effectively is a critical skill for every health care worker to have, and you learned how to develop this skill. Just as in other health care settings, you will need to be able to communicate effectively with your patients, as well as with other members of the health care team. Guidelines Box 1.1 reviews guidelines for effective communication.

Guidelines Box 1-1 Guidelines for Effective Communication

WHAT YOU DO	*WHY YOU DO IT*
Communicating With Patients Be a good listener. Give your full attention to the person who is speaking.	When you truly listen to a person, you gain a better understanding of what that person is thinking and feeling.
When you are the speaker, make sure your message is clear. Use terms the person is familiar with. If necessary, seek other ways of getting your message across. • If the person is unable to hear you clearly, make sure that his or her hearing aids are working properly. • Use an interpreter to translate if the person does not understand the language. • Write down important messages or use a picture board.	If the person is unable to hear you or understand what you are saying, communication is not clear.
Ask open-ended questions and use other techniques (such as rephrasing) to encourage the person to talk.	Asking open-ended questions and using techniques such as rephrasing encourage the person to share thoughts and feelings with you. This helps you to gain a better understanding of what the person is thinking and feeling.

Guidelines Box 1-1 Guidelines for Effective Communication (*Continued*)

WHAT YOU DO	*WHY YOU DO IT*
Provide and seek feedback.	Providing and seeking feedback help to confirm understanding.
Be mindful of your body language and tone of voice.	Negative body language or an inappropriate tone of voice can block communication or send the wrong message.
Remember that silence and comforting touch are valuable communication tools.	Sometimes your presence and a comforting touch are more effective than words for conveying your care and concern.
Communicating With the Health Care Team Be a good listener. Give your full attention to the person who is speaking.	Listening carefully (for example, to instructions or requests) helps prevent misunderstandings.
Make sure that information you report is accurate and factual. • Refer to the patient by name and room number. • Make sure to write down vital signs and other measurements so you do not forget them or report them inaccurately. • Report your observations in an orderly, concise manner. Avoid adding unnecessary details.	Information that is not accurately and efficiently reported to other health care team members can delay treatment and cause a serious medical condition to worsen, especially in the advanced care setting.
Make sure that information you record is accurate and written according to facility policy. • Write neatly with dark ink. • Use only facility-approved abbreviations. • Make sure all entries are signed and dated appropriately.	Clear, complete, accurate documentation helps prevent misunderstandings and mistakes when other members of the health care team refer to the patient's chart.
Provide and seek feedback.	Providing and seeking feedback helps to confirm understanding.

SPECIAL CONSIDERATIONS WHEN COMMUNICATING WITH PATIENTS IN AN ADVANCED CARE SETTING

In an advanced care setting, many things can interfere with a patient's ability to communicate with you, including:

- The patient may not be fully conscious.
- The patient may not be able to speak as the result of a stroke, head injury, or other medical condition.
- The patient may have a breathing tube down his throat or an oxygen mask over his mouth, making it impossible to speak.
- The patient may be in severe pain.

When this is the case, you will need to rely on your observation skills to determine what the person needs. Supplying the person with an alternate way of expressing himself may also be helpful. For example, the person may be able to write down what he needs or point to a picture of it on a picture board.

SPECIAL CONSIDERATIONS WHEN COMMUNICATING WITH OTHER MEMBERS OF THE HEALTH CARE TEAM IN AN ADVANCED CARE SETTING

Your role as the nursing team's "eyes and ears" is extremely important in the advanced care setting. Because your patients are acutely ill, they require close and frequent monitoring, and reporting the observations you make while providing care is very important. An acutely ill person's medical condition can change for the worse very quickly.

Nursing assistants who work in advanced care settings are often responsible for recording their observations and the care they provide in the patient's medical record. Although many facilities still maintain medical records on paper, computerized charting is replacing paper charting in many facilities (Fig. 1-5). If your facility uses computerized charting, your employer will train you in the correct use of the computer. Your facility will also have specific policies regarding documentation. These policies specify who is allowed to document information in the patient's record, procedures that are to be followed to protect the patient's confidentiality, and the abbreviations that are approved for use in the facility. Make sure you are familiar with these policies and follow them carefully. And, as always, follow the general guidelines for proper documentation that you learned as part of your basic training (Guidelines Box 1-2).

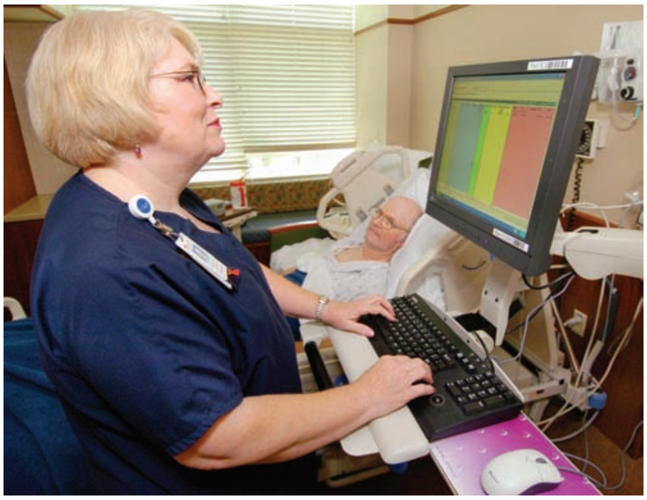


Figure 1-5
Computerized charting is becoming increasingly more common. In some facilities, the computer terminal is located in a central location, such as the nurse's station. In other facilities, each patient's room is equipped with a computer terminal. (*AP Photo/The Oklahoman, Steve Gooch.*)

Guidelines Box 1-2 Guidelines for Recording

WHAT YOU DO	*WHY YOU DO IT*
Write legibly, using blue or black ink. Your facility may have specific policies regarding the color of ink used.	It is important to write legibly to avoid miscommunication. A pen is used instead of a pencil because pencil can be erased, enabling someone to change the person's medical record. Blue and black ink reproduce best when a document is photocopied.
Always sign or initial your entry, according to facility policy.	By signing or initialing your entry, you indicate that you are the person who needs to be consulted if further clarification of the information you have entered is necessary. Additionally, signing or initialing your entry indicates that you accept legal responsibility for what you have written.

Guidelines Box 1-2 Guidelines for Recording (*Continued*)

WHAT YOU DO	WHY YOU DO IT
Only record observations that you have made, or care that you have given. Do not make entries for another person.	By making an entry in a medical record, you accept legal responsibility for that entry. Therefore, it is best to record only information that you, personally, can vouch for.
Date and time your entries correctly.	The date and time that actions occured or observations were made are extremely important elements of the medical record, which is a legal account of care provided.
Check the patient's name on the medical record and on the form where you are recording.	By verifying the patient's identification information, you will ensure that you are recording the person's information in the correct medical record.
Use appropriate medical terminology and facility-approved abbreviations when recording.	Using correct terminology and abbreviations will prevent others from having to second-guess your meaning.
Do not record care as given or procedures as performed before you have provided the care or performed the procedure. Only document after the fact.	You may become distracted or involved in another situation that prevents you from carrying out the duties you have already charted. If you record duties as "completed" in the medical record, but then do not actually complete these duties, you will have committed fraud.
Record information in a timely manner. If you must wait to record something, keep notes about your observations and care so that the information you record in the medical record will be accurate.	If you wait until the end of your shift to record, you may forget important information.
If you make an error, do not erase, use correction fluid to cover, or scribble through the mistaken entry. Simply draw a line through the mistake and initial it according to facility policy.	Striking through an error is the only legal way to indicate a change in the medical record. Erasing or using correction fluid to correct an error could be seen as an attempt to hide or change existing information.
Remember that in a liability situation, care not recorded was care not provided.	Proper and conscientious recording of patient information protects the patient, your employer, and you.

SUMMARY

- A patient in an advanced (acute) care setting often has serious illness. He may also have other chronic medical conditions that complicate treatments and recovery. The patient's condition is usually unstable, and he requires a high level of care and monitoring.
- Advanced (acute) care can be provided in hospitals, sub-acute care (skilled nursing) units, rehabilitation facilities, acute care units in long-term care facilities, or the person's home.
- A humanistic approach to health care is very important in the "high-tech," fast-

paced advanced care setting. Providing humanistic health care means acting with compassion, kindness, and respect for the unique qualities of each person in your care.

- Changes in the health care industry are resulting in an increased need for unlicensed assistive personnel (UAPs), such as nursing assistants, to take on additional responsibilities, many of which are not usually within the scope of practice for UAPs.
  - Cross-training (teaching employees how to do skills that are not usually within their scope of practice) helps health care organizations control costs.
  - Teaching nursing assistants how to do more advanced nursing skills can help to promote more efficient nursing care.
- The responsibilities of a nursing assistant in an advanced care setting vary greatly from state to state and even from facility to facility or unit to unit. Your job description will list the skills and tasks you are responsible for knowing how to do.
  - As a nursing assistant, you must receive additional training before performing advanced skills.
  - It is ultimately your responsibility to know what duties you are responsible for and to make sure you can competently perform these duties.
- Government regulations exist to ensure that the care provided by advanced care facilities is safe and of high quality. In addition, a health care organization may seek accreditation by an independent organization, such as The Joint Commission. To receive accreditation, the health care organization must demonstrate an ongoing commitment to quality patient care.
- The delegation of tasks cannot be taken lightly by either nurses or nursing assistants. Both share the responsibility for ensuring that no harm is done to the patient.
  - The nurse is responsible for making good decisions about which tasks to delegate and for providing adequate supervision. State laws, the standards of practice for nurses in your state, and facility policy regulate what duties a nurse may delegate to a nursing assistant. Ultimately, the nurse bases her decision to delegate the task on the individual patient's condition.
  - The nursing assistant is responsible for recognizing which tasks are within her scope of practice and range of abilities and using this knowledge as a basis for either accepting or refusing the assignment.
- Your role as the nursing team's "eyes and ears" is important in the acute care setting. An acutely ill person's medical condition can change for the worse very quickly.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Nursing assistants are considered UAPs. What does UAP stand for?
   a. Unauthorized assistive personnel
   b. Unlicensed authority personnel
   c. Ultimate assisting person
   d. Unlicensed assistive personnel

2. A nursing assistant must only perform skills that are listed in his or her:
   a. Job description
   b. Training manual
   c. License to practice
   d. Textbook

3. One of a nursing assistant's most important responsibilities in an advanced (acute) care setting is:
   a. Communication
   b. Cross-training
   c. Assessment
   d. Delegation

4. Where is advanced (acute) care provided?
   a. In a hospital
   b. In a rehabilitation facility
   c. In a subacute care facility
   d. All of the above
5. Under what condition should a nursing assistant decline to do a delegated task?
   a. The nursing assistant is too busy to do the task
   b. The nursing assistant has not been trained how to do the task
   c. The nursing assistant does not want to do the task because it is unpleasant
   d. All of the above
6. Which of the following is NOT one of the five rights of delegation?
   a. The right task
   b. The right direction
   c. The right person
   d. The right facility

STOP and Think!

1. You work in an advanced care setting. A new nurse assigned to the unit where you work has just delegated a task to you that you have not yet been trained to do. What are your responsibilities as a nursing assistant in this type of situation? What would you say to the nurse?
2. You are a nursing assistant who has worked for several years in a long-term care facility. You have always believed that providing care in a humanistic manner was one of the most important aspects of your job. Now you have accepted a job in a hospital on a busy surgical unit. Many of your responsibilities are the same as they were in the long-term care facility. However, the pace at your new job seems much more rushed. You wonder if you will still be able to provide humanistic care. Why do you think humanistic care is so important in an advanced care setting? What are some things that you can do to ensure that the care you provide is still humanistic?
3. You have just been hired as a nursing assistant on the acute care unit of a long-term care facility. At your previous job, you worked in a hospital where nursing assistants were trained to perform many advanced skills. You took this new job because not only will you be able to continue performing the advanced skills that you already know how to do, you will also have the opportunity to learn how to care for patients who are on respiratory ventilation systems. One of the nurses at the facility is not pleased that nursing assistants are being given the responsibility of performing more advanced skills, and she has expressed her feelings to you. You know that you are a conscientious and capable employee and that you can safely perform the tasks that you are being asked to perform. Why might the nurse who is opposed to nursing assistants doing advanced skills feel the way she does? What can you do to help the nurse gain confidence in your abilities?

Nursing Assistants Make a Difference!

My name is Ernest Forrester, and this is my wife, Elaine. We have had to endure one of the hardest things for parents to go through—our 33-year-old son, William, was diagnosed with Hodgkin's lymphoma 3 years ago. We lost William to the disease a little over a year ago.

William was in and out of the hospital so many times while he was sick. One thing my wife and I will always remember is the nursing care William received. The nurses and nursing assistants at the University Hospital were so knowledgeable, professional, and kind. There are so many incidents that stand out in my mind. For example, once William told me about a nursing assistant named Carlos. William said that he was so thirsty after going through a grueling chemotherapy treatment, but he couldn't keep anything down. Carlos came in and gave him ice chips. I remember William saying to me, "Dad, I thought I'd died and gone to heaven, those ice chips tasted so good."

There were so many times that Elaine and I were just upset and terrified. It's hard to watch someone you love suffer, and there are so many questions about the future. During William's last hospitalization, there was a nursing assistant named Jessi who cared for him. Jessi really took the time to listen to us. She listened without saying nice little routine things like, "Don't worry, William will be fine." She knew we were scared, and it was okay with her. Jessi also made it a point to check on William frequently, and she encouraged us to go down to the cafeteria for a meal, or home for a shower. Just knowing that Jessi was watching out for William and that she cared meant so much to us.

Nursing assistants like Carlos and Jessi were bright spots during an otherwise awful ordeal. We will always be grateful to them for the care that they provided to William, and to us.

UNIT

2

Advanced Patient Care Skills

As you have learned, people who are being cared for in advanced care settings usually require a higher level of nursing care than people who are being cared for in other settings. In this unit, you will learn about some of the more advanced skills that are frequently used in advanced care settings.

Photo: You will have many opportunities to put the new skills you are learning to use in an advanced care setting.

CHAPTER

2

Sterile Technique

WHAT WILL YOU LEARN?

As part of your basic training, you learned that people who are being cared for in health care settings are at risk for health care–associated infections (HAIs), also called nosocomial infections. (Remember that an HAI is an infection that is acquired while in a health care setting.) A patient's risk for getting an HAI is increased when the patient must undergo an invasive procedure (that is, one that involves breaking the skin or inserting equipment into the body, such as urinary catheterization). A patient's risk of getting an HAI is also increased when the patient has a medical condition that causes a break in the skin, such as pressure sores or burns. In these situations, health care workers use sterile technique to decrease the likelihood of HAI. In this chapter, you will learn about sterile technique and how to use it. When you are finished with this chapter, you will be able to:

Many of the advanced skills you will learn how to do require the use of sterile technique. Here, a nursing assistant pours sterile saline into a sterile basin.

1. Explain why the proper use of sterile technique is critical.
2. Define the term *sterile technique* and explain when sterile technique is used.
3. Describe how medical equipment is classified according to disinfection or sterilization requirements.
4. Describe the processes of high-level disinfection and sterilization and explain the difference between the two.
5. Describe how sterile items and supplies may be packaged.
6. Explain how to verify that the contents of a sterile package are sterile.
7. Explain how to properly handle and store sterile packages to maintain their sterility.
8. Describe the guidelines that health care workers follow to maintain sterility of equipment, supplies, and the work surface when using sterile technique.
9. Demonstrate the proper techniques for creating a sterile field using an envelope-wrapped package and a sterile drape.
10. Demonstrate the proper techniques for adding envelope-wrapped sterile supplies to a sterile field and for adding sterile supplies that are contained in a peel pouch to a sterile field.
11. Demonstrate the proper technique for pouring liquid into a sterile container.
12. Describe methods used to move sterile supplies around on a sterile field and demonstrate the proper technique for putting on and removing sterile gloves.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Sterile technique	Endospore	Peel pouch (sterilization pouch)	Sterile drape
Sterile field	Sterilization	Strike-through contamination	Transfer forceps
Sterile	Envelope-wrapped		
High-level disinfection			

As part of your basic training, you learned that our bodies are usually well-protected from the outside world. Skin that is without cuts, scrapes, or wounds physically prevents pathogens from entering the body. The four organ systems that open to the outside of the body (that is, the respiratory, digestive, urinary, and reproductive systems) and the eyes are lined with sticky mucous membranes that trap and destroy pathogens. But sometimes in a health care setting, these natural defenses against infection are missing or overridden. For example, the patient may have an open wound, such as that caused by burns or pressure ulcers. Or, to treat or monitor the person, the health care team may need to pierce the skin (for example, to give an injection) or place a piece of equipment into a body cavity that is normally free from pathogens (for example, the urinary bladder or the vascular system). In these situations, the person's risk of getting an HAI becomes very high.

HAIs are very expensive, both in terms of money and human life. The Centers for Disease Control and Prevention (CDC) estimates that each year in the United States, 250,000 patients get an HAI, just from the use of urinary catheters alone. If a patient develops an HAI, he will need additional treatments and a longer stay in the health care facility. This increases health care costs. But even more alarming, the CDC also estimates that anywhere between 10% and 25% of patients who get an HAI will die as a result of it. For these reasons, prevention of HAIs is extremely important.

PREVENTING HEALTH CARE–ASSOCIATED INFECTIONS

As part of your basic training, you learned about medical asepsis—techniques that are used to physically remove or kill pathogens on surfaces, equipment, and the hands of health care workers.

The four techniques of medical asepsis are sanitization, antisepsis, disinfection, and sterilization. Sanitization practices (such as handwashing) and general disinfection (the use of chemicals to reduce the number of microbes on a surface to a safe level) play a very important role in preventing HAIs. However, in some situations, sanitization and disinfection alone are not sufficient to prevent an HAI.

When a patient must undergo an invasive procedure or has a medical condition that disrupts the skin, **sterile technique** is used. Sterile technique involves creating a **sterile field** (a microbe-free area to work) and using equipment and supplies that have been made **sterile** (completely free of microbes) to minimize the person's risk of infection. Sterile technique is always used in operating rooms and labor and delivery suites because the procedures performed in these areas interrupt the patient's first line of defense against infection (that is, intact skin and mucous membranes). All instruments, supplies, and the gloved hands that handle them must remain sterile so that microbes are not introduced into the body. (Remember that many microbes that are quite harmless on a person's intact skin can be very dangerous if they are introduced into the body, for example, through a surgical incision.) Sterile technique is also frequently used at the patient's bedside in advanced care settings. Procedures such as inserting urinary catheters, giving injections, starting intravenous lines, and changing sterile dressings all require the use of sterile technique to protect the person from getting an HAI.

STERILE EQUIPMENT AND SUPPLIES

METHODS OF STERILIZING EQUIPMENT AND SUPPLIES

Items used in health care settings are grouped into three categories, depending on the risk of infection associated with each item (Table 2-1). These categories are used to determine the level of disinfection or sterilization an item requires. Critical items penetrate the skin or are placed in body cavities that are normally free of microbes and therefore carry a very high risk for causing infection. Semi-critical items come into contact with the mucous membranes and carry a moderate risk of causing infection. Noncritical items come into contact with intact skin and carry a lower risk of causing infection.

High-level disinfection and sterilization are used when it is necessary to ensure that an object is completely free of microbes (that is, for items in the critical and semi-critical categories). **High-level**

Table 2-1 Classification of Medical Equipment According to Disinfection or Sterilization Requirements

CATEGORY	DESCRIPTION	EXAMPLES
I: Critical	Items in this category penetrate the skin or are placed into body cavities that are normally free of microbes. These items must be completely free of microbes and endospores. Sterilization is required.	• Surgical instruments and supplies • Vascular and urinary catheters • Implants • Needles
II: Semi-critical	Items in this category come into contact with mucous membranes or non-intact skin. These items must be completely free of microbes, except for endospores. High-level disinfection is required.	• Respiratory therapy equipment • Anesthesia equipment • Endoscopes (colonoscopes, bronchoscopes, gastroscopes) • Vaginal speculums
III: Noncritical	Items in this category come into contact with intact skin but not mucous membranes. General disinfection is required.	• Blood pressure cuffs • Bed linens • Bedside tables • Crutches • Food utensils • Bed frames • Floors • Walls

disinfection involves using a very strong chemical to kill microbes on items that will come in contact with a person's skin or mucous membranes. High-level disinfection can also be achieved by boiling an item for 10 to 20 minutes. High-level disinfection kills almost all microbes except for some bacterial endospores. (Some types of bacteria can surround themselves with a protective shell, called an **endospore,** and enter a state of inactivity. If the inactive bacteria's best growing conditions become available, the bacteria will become active again. Because of their protective endospores, these types of bacteria are very difficult to kill.)

Sterilization is the most complete method of killing all microbes; it kills microbes as well as endospores. Items that pierce the skin or that will be placed inside a person's body, such as surgical instruments, needles, and urinary catheters, must be made sterile before use. Items that will be used on non-intact skin, such as dressings, must also be sterile. Instruments and equipment are usually sterilized on-site using heat (steam under pressure) or strong chemicals (Fig. 2-1). Prepackaged sterile items are sterilized by the manufacturer using ionizing radiation.

Figure 2-1
Most facilities have a department that is responsible for sterilizing reusable equipment, such as surgical instruments. Here, a technician uses an autoclave, a device that sterilizes equipment and instruments using pressurized steam.

You may be responsible for high-level disinfection or sterilization of reusable items at the facility where you work. The chemicals and equipment used to disinfect and sterilize instruments and other equipment may vary greatly from facility to facility. The length of time it takes to sterilize or disinfect an item might also vary, depending on the chemicals and equipment used. However, some basic guidelines for high-level disinfection and sterilization apply, no matter what chemicals or equipment are used (Guidelines Box 2-1). If disinfecting or sterilizing instruments or equipment is in your job description, your employer will teach you how to properly use the equipment or chemicals used for high-level disinfection and sterilization at your facility.

PACKAGING OF STERILE EQUIPMENT AND SUPPLIES

Equipment and supplies used for sterile procedures come packaged in many different ways. Sterile supplies that are packaged by the manufacturer are usually wrapped in paper and then in plastic. The plastic wrapper helps to protect the item from moisture, dust, dirt, insects, and other environmental factors that can affect the item's sterility. Items that are sterilized on-site may be contained in either a fabric or paper wrapper.

The paper or fabric wrapper may be a large square sheet that is wrapped around an item or a tray of instruments "envelope style." An **envelope-wrapped** package allows the user to open one corner at a time, creating a sterile field to open additional supplies onto and to work from. Alternatively, small items may be packaged in combination plastic and paper wrappers known as **peel pouches** or **sterilization pouches**. The user simply peels the two sides of the pouch apart and carefully drops the item onto the sterile field.

Commercially prepared items have writing on the outside of the packaging indicating that the contents are sterile. Items that are sterilized on-site have a chemical indicator strip on the outside of the package. The indicator changes color after being processed. Inside the package, an additional indicator strip shows that the sterilizing agent penetrated the packaging. You must check to make sure that both the outer and inner indicator strips have changed color completely. If either indicator has not changed, you must assume that the package is not sterile. Equipment and

Guidelines Box 2-1 Guidelines for High-Level Disinfection and Sterilization of Reusable Items

WHAT YOU DO	WHY YOU DO IT
Before sterilizing or disinfecting any item, clean it thoroughly to remove residue (such as blood or tissue) using the cleaning solution specified by your facility.	If residue is left on an item, it prevents the sterilizing agent or disinfectant from contacting the surface of the item. If steam sterilization is used, residue can become "baked" onto the surface of the item. As a result, the item cannot be considered sterilized or disinfected, and it cannot be used in a procedure that requires sterile technique.
Items that are to be soaked in a high-level disinfecting liquid must be dried thoroughly before placing them in the liquid.	Water left on the surface of an item (or inside a hollow item) dilutes the disinfecting solution. After it has been diluted, the chemical loses its effectiveness and may not be able to kill all the microbes on the item.
Items that have been soaked in a high-level disinfecting liquid must be thoroughly rinsed with sterile water before being used.	The chemicals used in high-level disinfecting liquids may be highly toxic to skin and other tissues.
Items with hollow passageways (such as tubing or suction tips) or that are made of porous materials (such as rubber or fabric) require a longer sterilizing cycle in a steam sterilizer.	Items with hollow passageways and porous items have more surface area than solid items. Therefore, a longer cycle is necessary to make sure the steam reaches all of the surface area.
Wrapped items that have been steam sterilized must be allowed to dry and cool before they are handled.	The steam makes the wrapper wet. If a wet wrapper is placed on a non-sterile surface, microbes can travel up through the moisture, contaminating the sterile items inside the wrapper. This is known as **strike-through contamination**. The items must be completely cool before they are handled because placing warm items on a cold surface (such as a metal table) can cause condensation (sweating), which can in turn make the wrapper wet, increasing the risk for strike-through contamination.

supplies that are not sterile should not be used when performing a procedure that requires sterile technique.

MAINTAINING STERILITY OF STERILE EQUIPMENT AND SUPPLIES

After equipment and supplies have been packaged and sterilized, certain steps must be taken to make sure the items remain sterile. You may be responsible for restocking sterile supplies and helping to maintain their sterility.

Years ago, an item was only considered sterile for a certain amount of time after processing. Expiration dates were stamped on the packaging, and the package was either discarded or reprocessed when the expiration date arrived. This was an expensive, time-consuming practice. Although date stamps are still used on sterile packages, these dates represent the date the package was sterilized and other information used for

Figure 2-2
Proper handling and storage of sterile packages is necessary to ensure that the items inside remain sterile. Sterile packages must be kept away from moisture, heat, dirt, and pests. The wrapper on a sterile package should be inspected for rips and tears before use.

tracking and quality control purposes. With the development of better packaging materials and processes, sterility is now “event related,” rather than “time related.” In other words, as long as a sterile package is stored properly and the packaging material is not damaged, an item will remain sterile (Fig. 2-2). However, if a sterile package is placed on a wet surface, dropped onto the floor, or torn, the item inside can become unsterile the very same day it was sterilized. Guidelines for maintaining the sterility of packaged items are given in Guidelines Box 2-2.

USING STERILE TECHNIQUE

When performing a procedure that requires sterile technique, you must ensure that your equipment, supplies, and work area are sterile to begin with and that they remain that way throughout the entire procedure. The basic principles that health care workers follow to maintain sterility when using sterile technique are given in Guidelines Box 2-3.

Care Alert!

FAILURE to observe proper sterile technique when you are performing a procedure that requires sterile technique puts your patient at risk for a serious, possibly even fatal, infection.

CREATING AND MAINTAINING A STERILE FIELD

To perform a sterile procedure, you must first learn how to create a sterile field and to work within this field without contaminating anything. As mentioned earlier, many sterile packages can be opened in a way that allows the wrapping to become the sterile field. Other times, you will need to cover a tray or an over-bed table with a **sterile drape** (a small paper or fabric towel that has been sterilized) to create the sterile field. Procedure 2-1 describes how to open a sterile package that has been wrapped envelope-style to create a sterile field. Procedure 2-2 describes how to create a sterile field using a sterile drape.

Guidelines Box 2-2 Guidelines for Maintaining the Sterility of Packaged Items

WHAT YOU DO	WHY YOU DO IT
Store sterile items in a cool, dry, well-ventilated area that is free of insects, rodents, and other pests.	Heat and moisture can damage the packaging material, affecting the sterility of the contents inside. Insects, rodents, and other pests can chew through the package or contaminate the outside of the package.
Inspect packages for evidence of tears, holes, worn areas, and water spot discolorations and discard or reprocess these items.	Tears, holes, worn areas, or water spots indicate that the packaging material is damaged and the contents inside are most likely no longer sterile. These items should be removed from the supply area where sterile items are kept so they are not accidentally used during patient care.
Store sterile items with other sterile items.	Storing sterile items with non-sterile items can introduce microbes into the environment. In addition, sterile items must be stored under certain conditions to maintain their sterility.
Rotate sterile items by placing more recently purchased or processed items behind or under older ones.	Although sterility is not a time-related event, it is good practice to use older supplies before newer ones.
Handle sterile packages with clean hands.	Handling sterile packages with clean hands helps to minimize the number of microbes on the outside of the packages.
Do not place sterile packages on dirty surfaces or on the floor.	Keeping sterile packages away from dirty surfaces helps to minimize the number of microbes on the outside of the packages.
Do not place sterile packages on wet surfaces.	Moisture can penetrate the packaging material, affecting the sterility of the item inside.
Do not return to the supply area any unused sterile packages that have been taken to a patient's room.	After a sterile package has been placed in a patient's room, the items inside are considered contaminated and cannot be used on another patient.

After creating a sterile field, you may need to open additional supplies onto the field. When adding supplies to a sterile field, make sure to follow the guidelines for using sterile technique (see Guidelines Box 2-3). Some items are wrapped envelope style, and others are packaged in a peel pouch. Procedure 2-3 explains how to add envelope-wrapped sterile supplies to a sterile field. Procedure 2-4 describes how to add sterile supplies that are contained in a peel pouch to a sterile field. Procedure 2-5 describes how to pour liquid into a sterile container.

(Text continues on page 28)

Guidelines Box 2-3 Guidelines for Using Sterile Technique

WHAT YOU DO	WHY YOU DO IT
The work surface where a sterile field will be created (for example, an over-bed table) should be clean and dry.	Moisture on the work surface could penetrate the sterile paper or cloth drape, contaminating it.
Create the sterile field as close as possible to the time of the procedure.	Keeping a sterile field set up for an extended period of time increases the chance that dust or other airborne contaminants will settle on it and contaminate it.
Do not cover a sterile field for use at a later time.	It is impossible to remove a covering without risking contamination of the sterile field.
Open envelope-wrapped sterile packages by folding the first flap away from you and the last flap toward you.	Unfolding the flaps in this order prevents you from reaching across the sterile field and contaminating it.
Avoid holding an object that is not sterile over a sterile field.	If you hold an object that is not sterile over the sterile field, you could contaminate the field. Remember that the outside of a sterile package is not sterile (just the inside is sterile).
Avoid reaching across a sterile field with your bare hands.	Small flakes of skin or hair can fall from your hands and lower arms onto the sterile field below and contaminate it.
Avoid talking, coughing, and sneezing over a sterile field. Use a mask if the procedure requires it.	Droplets from the nose and mouth can fall onto the sterile field and contaminate it.
Keep the front of your uniform at least 12 inches away from the sterile field.	Small flakes of skin, hair, or dust can fall from your uniform onto the sterile field and contaminate it. Standing 12 inches away from the sterile field also reduces the risk of contaminating the sterile field through direct contact with your uniform.
Verify that sterile items are sterile before using them by checking both the inner and outer indicator strips (on packages processed on-site) or by reading the statement on the package (on commercially prepared packages). Also, before opening an item onto a sterile field, check the wrapper for tears, holes, worn areas, and water spot discolorations, which could indicate that the item is no longer sterile.	Any piece of equipment or supply that is used during a procedure that requires sterile technique must be sterile, or the patient will be put at risk for infection. If you open an item that is not sterile onto a sterile field, you will contaminate the entire field. The sterile field will need to be discarded, and you will have to create a new one.
Allow only a sterile item to touch another sterile item or area.	If an item that is not sterile touches a sterile item or area, the sterile item or area is considered contaminated. If contamination occurs, the sterile item, the sterile field, or both will need to be discarded, and you will need to start over again.

Guidelines Box 2-3 Guidelines for Using Sterile Technique (*Continued*)

WHAT YOU DO	WHY YOU DO IT
When opening supplies onto a sterile field, stand back from the sterile field to unwrap the item and then step forward to deposit the item onto the sterile field.	If you fumble while opening the package, you could contaminate the item inside. If you then accidentally drop the item onto your sterile field, you will have contaminated the entire sterile field, and you will need to start over again.
Avoid spilling liquids on the sterile field.	The liquid will penetrate the sterile paper or cloth drape and come into contact with the surface underneath, which is not sterile. This can result in strike-through contamination.
When working within a sterile field, remember to keep your sterile items in the center of your sterile field. The outer 1 inch of the field is not considered sterile, and any item that comes in contact with the edge of the field is considered contaminated.	The edges of the sterile field come in contact with the work surface and your ungloved hands (while you are opening the sterile drape). Your ungloved hands and the work surface are not sterile, so the edges of the sterile field are not sterile.
Keep sterile items above the level of your waist or the work surface.	You must keep sterile items in your line of sight at all times so you can be sure that you have not accidentally contaminated them (by touching the sterile item to an item or area that is not sterile). It is easier to keep items in your line of sight if you keep them higher than the level of your waist or the work surface.
Do not turn away from a sterile field or leave a sterile field unattended.	You must keep the sterile field in your line of sight at all times so you can be sure it has not been contaminated. If you turn away from the sterile field or leave it unattended, another person (for example, the patient) could touch the sterile field and contaminate it, and you would have no way of knowing that contamination has occurred.
If there is any doubt about the sterility of an item, consider it contaminated. ("When in doubt, throw it out!") • If you think that you may have touched something that is not sterile with your sterile gloves, remove your gloves and replace them. • If you think you may have touched something that is sterile with an item that is not sterile, consider the sterile item contaminated and discard it. Wrapped sterile items that are dropped on the floor should also be considered contaminated and must be discarded. • If you have touched the sterile field with a glove or item that may have been contaminated, consider the entire field contaminated, throw it away, and open new supplies.	The use of a contaminated item during a procedure that requires sterile technique puts the patient at high risk for infection. It is better to be safe than sorry.

WORKING WITHIN THE STERILE FIELD

After the sterile supplies are all opened onto the sterile field, you will have to arrange them so they can be used. If you are assisting someone with the procedure, you may need to hand the supplies to that person. In some facilities, you may be required to use sterile **transfer forceps** to move items around within the sterile field (Fig. 2-3). After they are sterilized, transfer forceps are usually packaged in a peel pouch. (Soaking transfer forceps in liquid disinfectant is not an effective way of sterilizing them.) When using transfer forceps, take care to avoid touching the tip to anything that is not sterile.

Transfer forceps can be awkward to use, and their use can lead to accidental contamination of the sterile field. For this reason, many people prefer to put on sterile gloves so they can use their hands to move items around on the sterile field (Fig. 2-4). Sterile gloves come in many sizes and types. If you are allergic to latex, you should make sure you use sterile gloves that are latex free.

As always, you must wash your hands before putting on your gloves. (Depending on the procedure, you may be required to perform a special surgical scrub before putting on your gloves.) Each pair of gloves comes packaged individually. As with other packaged sterile items, you should inspect the outer package for signs of damage before opening it. You should also inspect the gloves for tears

Figure 2-3
Transfer forceps may be used to move items around on a sterile field. The ringed handles are used to separate and close the grasper tip at the end of the forceps. The handles of the forceps are not sterile (because you have touched them with ungloved hands) and must be kept away from the sterile field. The tip of the forceps must remain sterile throughout the procedure.

Figure 2-4
Sterile gloves allow you to use your fingers to move items around on a sterile field. The gloves must remain sterile throughout the procedure. When you are wearing sterile gloves, remember to keep your gloved hands above waist level and in your line of sight at all times. If you touch an item that is not sterile with your gloved hands, the gloves are considered contaminated, and you must discard them and put on a new pair.

and holes after you put them on, before you touch the sterile field. A glove with a hole in it is not sterile. After putting on the sterile gloves, make sure to follow the guidelines for using sterile technique to avoid contaminating your gloves or the sterile field (see Guidelines Box 2-3). Procedure 2-6 describes how to put on and remove sterile gloves.

When using sterile gloves, remember that it is only your gloves that are sterile, not your arms or the front of your uniform. Stand back from the sterile field and keep your arms extended to avoid accidentally contaminating the sterile field. If you accidentally touch something that is not sterile with your gloved hand, stop immediately and back away from the sterile field. If you had a sterile item in your hand when you contaminated your glove, bring it with you; do not place it back on the sterile field. You should remove your gloves and put on another sterile pair to continue with your procedure.

SUMMARY

- Health care–associated infections (HAIs) can have serious consequences. In some situations, to prevent a patient from developing an HAI, it is necessary to ensure that the equipment, work surface, supplies, and hands of the health care workers performing the procedure are completely free of microbes. In these situations, sterile technique is used.
  - Sterile technique involves creating a sterile field (a microbe-free area to work) and using equipment and supplies that have been made sterile (completely free of microbes) to minimize the patient's risk of infection.
  - Sterile technique is used when a patient must undergo an invasive procedure (one that involves breaking the skin or inserting equipment into the body) and when the patient has a medical condition that causes breaks in the skin.
  - Sterile technique is only as effective as the person using it. In other words, when performing a procedure that requires sterile technique, you must conscientiously follow all procedures and guidelines to ensure that your work surface, equipment, supplies, and hands remain microbe free. Otherwise, you are putting your patient at risk for a serious, potentially even fatal, infection.
- Items used in health care settings are grouped into three categories, depending on the risk of infection associated with each item. These categories are used to determine the level of disinfection or sterilization an item requires.
  - Category I (critical) items must be free of all microbes and endospores and are processed using heat (steam under pressure), strong chemicals, or ionizing radiation. These items penetrate the skin or are placed into body cavities that are normally free of microbes.
  - Category II (semi-critical) items must be free of all microbes except for endospores and are processed using high-level disinfection. These items come into contact with mucous membranes or broken skin.
  - Category III (noncritical) items may contain a minimal number of microbes and are processed using general disinfection. These items only come in contact with intact skin.
- Supplies and equipment used for sterile procedures may be processed and packaged in the health care facility or by the manufacturer.
  - Packaging material for sterile items must protect the item from dirt, holes, moisture, and pests.
  - Sterile supplies must be handled and stored properly to maintain the sterility of the items inside. Sterility is event related rather than time related.
- Creating a sterile field provides a sterile area where other sterile supplies can be opened and moved around when doing a procedure requiring sterile technique.
  - Sterile supplies must be opened in a manner that does not contaminate them or the sterile field.
  - Wearing sterile gloves allows you to arrange and use sterile supplies within the sterile field.

CHAPTER

2 PROCEDURES

PROCEDURE 2-1

Creating a Sterile Field from an Envelope-Wrapped Package

WHY YOU DO IT A sterile field gives you a microbe-free area in which to work. Packages that are wrapped "envelope style" can be opened so that the inner portion of the wrapper becomes the sterile drape.

1. Gather needed supplies:
   - Envelope-wrapped package that will form a sterile drape
   - Disinfectant
   - Paper towels
2. Use the disinfectant and paper towels to disinfect the work surface (for example, the over-bed table) and dry it thoroughly. Position the over-bed table at a comfortable working height.
3. Wash your hands.
4. Explain the procedure to the patient. Explain the importance of avoiding contamination of the sterile field. Ask the patient to avoid touching the sterile field.
5. Verify that the item inside the envelope-style package is sterile by checking the outside of the package.
   - a. If the package was processed on-site, check the chemical indicator on the outside of the package to make sure that it has changed.
   - b. If the package was processed by the manufacturer, look for the statement on the outside of the package that indicates that the contents are sterile.
   - c. Check the package for tears, holes, worn areas, and water spot discolorations. These findings indicate that the item inside the package is no longer sterile.
6. If there is any indication that the items inside the package are not sterile, discard the package and obtain a new one. Otherwise, continue with the procedure.
7. Place the package on the surface of your work area, in the center. Make sure the package is positioned so that the first flap will open away from you.
8. Touching only the outer corner of the first flap, open the package away from you by reaching around (not over) it. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package. (If the flap folds back onto the package, the place where your fingers touched the flap will come in contact with the item inside the package, contaminating it.)

Step 8 Reach around the package (not over it) to unfold the first flap away from you.

9. Touching only the outer corner of the left flap, open it to the left. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.

Step 9 Open the left flap to the left.

10. Touching only the outer corner of the right flap, open it to the right. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.

Step 10 Open the right flap to the right.

11. Touching only the outer corner of the last flap, open it toward you. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.

Step 11 Open the last flap toward you.

PROCEDURE 2-2

Creating a Sterile Field Using a Sterile Drape

Watch & Learn

WHY YOU DO IT A sterile field gives you a microbe-free area in which to work. If you do not have an envelope-wrapped sterile package that allows you to create a sterile drape from the inner portion of the wrapper, you will need to create a sterile field using a sterile paper or fabric drape.

1. Gather needed supplies:
- Package containing sterile drape
- Disinfectant
- Paper towels

2. Use the disinfectant and paper towels to disinfect the work surface (for example, the over-bed table) and dry it thoroughly. Position the over-bed table at a comfortable working height.

(continued)

3. Wash your hands.
4. Explain the procedure to the patient. Explain the importance of avoiding contamination of the sterile field. Ask the patient to avoid touching the sterile field.
5. Verify that the sterile drape inside the package is sterile by checking the outside of the package.
   a. If the package was processed on-site, check the chemical indicator on the outside of the package to make sure that it has changed.
   b. If the package was processed by the manufacturer, look for the statement on the outside of the package that indicates that the contents are sterile.
   c. Check the package for tears, holes, worn areas, and water spot discolorations. These findings indicate that the item inside the package is no longer sterile.
6. If there is any indication that the sterile drape inside the package is not sterile, discard the package and obtain a new one. Otherwise, continue with the procedure.
7. Open the package containing the drape.
   a. If the package is wrapped envelope style, place the package flat on the clean work surface and open it in the manner described in Procedure 2-1.
   b. If the package is a peel pouch, place the package flat on the clean work surface. Peel the top flap back while holding the bottom flap steady until the package is flat against the work surface. Make sure to open the package fully so that the top flap of the package does not fold back down over the sterile drape. (If the top flap folds back down over the sterile drape, the place where your fingers touched the package will come in contact with the drape inside the package, contaminating it.)

Step 7b Peel the upper portion of the peel pack back to expose the sterile drape inside.

8. Look for the edge of the sterile drape that is folded back to create a small area for you to grasp.
9. Grasp the edge of the drape with your thumb and index finger and lift the sterile drape straight up as you step back. Do not allow the sterile drape to drag across the wrapper as you lift it up.

Step 9 Grasp the edge with your thumb and index finger and lift straight up.

10. Hold the sterile drape away from your body and allow it to unfold. Do not shake the

Step 10 Hold the sterile drape away from your body and allow it to unfold completely.

sterile drape. Grasp the other top corner of the sterile drape with the thumb and index finger of your other hand and allow the sterile drape to unfold completely. Make sure that the drape does not touch your arms, your uniform, or other surfaces and make sure to only hold the sterile drape at the edges.

11. When the sterile drape is unfolded completely, turn carefully toward the work surface that you plan to drape. Holding the sterile drape up high, place the sterile drape across the work surface, starting with the edge of the work surface that is farthest away from you. This way, you do not reach across the sterile field or risk moving the front of your body too close to it.

Step 11 Place the sterile drape across the work surface that you plan to drape, starting with the edge farthest away from you.

PROCEDURE 2-3

Adding Envelope-Wrapped Sterile Items to the Sterile Field

WHY YOU DO IT Additional sterile items may need to be added to the sterile field. Following the proper procedure for adding envelope-wrapped sterile items to the sterile field prevents contamination of the sterile item, as well as the sterile field.

---

1. Gather needed supplies:
- Envelope-wrapped package that will form a sterile drape OR package containing a sterile drape (to create the sterile field)
- Envelope-wrapped package containing sterile item to be added to the sterile field

2. Create a sterile field (see Procedures 2-1 and 2-2).

3. Verify that the item inside the package is sterile by checking the outside of the package.

a. If the package was processed on-site, check the chemical indicator on the outside of the package to make sure that it has changed.

b. If the package was processed by the manufacturer, look for the statement on the outside of the package that indicates that the contents are sterile.

c. Check the package for tears, holes, worn areas, and water spot discolorations. These findings indicate that the item inside the package is no longer sterile.

4. If there is any indication that the item inside the package is not sterile, discard the package and obtain a new one. Otherwise, continue with the procedure.

5. Stand back from the sterile field and hold the bottom edge of the package in one hand. Make sure the package is positioned so that the first flap will open away from you.

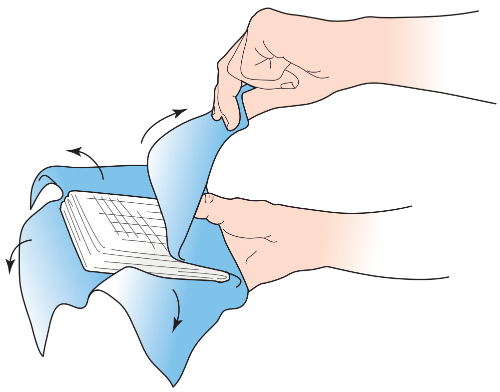
6. Touching only the outer corner of the first flap with your other hand, open it away from you by reaching around (not over) the package. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package. (If the flap folds back onto the package, the place where your fingers touched the flap will come in contact with the item inside the package, contaminating it.)

(continued)

7. Touching only the outer corner of the left flap, open it to the left. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.

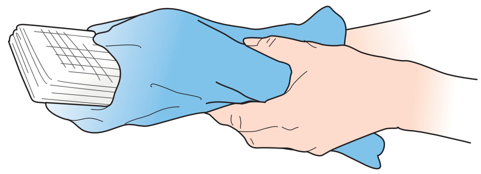
8. Touching only the outer corner of the right flap, open it to the right. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.

9. Touching only the outer corner of the last flap, open it toward you, covering the hand holding the item. Pull the flap firmly, straightening out the material so that the flap does not fold back onto the package.



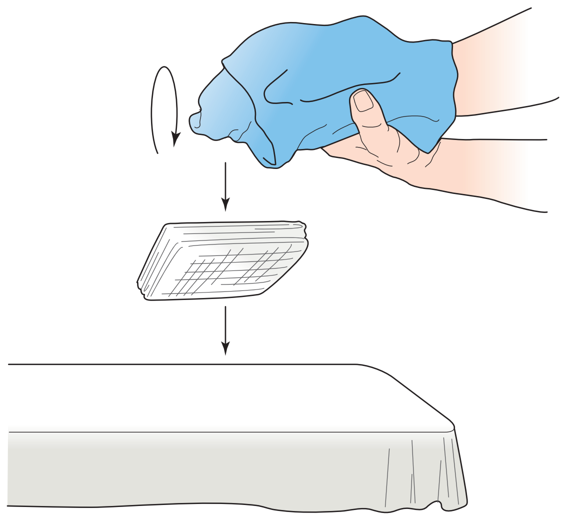
Step 9 Open the last flap toward you, allowing it to cover your wrist.

10. Holding the item securely, gather the corners of all four flaps around your wrist with your other hand so that your hand and wrist are covered. Avoid touching the inside of the wrapper.



Step 10 Gather the flaps around your hand and wrist.

11. Step toward the sterile field. Extend your hands, holding the item about 6 inches above the sterile field. Turn your hands over and gently drop the item out of the wrapper onto the center of the sterile field. (Remember that the outer 1 inch of the field is considered contaminated.)



Step 11 Extend your arm toward the sterile field and turn your hands over, gently releasing the item onto the sterile field.

12. Dispose of the wrapper in a facility-approved waste container.

PROCEDURE 2-4

Adding Sterile Items That Are Contained in a Peel Pouch to a Sterile Field

WHY YOU DO IT Additional sterile items may need to be added to the sterile field. Following the proper procedure for adding sterile items that are contained in a peel pouch to the sterile field prevents contamination of the sterile item, as well as the sterile field.

---

1. Gather needed supplies:
   - Envelope-wrapped package that will form a sterile drape or package containing a sterile drape (to create the sterile field)
   - Sterile item contained in a peel pouch to be added to the sterile field
2. Create a sterile field (see Procedures 2-1 and 2-2).
3. Verify that the item inside the package is sterile by checking the outside of the package.
   - **a.** If the package was processed on-site, check the chemical indicator on the outside of the package to make sure that it has changed.
   - **b.** If the package was processed by the manufacturer, look for the statement on the outside of the package that indicates that the contents are sterile.
   - **c.** Check the package for tears, holes, worn areas, and water spot discolorations. These findings indicate that the item inside the package is no longer sterile.
4. If there is any indication that the item inside the package is not sterile, discard the package and obtain a new one. Otherwise, continue with the procedure.
5. Stand back from the sterile field. Grasp the separate edges of the peel pouch between your thumbs and the gently folded fists of each hand.
6. Start pulling the edges of the peel pouch away from each other, separating the pouch along the edges. If the peel pouch tears down the center instead of separating along the edges, the item is considered contaminated, and you must discard it.

Step 6 Grasp the separate edges of the peel pouch and begin peeling them apart.

7. As you open the peel pouch, hold it so that one side becomes the bottom and the other becomes the top. The sterile item will be lying on the bottom flap until the package is opened completely.

Step 7 Hold the peel pouch as you are opening it so that one side becomes the bottom.

(continued)

8. Step toward the sterile field. Hold the peel pouch over the sterile field at about a height of 6 inches. Flip the item onto the center of the sterile field by bringing the hand that is holding the bottom flap down and back while you bring the hand that is holding the upper flap up and over. (Remember that the outer 1 inch of the field is considered contaminated.) Do not allow the item to touch the edges of the peel pouch, which are also considered contaminated.

Step 8 Flip the item out of the peel pouch onto the sterile field.

9. Dispose of the peel pouch in a facility-approved waste container.

PROCEDURE 2-5

Pouring a Sterile Solution into a Sterile Container

WHY YOU DO IT Sterile solutions (such as medications or irrigation fluids) are often used during sterile procedures. Following the proper procedure for pouring a sterile solution into a sterile container on the sterile field prevents contamination of the sterile solution, as well as the sterile field.

---

1. Gather needed supplies:
   - Envelope-wrapped package that will form a sterile drape or package containing a sterile drape (to create the sterile field)
   - Envelope-wrapped package containing small sterile basin or peel-pack package containing a sterile cup (such as a sterile specimen cup)
   - Bottle of sterile solution
2. Create a sterile field (see Procedures 2-1 and 2-2).
3. Add the sterile basin or cup to the sterile field (see Procedures 2-3 and 2-4). If necessary, use transfer forceps or sterile gloves to position the sterile basin or cup right side up, close to the outside edge of the sterile field. (Remember that the outer 1 inch of the field is considered contaminated.)
4. Carefully check the label on the bottle of sterile solution. Make sure it is the correct solution and the correct strength. Also note the expiration date or "use by" date.
   a. **Multiple-use bottles.** Antibacterial solutions (such as Betadine, alcohol, hydrogen peroxide, or prepping solution) are often supplied in multiple-use bottles. Multiple-use bottles should be labeled with the time and date they were opened for the first time.
   b. **Single-use bottles.** Normal saline and sterile water are usually supplied in single-use bottles. Single-use bottles should not be recapped for use later. Follow your facility policy.
5. Check the bottle for cracks, a broken lid seal, and discoloration of the solution. If there is any indication that the sterile solution is not sterile, discard the bottle and obtain a new one. Otherwise, continue with the procedure.

6. Open the bottle of sterile solution. Place the cap on a clean surface with the inside of the cap facing up. Be careful not to touch the inside of the cap.

Step 6 Place the cap on a clean surface with the inside of the cap facing up.

7. If the solution is contained in a multiple-use bottle that has been opened previously, pour a small amount of the solution into the waste container to cleanse the lip of the bottle. This procedure is known as "lipping."

8. Without reaching over the sterile field, hold the tip of the bottle about 4 to 6 inches above the sterile basin or cup and carefully pour the required amount of solution into it. Avoid splashing liquid onto the sterile drape.

Step 8 Carefully pour the required amount of solution into the sterile basin or cup.

9. If solution remains in a multiple-use bottle, recap the bottle, being careful to touch only the outside of the cap. Dispose of a single-use bottle or an empty multiple-use bottle in a facility-approved waste container.

PROCEDURE 2-6

Putting On and Removing Sterile Gloves

WHY YOU DO IT Sterile gloves are worn when working within a sterile field and when performing sterile procedures. Following the proper procedure for putting on sterile gloves prevents contamination of the sterile gloves. Following the proper procedure for taking off sterile gloves prevents you from contaminating your skin or uniform.

Putting On Sterile Gloves

1. Gather needed supplies:
   - Sterile gloves in the appropriate size
2. Wash your hands.
3. Verify that the gloves inside the package are sterile by checking the outside of the package.
   - **a.** Look for the statement on the outside of the package that indicates that the contents are sterile.
   - **b.** Check the package for tears, holes, worn areas, and water spot discolorations. These findings indicate that the gloves inside the package are no longer sterile.
4. If there is any indication that the gloves inside the package are not sterile, discard the package and obtain a new one. Otherwise, continue with the procedure.
5. Open the outer wrapper by peeling it apart to expose the inner package. Remove the inner package, touching only the outside of it.

(continued)

Step 5 Remove the outer wrapper.

6. Dispose of the outer wrapper in a facility-approved waste container. Place the inner package on a clean, dry surface.

Step 6 Place the inner package on a clean, dry surface.

7. Open the inner package by carefully grasping the center flaps and pulling them open to the sides. Do not touch the inside of the package. Pull the flaps firmly, straightening out the material so that the flaps do not fold back onto the gloves. If the flaps fold back onto the gloves, the places where your fingers touched the flaps will come in contact with the gloves, contaminating them.

Step 7 Open the center flaps to the sides.

8. Fold the lower flap underneath the inner package. This helps hold the package open for you. Note that the gloves are positioned with the fingers pointing away from you and the cuffs toward you. The gloves are labeled *R* and *L* for the right and left hands, respectively.
9. Using the thumb and index finger of your nondominant hand, grasp the folded edge of the cuff on the glove for the dominant hand. Do not touch the inside of the package.

Step 9 Grasp the cuff of the glove that you will wear on your dominant hand.

10. Lift the glove straight up. (Do not slide it across the package.) Take one step backward. Avoid letting the glove touch anything.
11. Holding your hands above waist level, carefully insert your dominant hand, palm up, into the glove and slowly pull the glove on. Leave the cuff folded down. (Your bare fingers only come into contact with the part of the sterile glove that will contact bare skin.)

Step 11 Insert your hand into the glove, palm up.

12. With your gloved hand, reach toward the remaining glove. Holding your thumb up and out of the way, slide your gloved fingers under the cuff of the remaining glove.

Step 12 Slide your gloved fingers under the cuff of the other glove.

13. Lift the glove straight up. (Do not slide it across the package.) Take one step backward. Avoid letting the glove touch anything.
14. Holding your hands above waist level, carefully insert your nondominant hand, palm up, into the glove and slowly pull on the glove. Do not allow the thumb of your dominant hand to touch the skin of your nondominant hand as you are putting on the glove.

Step 14 Insert your hand into the glove, palm up, being careful not to contaminate your gloved hand.

15. Keeping your fingers underneath the cuff, pull the cuff up over your wrist. Be careful not to touch the skin on your arm with your gloved hand.

Step 15 Pull the cuff up over your wrist.

16. Insert the gloved fingers of your nondominant hand under the cuff of the glove on your dominant hand (which is still folded). Pull the cuff up over your wrist. (Your gloved fingers only come into contact with the part of the sterile glove that did not contact bare skin.)
17. Adjust the gloves on both hands, touching only sterile areas. Pull the fingers of the gloves down so that excess glove material is not wrinkled over your fingertips.

(continued)

Step 17 Adjust the gloves, touching only sterile areas.

Removing Sterile Gloves

1. With one gloved hand, grasp the other glove at the palm and pull the glove off your hand. Keep the glove you have removed in your gloved hand. (Think "glove to glove.")

Step 1 "Glove to glove."

2. Slip two fingers from the ungloved hand underneath the cuff of the remaining glove at the wrist. Remove that glove from your hand, turning it inside out as you pull it off. (Think "skin to skin.")

Step 2 "Skin to skin."

3. Dispose of the soiled gloves in a facility-approved waste container.
4. Wash your hands.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. The method used to clean pathogens from inanimate objects, such as floors, beds, tables, blood pressure cuffs, and other objects, is referred to as:
   a. Sanitization
   b. High-level disinfection
   c. Sterilization
   d. General disinfection

2. Which of the following is NOT an effective method of killing endospores?
   a. Steam under pressure
   b. Chemicals
   c. Boiling water
   d. Ionizing radiation

3. Items that penetrate a person's skin or are placed in body cavities that are normally free of microbes, such as the vascular system, belong to which category?
   a. Category I
   b. Category II
   c. Category III
   d. Semi-critical

4. Chemical indicators are used to indicate whether an item has been exposed to a sterilizing agent. You should look for the chemical indicator:
   a. On the outside of the package
   b. On the inside of the package
   c. On the item inside the package
   d. On both the outside and inside of the package

5. How long is a sterile package considered sterile?
   a. Until the date marked on the package
   b. As long as the packaging remains intact
   c. Forever
   d. For 2 weeks after being processed

6. When opening an envelope-wrapped sterile package, you should:
   a. Unwrap the first flap toward you
   b. Unwrap the first flap to the side
   c. Unwrap the first flap away from you
   d. Unwrap both side flaps at the same time

7. How far back from a sterile field should you stand?
   a. 6 inches
   b. 18 inches
   c. 3 feet
   d. 12 inches

STOP and Think!

1. You are working at the bedside of Mrs. Thomas, preparing to assist the nurse with a sterile dressing change. You have created a sterile field on the over-bed table, and you are arranging the supplies for the nurse to use. Mrs. Thomas is occasionally a bit disoriented as the result of her pain medication. Suddenly, she reaches up to the field and removes a stack of gauze sponges you have just arranged. What should you do? What steps could you take to prevent this from happening in the future?

2. You are checking supplies on the sterile supply cart and find that you need to restock several items. As you are placing the needed items on the cart, you notice that the outer packaging of some of the items looks water stained. Are these items still sterile? What should you do?

3. You are preparing to set up a sterile field and open sterile supplies for a procedure in a patient's room. You plan to arrange your sterile field on the over-bed table. What must you do to prepare this area before setting up the sterile field?

4. It is time for the sutures to be removed from Mr. Wilson's wound. Kari, the nurse you are working with, is preparing to carry out this procedure using sterile technique. You have assisted her by setting up the sterile field and opening the sterile supplies. You are now wearing sterile gloves and have everything neatly arranged for the procedure. Right before Kari starts to clean Mr. Wilson's wound, you notice a hole in one of your gloves, and you are not sure how it got there. What should you do?

CHAPTER

3

Advanced Wound Care Skills

WHAT WILL YOU LEARN?

Many of your patients will have wounds (an injury that results in a break in the skin and usually the underlying tissues as well). The wound might be the main reason the person is receiving health care. Or the wound might be the result of surgery or some other health care **intervention** (an action taken by the health care team to help the person), such as placement of an intravenous (IV) line. In this chapter, we will discuss the different types of wounds, how wounds heal, and some of the complications that can delay wound healing. We will also discuss how the health care team supports the wound healing process. As a nursing assistant, you will play a very important role in helping to heal your patients' wounds. When you are finished with this chapter, you will be able to:

Many patients in advanced care settings have wounds.

1. Explain common ways of describing wounds.
2. Describe the three phases of wound healing.
3. Explain the difference between first-intention wound healing, second-intention wound healing, and third-intention wound healing.
4. List factors that can affect wound healing.
5. Describe four common complications that can occur with wound healing and state the signs or symptoms of these complications that should be reported to the nurse.
6. Discuss how closing the wound, applying dressings, and inserting drains help support the wound healing process.
7. State observations that you may make when cleaning an incision site and changing a dressing that should be reported to the nurse.
8. Discuss how a wound might affect a person emotionally and describe ways to provide holistic, humanistic care when caring for a patient with a wound.
9. Demonstrate proper technique for cleaning an incision site and changing a sterile dressing.
10. Explain methods used to care for wounds that are healing by second intention.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Intervention	Third-intention wound healing	Evisceration	Sanguineous
Sutures	Pus	Abdominal binder	Serosanguineous
Granulation tissue	Purulent	Approximated	Pin care
Scar tissue	Hematoma	Dressing	Irrigation
Second-intention wound healing	Dehiscence	Bandage	Débridement
First-intention wound healing		Serous	

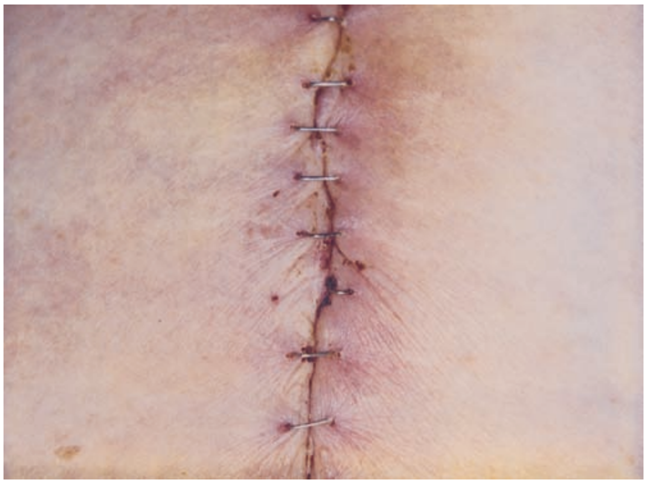
WAYS OF DESCRIBING WOUNDS

There are many different ways health care workers describe wounds. A wound may be described in terms of whether or not the skin is broken:

- **Open wounds** are wounds that break the skin and possibly involve the underlying tissues as well.
- **Closed wounds** are wounds that damage the tissues underneath the skin, but the skin itself is not broken.

A wound may be described in terms of whether it was planned or accidental:

- **Intentional wounds** are the result of a planned surgical or medical intervention. Examples of intentional wounds are surgical incisions and sites where intravenous (IV) lines and other medical devices are inserted into the body through an artificial sterile opening. Intentional wounds are usually created under controlled conditions. Precautions are taken to minimize the risk of infection. The edges of the wound are usually clean and even, and the wound is usually closed with **sutures** (stitches) or staples. Healing is usually uncomplicated (Fig. 3-1A).
- **Unintentional wounds** are the result of an accident. Examples of unintentional wounds are those resulting from falls, motor vehicle crashes, and gun and knife violence. Because unintentional wounds are made by objects that are not sterile, they are usually contaminated with microbes. The edges of the wound are often uneven, making it difficult to close the wound. Healing is often complicated (Fig. 3-1B).



A. Intentional wound

B. Unintentional wound

Figure 3-1
Wounds can be intentional or unintentional. (**A**) Intentional wounds, like this surgical incision, are created under controlled conditions, minimizing the risk of infection. (**B**) Unintentional wounds are the result of an accident and carry a high risk of infection because they are often contaminated with dirt and microbes. This unintentional wound was the result of a fall. (© *Dr. P. Marazzi/Photo Researchers, Inc.*)

A wound may be described in terms of whether or not it is expected to heal completely within a normal time frame:

- **Acute wounds** are expected to heal completely within a few days or weeks. The wound is clean, with even edges that are usually closed with sutures or staples. The risk of infection is minimal.
- **Chronic wounds** are delayed in healing, or they may never heal completely. These wounds often occur in people who have underlying medical conditions that affect the body's ability to heal wounds on its own, such as cardiovascular disease or diabetes. Three of the most common types of chronic wounds are late-stage pressure ulcers, venous (stasis) ulcers, and arterial ulcers on the lower legs (Box 3-1). The edges of these wounds cannot be closed with sutures or staples. The risk of infection is very high.

Finally, a wound may be described in terms of the mechanism of injury (Table 3-1).

WOUND HEALING

The human body is very efficient at healing wounds, especially when the person is healthy. However, several factors may affect a person's ability to heal from a wound, and complications can develop during the wound healing process.

PHASES OF WOUND HEALING

The wound healing process begins as soon as the injury occurs and takes place in three phases: the inflammatory, proliferative, and remodeling phases.

Inflammatory Phase

The body's first priority is to stop the wound from bleeding. The injured blood vessels at the site of the injury constrict (narrow). Platelets (thrombocytes)—one of the three main types of blood cells—stick together to form a temporary plug over the site of the injury. The platelets also release chemicals that react with fibrinogen (a type of protein found in the plasma) to form a more permanent clot.

As soon as a clot has formed, stopping the loss of blood from the circulatory system, the blood vessels dilate (widen) to allow more blood to flow to the injured area. The blood carries oxygen, nutrients, and white blood cells (leukocytes) to the site of the injury. The white blood cells help clean up the area. Some white blood cells surround pathogens and "eat" them in a process called phagocytosis. Others secrete a substance that kills pathogens.

BOX 3-1 Chronic Wounds

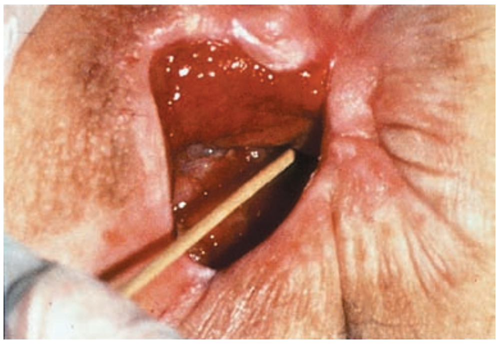
Venous (Stasis) Ulcers

Venous stasis ulcers are seen on the lower legs, usually in the ankle area. They occur when loss of elasticity and decreased efficiency of the valves in the walls of the veins makes it more difficult for the body to return blood to the heart. The blood "pools" in the veins. The pressure of the blood in the veins forces plasma out of the blood vessels and into the surrounding tissues. Swelling occurs, and the skin becomes fragile and inflamed. Eventually, the skin breaks down, resulting in an open sore.

Arterial Ulcers

Arterial ulcers develop on the feet and lower legs. People who have conditions that affect arterial blood flow (such as arteriosclerosis, diabetes, and hypertension) are at risk for developing arterial ulcers. Because blood flow to the tissues is not adequate, the tissues do not receive enough oxygen and nutrients. Small injuries on the feet can easily become infected and create open sores. Gangrene of the toes may result in the need for amputation.

Pressure Ulcers



When you first studied to become a nursing assistant, you learned basic information about pressure ulcers and how to prevent them. Although many people associate pressure ulcers with elderly residents in long-term care facilities, you may be surprised to learn that 60% of pressure ulcers develop in hospitalized patients, and only 18% develop in nursing home residents. Another 7% to 12% of pressure ulcers develop in clients receiving home health care services. In advanced care settings, the most common site for pressure ulcer development is the sacrum (lower spine), with the heels being second.

The constant application of pressure on pressure points as a result of immobility is the basic cause of all pressure ulcers. In an advanced care setting, normally healthy, active people may now have difficulty moving because of illness, surgery, or trauma. Patients with spinal cord injuries, traumatic brain injuries, or neuromuscular disorders may not be able to reposition themselves, and they may also lack the ability to sense discomfort from sitting or lying in one position for too long. Patients who are unconscious, emotionally depressed, confused, or sedated are also at risk for developing pressure ulcers.

Pressure ulcers are extremely painful and difficult to treat, and they can be fatal. Pressure ulcers can be devastating for both the patient and the patient's family members. For these reasons, it is important to try to prevent

BOX 3-1 Chronic Wounds (*Continued*)

a pressure ulcer from forming in the first place. To help prevent a pressure ulcer from forming:

- Avoid allowing a patient to remain in one position for a long period of time.
- Use your observation skills (look for red, hot, or painful areas over pressure points or previously reddened areas that have turned white, pale, or shiny).
- Provide good skin care.
- Anticipate toileting needs and provide good perineal care.
- Encourage exercise.
- Use lift devices and lift sheets when moving or repositioning patients to minimize skin injury caused by friction or shearing.
- Encourage good nutrition and hydration.
- Use pressure-relieving devices.

If a pressure ulcer does develop, the approach to treatment varies, depending on the stage of the pressure ulcer:

- **Stage 1:** The goal is to relieve pressure on the area. The person requires frequent repositioning, and pressure-relieving devices are used.
- **Stage 2:** Special dressings are used to keep the wound moist. This promotes wound healing.
- **Stage 3:** Necrotic (dead) tissue needs to be removed to promote wound healing.
- **Stage 4:** Skin grafts may be required.

During the inflammatory phase, the area is hot, red, swollen, and painful. The heat and redness occur because of the increased blood flow to the area. The swelling and pain are caused by plasma leaking out of the dilated capillaries into the surrounding tissue.

Proliferative Phase

The proliferative phase begins 2 to 3 days after the injury and lasts up to 2 to 3 weeks in uncomplicated wounds. Wounds that are complicated stay in the proliferative phase for much longer.

Table 3-1 Description of Wounds by Mechanism of Injury

WOUND	MECHANISM OF INJURY
Abrasion	Rubbing or scraping away of the top layer of the skin
Avulsion	Tearing away of a body part, such as could occur with an animal attack or an accident involving a part of the body caught in a piece of machinery
Chemical	Exposure of the skin or other body tissues to a solution or agent that changes the structure of the cells, causing them to die
Contusion (bruise)	Rupture of blood vessels underneath the skin as a result of impact with a blunt instrument
Incision	Slicing through the skin with a sharp instrument, such as a scalpel, resulting in a wound with clean edges
Irradiation	Exposure of the skin or other body tissues to radiation, which changes the structure of the cells, causing them to die
Laceration	Tearing or cutting away of the skin with a dull instrument, resulting in a wound with jagged edges
Penetrating	Foreign object (for example, a bullet or fragments of metal or glass) entering the body at a high speed
Puncture	Piercing of the skin with a pointed object or instrument
Microbial	Invasion of the skin or other body tissues by pathogens, such as “flesh-eating bacteria”
Thermal	Exposure to high or low temperatures

To "proliferate" means to grow rapidly. During the proliferative phase, the body begins to replace the damaged tissue. Special cells called fibroblasts produce a thin layer of epithelial cells and promote the growth of new blood vessels. This thin layer of new tissue is called **granulation tissue**. It is red and bumpy in appearance because of all of the fragile new blood vessels, and it bleeds easily. The fibroblasts also produce collagen, a protein that adds strength to the healing tissues. Collagen pulls the edges of the wound together and forms **scar tissue** to fill in the gap. Scar tissue replaces the tissue that is normally found in the area. Scar tissue is weaker than the normal tissue and is not able to function the way the normal tissue does. For example, scar tissue that replaces skin lacks blood vessels, hair follicles, sweat glands, and melanin, so it does not bleed, grow hair, sweat, or tan.

Remodeling Phase

The final stage of wound healing is the remodeling phase. This phase may last as long as 6 months for larger wounds. During the remodeling phase, more collagen is secreted to strengthen the wound. At the same time, collagen in the scar is broken down. This process is what causes the scar, which at first is raised, large, and red, to eventually shrink and become a flat, thin, white line.

TYPES OF WOUND HEALING

If a wound is kept clean but otherwise left alone, eventually the tissue will repair itself, and the wound will close on its own. This is called **second-intention wound healing**. However, second-intention wound healing can take a long time, it increases the risk of infection, and it often results in a large scar. To speed up this process, minimize the risk of infection, and reduce the amount of scarring, the doctor may decide to close the wound using sutures or staples. In **first-intention wound healing,** an open wound is closed surgically with sutures or staples as soon as possible. In **third-intention wound healing,** the wound is left open for a period of time to make sure that an infection is not going to occur, and then the wound is closed surgically with sutures or staples.

FACTORS THAT AFFECT WOUND HEALING

The length of time it takes for a wound to heal differs from person to person. Many factors affect wound healing.

Nutrition and Hydration

Wound healing is aided by proper nutrition and adequate fluid intake. If a person is malnourished or dehydrated, wound healing will be delayed. The body needs the proper amount of all six types of nutrients—carbohydrates, protein, fat, minerals, vitamins, and water—to carry out the processes necessary for rebuilding damaged tissue. In fact, wound healing increases the body's need for calories and protein. The doctor may order nutritional supplements and increased fluid intake for a person with a healing wound. When caring for a person with a wound, be sure to accurately record the person's food and fluid intake. If the person refuses to eat or only partially finishes the meal or supplement, be sure to report it to the nurse immediately.

Overall Health Status

Wound healing is usually faster in people who are otherwise healthy. Chronic illness places stress on the body, making it harder for the body to recover from the additional injury. Some people have many medical conditions at the same time, which also stresses the body and can delay wound healing. Certain medical treatments, such as chemotherapy, radiation, and corticosteroid therapy, can affect the functioning of the body's immune system, delaying wound healing and putting the person at greater risk for infection.

Many chronic and acute illnesses affect cardiovascular or respiratory function. Wound healing is aided by adequate blood flow to the area. The blood carries nutrients, oxygen, infection-fighting white blood cells, and other substances that are necessary for wound healing to the area. A person with a cardiovascular disorder often has problems getting enough blood to the tissues. In a person with a respiratory disorder, the blood that is delivered to the tissues may not contain enough oxygen.

Obesity can also have a negative impact on wound healing. Fatty tissue is more difficult to suture, is more prone to infection, and takes longer to heal. It also contains fewer blood vessels.

Age

Wound healing usually takes longer in older people. As a result of normal age-related changes, blood flow to the skin decreases, and the skin becomes much more fragile. Many older people also have other medical conditions that can affect blood flow, oxygenation, or nutrition.

Wound Condition

Large, complicated wounds are slower to heal because of the extent of damage to the tissue. Wounds that become infected or that contain foreign objects (such as bone fragments, glass, or metal) may be very difficult to heal.

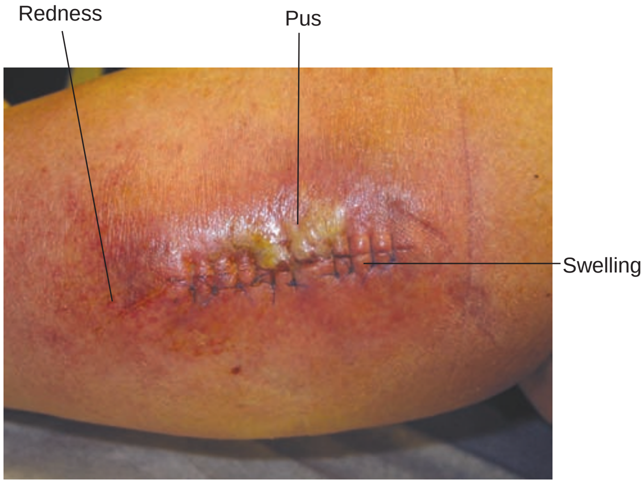


Figure 3-2
An infection has developed in this healing surgical incision. Note the redness, swelling, and pus along the suture line. (*Image provided by Stedman's.*)

COMPLICATIONS OF WOUND HEALING

Complications can develop at any point in the wound healing process. Complications of wound healing result in the need for additional treatments, medications, or surgical procedures; increase the length of time that the person will need to be hospitalized; and put the person at risk for permanent disability or even death. For these reasons, it is very important to take measures to prevent these complications from developing. It is also important to be aware of the signs and symptoms of a developing complication so that if a complication does develop, action can be taken immediately to prevent the problem from getting worse. Common complications of wound healing include infection, hemorrhage, dehiscence, and evisceration.

Infection

Infection can occur if a pathogen gets into the wound. Most wound infections are caused by bacteria. Bacteria can enter the wound at the time of injury or during the early phases of wound healing.

Signs and symptoms of a wound infection usually appear 2 to 7 days after the injury or surgical procedure and include fever, pain, **pus** (a thick, yellowish fluid), redness, and swelling in or around the wound (Fig. 3-2). If present, wound drainage may be foul smelling and **purulent** (that is, pus-containing). The wound and surrounding tissue may feel hot to the touch.

Hemorrhage

Hemorrhage (severe, uncontrolled bleeding) is usually an early complication of a wound. However, a person with a severe wound resulting from trauma may be at risk for hemorrhage for an extended period of time. A person who takes medications that prevent blood clotting (also called "blood thinners") is also at an increased risk for hemorrhage after surgery or a traumatic injury.

Hemorrhage often appears as increased amounts of bloody drainage on the dressing or in the wound drainage system. However, in some cases, blood collects under the skin, and the only sign of hemorrhage is increased swelling around the wound. The blood that collects under the skin, causing the swelling, is known as a **hematoma**. Wound dressings should be checked frequently for the first 48 hours after an injury or surgery. If bloody drainage is noted on the dressing, use a pen to indicate the extent of the drainage right on the dressing and note the time. If the drainage has increased the next time you check the dressing, notify the nurse immediately (Fig. 3-3). Similarly, if you notice a sudden increase in the amount of drainage in a drainage collection device or if the drainage suddenly becomes bloody, report it to the nurse immediately.

Applying a pressure dressing (one that compresses the wound, helping to slow bleeding) may be sufficient to stop the hemorrhage. However, if the hemorrhage is severe or cannot be stopped by other means, surgery is necessary.

Dehiscence and Evisceration

A **dehiscence** occurs when a wound that is sutured or stapled closed bursts open along the

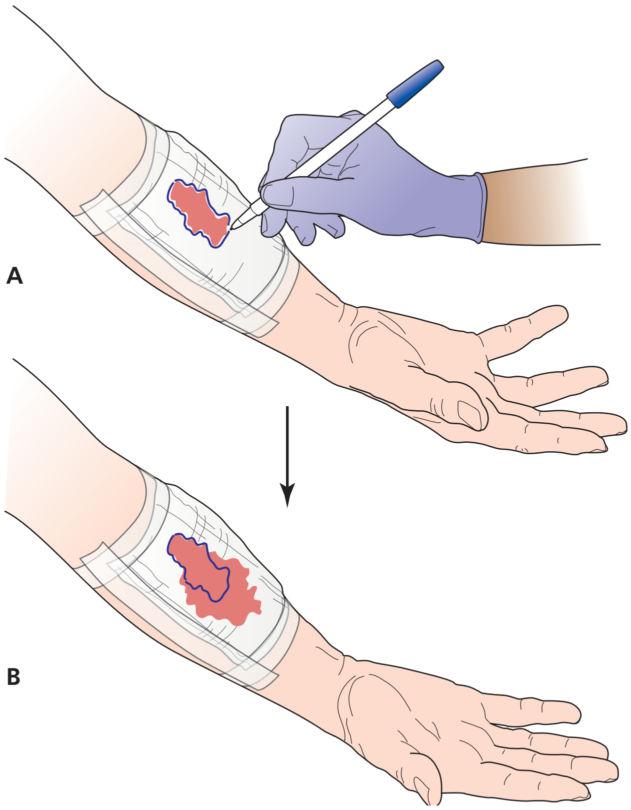


Figure 3-3
The first sign of hemorrhage may be increased amounts of bloody drainage on the dressing. (**A**) If you notice bloody drainage on the dressing, mark the extent of the drainage right on the dressing. (**B**) If the drainage has increased the next time you check the dressing, immediately notify the nurse.

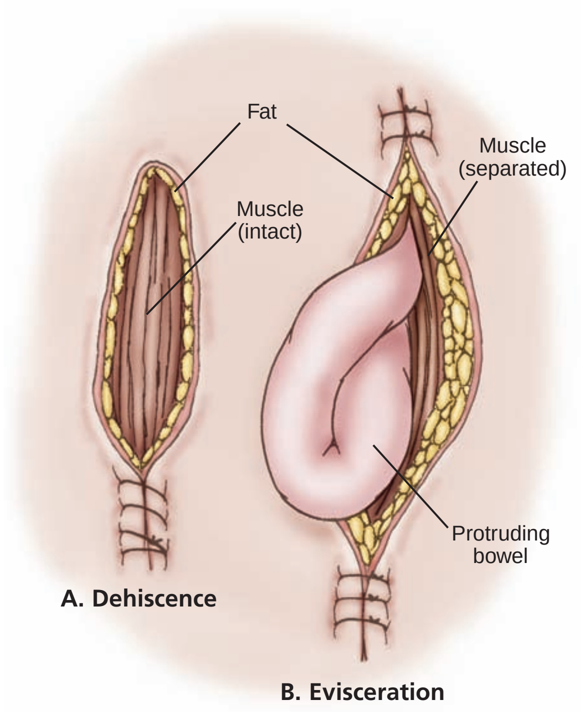


Figure 3-4
Dehiscence (**A**) and evisceration (**B**) are very serious post-operative wound complications.

suture or staple line. A dehiscence may be partial (affecting only the top layers of tissue) or complete (affecting all of the layers of tissue). If the dehiscence is complete, evisceration could occur. In **evisceration,** an internal organ pushes through the opening (Fig. 3-4). Conditions that place stress on the suture line (such as excessive coughing or vomiting) put the person at risk for dehiscence, evisceration, or both. Other risk factors for dehiscence and evisceration include infection at the wound site, malnutrition, and obesity.

If the patient has risk factors for dehiscence, the doctor may use a special suturing technique to reinforce the wound closure. The doctor may also order the use of an abdominal binder. An **abdominal binder** is a wide, flat piece of material that is wrapped all the way around the person's body and secured with Velcro fasteners or safety pins (Fig. 3-5). The snug-fitting binder helps support the incision site and prevent dehiscence.

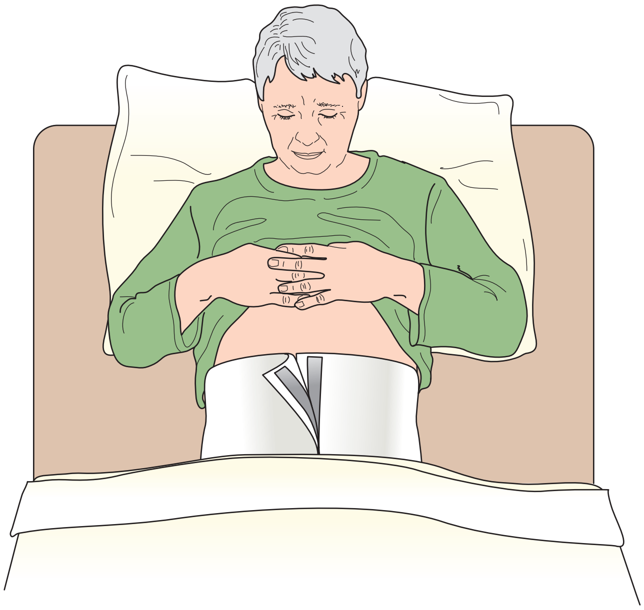


Figure 3-5
An abdominal binder may be used to help prevent wound dehiscence. The secure fit of the binder provides additional support to the incision site.

Having the patient support the incision site with a small pillow or folded towel while coughing or vomiting can also help prevent dehiscence.

Dehiscence usually occurs 4 to 5 days after surgery. A patient who has experienced dehiscence may feel the sutures or staples "give way." You may also note an increase in wound drainage. If you see that dehiscence, evisceration, or both has occurred, cover the wound with sterile gauze or a sterile towel that has been soaked with sterile saline solution and notify the nurse immediately. Dehiscence and evisceration are very serious complications that require emergency surgical intervention.

TELL THE NURSE !

When caring for a patient with a wound, be observant for signs and symptoms of complications. Quick action can prevent complications from worsening. Tell the nurse immediately if you observe any of the following:

- The edges of the wound are gapping open between the sutures or staples.
- The sutures or staples have ripped out or broken.
- There is excessive swelling along the incision line.
- There is excessive redness along the incision line.
- The incision line is hot to the touch.
- There is purulent drainage or pus along the incision line.
- The wound drainage has a foul odor.
- The patient complains of increased pain at the wound site 2 to 3 days after the injury or surgery took place.
- The patient has a fever 24 hours or more after the injury or surgery took place.
- There is an increased amount of bloody drainage on the wound dressing or in the wound drainage system.

INTERVENTIONS TO SUPPORT WOUND HEALING

The health care team does many things to help wounds to heal quickly with minimal complications. Some of the measures taken by the health care team to support the wound healing process include closing the wound, applying dressings, and inserting drains.

SUTURES AND STAPLES

Wound closure helps to speed the healing process, prevent infection, and minimize scarring. To close a wound, the edges of the wound are **approximated** (brought together) and either sutured or stapled together.

Many types of suture materials and many techniques for suturing a wound closed are available. The doctor chooses the suture material and technique according to the situation. *Subcuticular sutures* are placed underneath the dermis of the skin to pull the wound closed. They are not seen on the outside of the skin. These sutures are usually made of an absorbable material that dissolves and is eventually absorbed by the tissue. Small adhesive strips, called Steri-Strips, may be placed across the top of the incision to support the outer layer of the skin. For people at risk for wound dehiscence, the doctor may use large, heavy sutures to add extra strength to the closure. These are called *retention sutures*. Retention sutures are usually threaded through a rubber tube or over a plastic bridge so they do not cut into the skin when the tissue around the incision swells.

As an alternative to sutures, small metal staples may be used to close surgical incisions. Stapling a wound closed is faster than suturing a wound closed. In addition, because the metal is less irritating to the skin, scarring is reduced.

DRESSINGS AND BANDAGES

A **dressing** is placed directly on the wound and can serve many purposes, depending on the situation. Dressings can be used to:

- Keep a wound clean and help prevent infection.
- Maintain a moist environment that assists with wound healing.
- Absorb wound drainage.
- Treat infection.
- Apply pressure to the wound (to prevent or control hemorrhage, bruising, or swelling).
- Remove necrotic (dead) tissue.
- Protect the wound from further injury.

Figure 3-6
A transparent dressing.

- Protect the patient from becoming upset at the sight of the wound.

Transparent dressings (such as Tegaderm™ Transparent Dressing or OpSite™) are thin, clear, single-layer dressings that are used on small wounds, drain sites, and IV insertion sites (Fig. 3-6). Another type of transparent single-layer dressing comes in a liquid form. The liquid is applied over Steri-Strips to create a moisture-proof, transparent dressing that eventually peels off as the wound heals. Transparent dressings are not used on wounds that are draining. These dressings adhere directly to the skin and protect the wound from moisture and microbes but allow air to circulate freely. Because they are transparent, the health care team can inspect the wound without removing the dressing.

Some dressings have multiple layers:

- The *contact layer* is applied directly to the wound. It pulls excess drainage away from the wound and into the upper layers of the dressing. The contact layer is nonadherent, which means it will not stick to the surface of the healing wound when it is removed. Because a moist environment is best for wound healing, some contact layers contain a Vaseline-like substance that keeps the wound surface moist and lubricated. Some even contain antibacterial agents. Commonly used contact layers include Telfa™, Adaptic®, Xeroform™, and Vaseline™ petrolatum gauze.
- The *secondary layer* absorbs wound drainage. This layer is usually made of gauze or a similar material. If a wound is not expected to drain very much, the secondary layer may consist of only a few thicknesses of gauze. For wounds that will drain or require pressure, "fluffs" (4 × 4 gauze sponges that are unfolded and "fluffed" out) or a thick abdominal (ABD) pad may be used.

The layers of the dressing are held in place by a **bandage**. Bandages can be made out of tape; an elastic material (such as an ACE bandage); or a soft, woven material. In some cases, a large transparent dressing is placed on top of a gauze dressing to hold the gauze dressing in place. Montgomery ties are also a type of bandage.

The type of dressing and bandage used for each patient depends on the type of wound, whether excessive drainage is expected, the body part where the wound is located, and the preference of the doctor. If you are responsible for changing dressings in your facility, make sure that you are familiar with the different types of dressing and bandage materials used and follow the doctor's orders carefully.

DRAINS

As part of the healing process, some wounds produce a lot of fluid, or drainage. A wound that is infected or bleeding also often produces a lot of drainage. Blood or fluid that is allowed to collect in a wound can promote infection, delaying the healing process. Therefore, wound drains are often used to allow blood and other fluids to flow out of the wound. Some drains, called "open drains," allow fluid to collect in the wound dressing. Other drains are connected to a collection device. This is known as a "closed drainage system."

Open Drains

A very common type of open drain is the *Penrose drain*. A Penrose drain is made of a soft latex-type material and looks like a collapsed, thin-walled tube (Fig. 3-7). The diameter of the tube ranges from ¼ inch to 1 inch. One end of the tube is placed into the tissues of the wound, and the other is brought out to the surface of the body, either through the wound incision or through

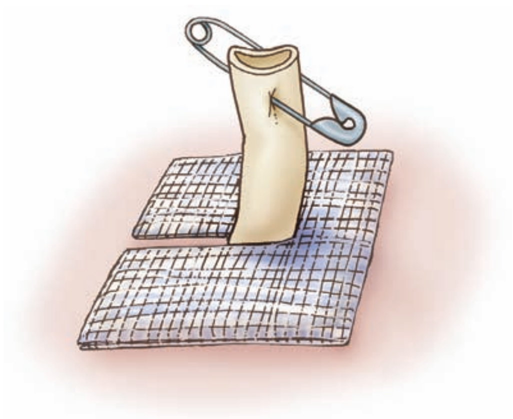
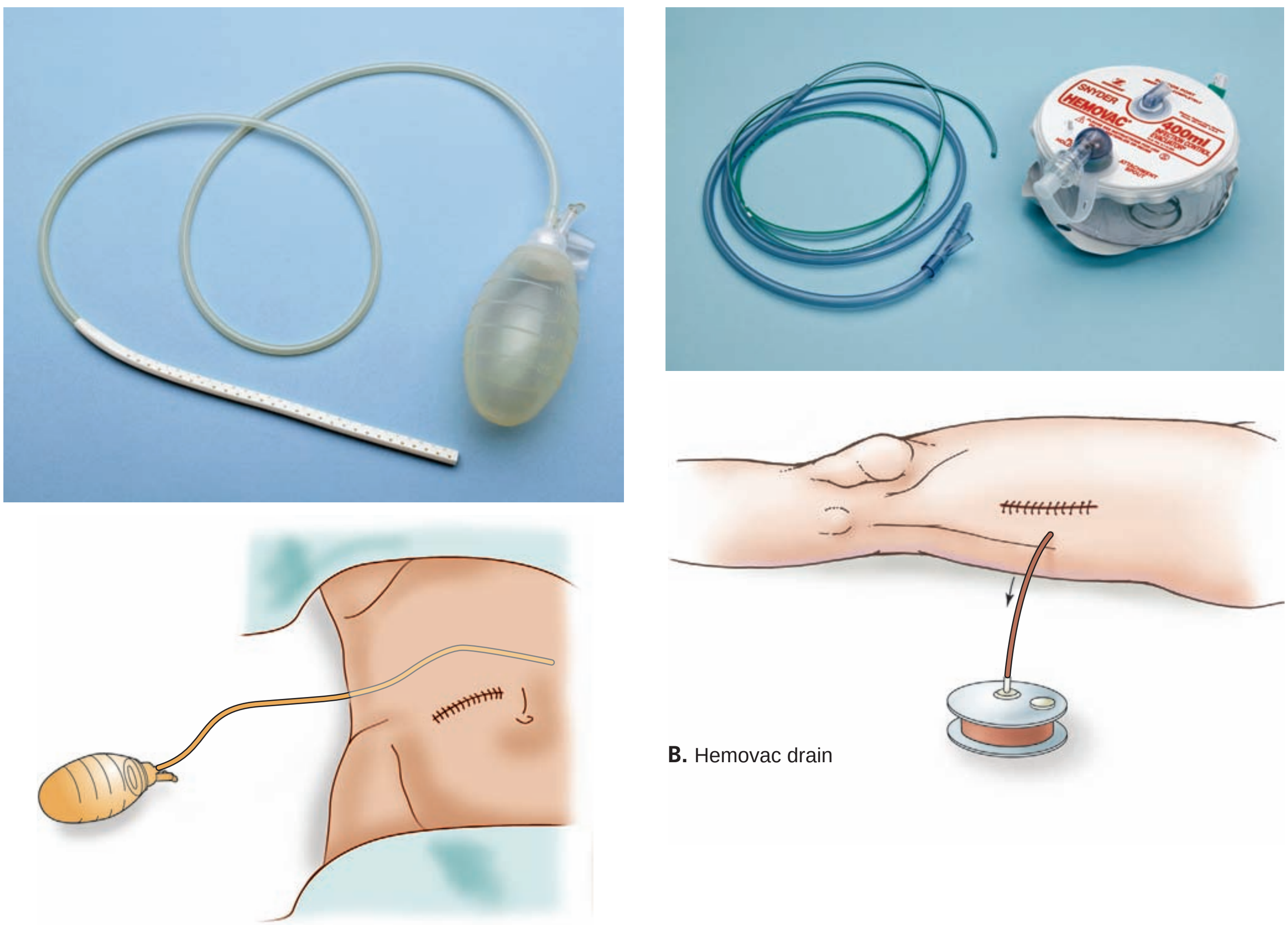


Figure 3-7
A Penrose drain is an open drain. The drainage passes through the tube and is collected by the wound dressing. A 4 × 4 gauze sponge can be cut with sterile scissors to fit around the drain.

another incision that is made nearby. A sterile safety pin is placed through the end of the Penrose drain to prevent the drain from slipping back into the wound. (Because a Penrose drain is not secured in place with sutures, be careful to avoid pulling it out of the wound when you are cleaning the wound and applying a fresh dressing.) The drainage passes through the Penrose drain and is collected on the wound dressing.

Closed Drainage Systems

Two common types of closed drainage systems are the *Jackson-Pratt drain* and the *Hemovac drain* (Fig. 3-8). Closed drainage systems consist of plastic tubing and a collection device. The tubing is usually rather small in diameter and may be soft or more rigid, depending on the type of drain. The tubing is placed inside the wound and



B. Hemovac drain

A. Jackson-Pratt drain

Figure 3-8
Two types of closed drainage systems. Closed drainage systems use suction to actively draw the drainage out of the wound. (**A**) A Jackson-Pratt drain. (**B**) A Hemovac drain.

then brought to the outside of the body through a separate incision. The tubing may be secured to the skin by sutures. The tubing is connected to the collection device, which uses suction to actively draw drainage out of the wound. Your duties may include emptying the collection device, measuring the amount of drainage, and recording the measurement on the graphic sheet.

WOUND CARE

Depending on your facility's policy, you may be trained to do several routine tasks related to wound care, such as cleaning the wound site and changing the dressing, emptying a drainage collection device, removing sutures or staples, and providing pin care. If you have received advanced training in these skills, you may be assigned to do these tasks independently. You may also be trained to assist nurses and wound care specialists with the care of wounds that are healing by second intention, which tend to be more complex.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

A wound can cause a great deal of emotional stress for a patient as well as the patient's family members. Because many wounds are disturbing to look at, and they may have a foul odor, the person may worry about how others will react to the wound. The wound may take a long time to heal, and even after it heals, the person may be left with a permanent reminder of the injury in the form of a large scar. As a result, the person may worry that others will no longer find him attractive, even after the wound heals.

When caring for a person with a wound, be careful to protect his privacy by only exposing the part of the body that needs to be exposed to provide wound care. Be professional in any remarks you may make about the wound. Do not force the person to look at the wound or take part in self-care measures if the person seems reluctant to do these things. If the person has questions that you are not qualified to answer on your own, be sure to relay the questions to a nurse so they can be answered promptly. When you act with empathy and compassion, you play a very important role in helping your patient to heal emotionally as well as physically.

CARE OF SIMPLE WOUNDS AND PIN SITES

Cleaning a Wound and Changing a Sterile Dressing

To promote healing, wound dressings must be changed periodically. The frequency of dressing changes depends on the type of wound, the amount of drainage, and the doctor's orders. With each dressing change, the wound is cleaned. Dressing changes give you an excellent opportunity to observe the wound and surrounding tissues:

- **Wound appearance.** A wound that is healing properly will have clean edges and may have a crust or slight scab along the surface. In the early stage of healing, the wound edges will look red and swollen, and there may be some bruising. (An infected wound will look more swollen than usual, and the color will be a deeper red.) There will be good approximation of the edges of the wound, and the staples or sutures will be intact.
- **Wound drainage** is usually described as **serous** (clear and watery-looking), **sanguineous** (bloody-looking), **serosanguineous** (pink and watery-looking), or purulent (thick and ranging in color from dark yellow or green to creamy white). Note the type of drainage, the amount of drainage, and the odor of the drainage. Report a change in the appearance of the drainage, an increase in the amount of drainage, or a foul odor to the nurse immediately.
- **Appearance of surrounding skin.** Many people have sensitive skin and may have an allergic reaction to the tape used to secure a dressing. Report any redness, swelling, or blistering of the skin to the nurse immediately.

A sterile saline solution is most often used to clean the wound because it does not sting and does not damage the healing tissue. When cleaning a wound, you must use sterile technique. Clean from the cleanest area (the incision line) outward. Use a clean solution-soaked gauze sponge for each stroke and be sure to dispose of the used sponges properly so you do not contaminate your sterile field.

Be gentle when you are working. Wounds can be quite painful, especially if they are deep. Pain is usually the most severe for 2 to 3 days after the injury or surgical procedure, and then it begins to gradually lessen. If a dressing change is likely to be very painful for the patient, the nurse may administer a pain medication 20 to 30 minutes before the dressing change is scheduled to take place.

Replace the dressing and bandage using the specific type of dressing and bandage material that is ordered for the patient. Make an effort to do the job neatly—a dressing's appearance is important to the patient, and a neat, clean dressing indicates good care.

Make sure that when you report and record that you have completed the dressing change, you also make note of your observations. Procedure 3-1 describes how to clean a wound and change a sterile dressing.

Removing Sutures and Staples

Sutures or staples are usually removed 6 to 8 days after they are put in, depending on the nature of the wound, the condition of the patient, and the part of the body where the wound is located. A suture removal set contains forceps and small scissors that easily slip under the suture, allowing you to snip the suture (Fig. 3-9A). A special staple remover is used to take out skin staples (Fig. 3-9B). Sterile technique is used when removing sutures or staples. Before removing sutures or staples, make sure that you have been trained how to do the procedure properly.

Providing Pin Care

Patients with bone fractures may require the use of fixation devices (such as pins, plates, or screws) to hold the broken ends of the bone in place as healing occurs. Sometimes these fixation devices are internal, which means that the surgeon surgically exposes the bone, places the fixation devices on or into the bone, and then closes the tissues over top. Other times, these fixation devices are external, which means that they are on the outside of the body. The surgeon inserts large pins into the bone through the skin using a drill and then attaches rods to the pins to stabilize the fracture (Fig. 3-10). Pins are also used in skeletal traction, which involves suspending weight from pins that have been driven through

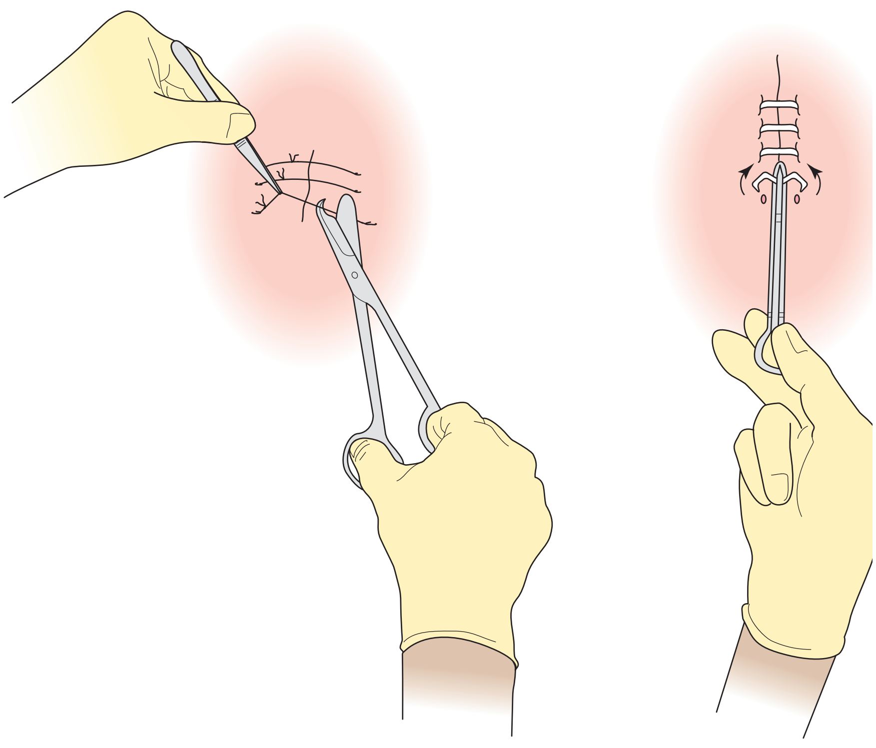


Figure 3-9
Removing sutures and staples. (**A**) To remove sutures, lift up the knot with the sterile forceps and snip the suture using the sterile scissors. Then pull the cut suture through the skin. (**B**) To remove staples, position the sterile staple remover under the staple. Squeeze the handles together, which straightens the ends of the staple. Then gently lift upward to remove the staple.

A. Sutures

B. Staples

Figure 3-10
Patients with bone fractures may have metal pins inserted through the skin into the bone. These pins may be part of an external fixation device (*shown*) or may be attached to a traction device. The place where the pin goes through the skin is considered a wound and requires routine care just like any other wound.

the bone to keep the ends of the broken bone in alignment until the fracture can be permanently repaired.

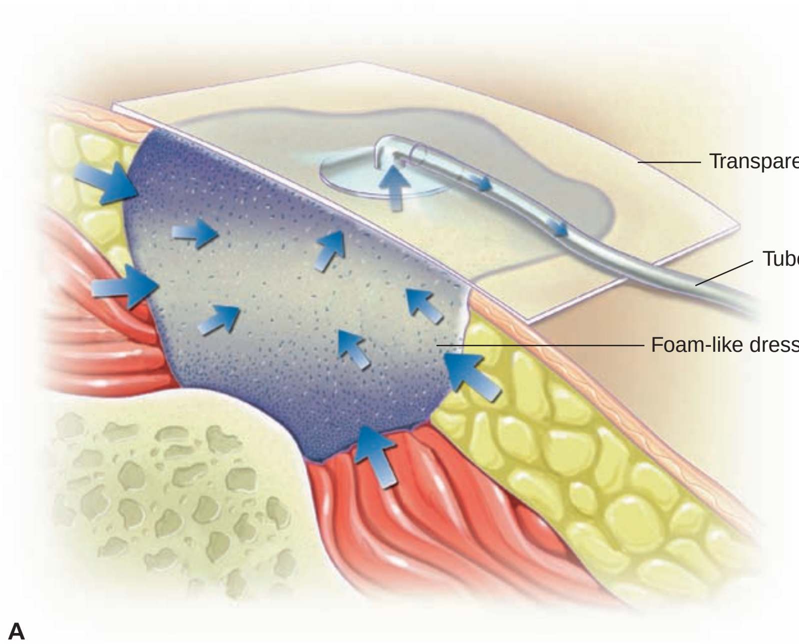
The insertion site, where the pin goes through the skin, requires wound care. This care is called **pin care**. The insertion sites may be covered with gauze sponges or may be left open to the air. You may be asked to clean the skin around the pins according to the doctor's orders and apply new dressings as necessary. An antiseptic or antibiotic ointment may be applied to the skin around the pin if ordered. If this task is assigned to you, make sure that you follow the pin care directions carefully and that you observe for any signs of drainage or infection. An infection can travel along the pin to the bone and cause a very serious bone infection.

CARE OF WOUNDS THAT ARE HEALING BY SECOND INTENTION

Some wounds must be left open to heal by second intention. For example, burn wounds, wounds that have become infected, and wounds that have opened up by dehiscence are usually left open to heal. In cases of severe trauma, there may be too much tissue damage to close the wound using staples or sutures, so the wound has to be left open to heal. Chronic wounds, such as late-stage pressure ulcers, venous (stasis) ulcers, and arterial ulcers, also heal by second intention. Because the care of wounds that are healing by second intention is complex, this type of wound care is usually out of the scope of practice for nursing assistants. You may, however, be trained to assist a nurse or wound care specialist with the care of these wounds.

Wounds that are healing by second intention must be kept clean and free from excess drainage. When dressings are changed on a wound that is healing by second intention, the cleaning process may include **irrigation** (flushing) of the wound with sterile saline or other solutions to remove collected drainage. **Débridement,** the removal of necrotic tissue, may also be necessary. Several different methods of débridement may be used, depending on the depth of the wound, whether or not it is infected, and the overall condition of the patient:

- **Sharp (surgical) débridement** involves the use of a sharp instrument to cut away the dead tissue. The doctor or wound care specialist may perform sharp débridement at the bedside for smaller wounds. Larger, more complicated wounds may require the use of an operating room and an anesthetic. If large amounts of tissue are removed, the patient may need skin grafting at a later date.
- **Mechanical débridement** uses force to remove the necrotic tissue. A gauze dressing that has been moistened with saline is applied to the wound and allowed to dry (this is called a "wet-to-dry" dressing), or the wound may be packed with moistened gauze and allowed to dry. When the wet-to-dry dressing or packing is remoistened and removed from the wound, it takes the necrotic tissue with it. Whirlpool baths are also used for mechanical débridement.
- **Autolytic débridement** uses the body's own digestive enzymes to soften and break down the necrotic tissue. (*Auto-* means "self.") The wound is covered with a dressing that helps keep moisture in the wound. The moisture



A

B

Figure 3-11
Vacuum-assisted closure (VAC) therapy is often used to promote healing of complicated or chronic wounds. (**A**) The wound is filled with a foam-like dressing. A tube is inserted into the foam, and then the area is sealed with transparent film. When the pump is turned on, it creates suction, which draws fluid out of the wound and stimulates blood flow and growth of new tissue. (**B**) The V.A.C.® ATS device. (*Courtesy of KCI Licensing, Inc. 2007.*)

and the enzymes work together to soften and break down the necrotic tissue so that it can be removed by irrigation.

- **Enzymatic (chemical) débridement** also uses enzymes to help soften and break down necrotic tissue. The enzymes are applied to the wound in the form of a gel or solution and then the wound is covered with a dressing that helps to keep moisture in the wound. The broken-down tissue is then removed by irrigation.
- **Biologic débridement** uses maggots (fly larvae) to eat the necrotic tissue. This type of débridement is popular in Europe and is being used more frequently in the United States.

Vacuum-assisted closure (VAC) therapy may be used to help promote healing by second intention. In VAC therapy, the wound is covered with a foam-like dressing. Tubing is embedded in the foam. The foam, the tubing, and a margin of healthy skin are covered with transparent adhesive film, forming a seal. The end of the tubing is connected to a vacuum pump. When the pump is turned on, it creates suction, which removes wound drainage from the surface of the wound, stimulates blood flow to the wound, and stimulates growth of new tissue (Fig. 3-11).

Summary

- A wound is an injury that results in damage to the skin and often the underlying tissues as well. Wounds can be described according to whether the skin is broken, whether the wound was planned or accidental, or whether the wound is expected to heal completely within a normal time frame. Wounds can also be described by mechanism of injury.
- The wound healing process begins as soon as an injury occurs and takes place in three phases.
  - The inflammatory phase begins right after the injury has occurred and is characterized by pain, heat, redness, and swelling at the wound site.
  - During the proliferative phase, the body begins to replace damaged tissue. Granulation tissue—a thin, very vascular layer of new tissue—begins to form. Collagen is also secreted to form scar tissue.
  - During the remodeling phase, more collagen is secreted to strengthen the wound, and the scar shrinks.
- There are three types of wound healing.
  - In first-intention wound healing, the edges of the wound are brought together and sutured or stapled soon after the injury occurs.
  - In second-intention wound healing, the wound is left open to close on its own.
  - In third-intention wound healing, the wound is left open for a period of time, and then the wound is closed with sutures or staples.
- Factors that can affect the body's ability to heal a wound include nutrition and hydration status, overall health status, the person's age, and the condition of the wound.
- Complications can occur during the healing process and can increase the patient's risk for permanent disability or even death. Common complications include infection, hemorrhage, dehiscence, and evisceration.
- The health care team does many things to help wounds to heal quickly with minimal complications. Some measures taken by the health care team include closing the wound with sutures or staples, applying dressings, and inserting drains.
  - Suturing or stapling the wound brings the edges of the wound together, promoting healing, minimizing the risk of infection, and reducing the amount of scarring.
  - Dressings are placed directly on the wound. Dressings serve many purposes, depending on the situation. For example, a dressing can be used to protect the wound and help to keep it clean, absorb wound drainage, assist in maintaining a moist environment for healing, or apply medication.
  - Drains prevent wound drainage and other fluid from accumulating in the wound. The accumulation of fluid in a wound delays healing and increases the risk for infection. An open drain or a closed drainage system may be used, depending on the situation.
- Nursing assistants who have received advanced training may be allowed to provide wound care for patients with simple wounds that have been sutured or stapled closed. Removal of sutures or staples and pin care may also be the responsibility of the nursing assistant if he has been trained to do these procedures.
  - The wound is usually cleaned when the dressing is changed. Sterile technique is used, and the wound is cleaned from the incision outward to prevent contamination of the wound edges.
  - While providing wound care, the nursing assistant should be especially observant of the appearance of the incision site, wound drainage, and surrounding skin.
- Chronic, complicated, or very traumatic wounds may be left open to heal by second intention. Care of these wounds is usually outside the scope of practice of nursing assistants, although those who have received advanced training may be permitted to assist nurses or wound care specialists with these procedures.
  - Irrigation (flushing of the wound with fluid) may be used to clean wounds.
  - Débridement is necessary to remove necrotic (dead) tissue. There are several different ways of accomplishing débridement.
  - Vacuum-assisted closure (VAC) therapy uses suction to remove wound drainage from the surface of the wound and stimulate blood flow to the wound and the growth of new tissue.

CHAPTER

3 PROCEDURES

PROCEDURE 3-1

Cleaning a Wound and Applying a Sterile Dressing

WHY YOU DO IT To help prevent infection, the incision site must be cleaned routinely, and a new dressing must be applied. Cleaning the incision site and changing the dressing also gives you the opportunity to observe the wound for complications.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Sterile gloves
- Sterile drape
- Sterile basin
- Sterile saline (or other cleaning solution, as specified in the person's care plan)
- Sterile bulb syringe (if wound is to be irrigated)
- Sterile dressing set:
  - Sterile scissors
  - Sterile sponge forceps
- Sterile dressings (type and number as specified on the person's care plan)
- Sterile gauze sponges
- Tape
- Plastic bag
- Bed protector
- Bath blanket (if necessary)

Procedure

2. Place the dressing supplies on a clean surface, such as the bedside table.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked.
4. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
5. Help the person to a comfortable position that allows access to the wound.
6. Fanfold the top linens to the foot of the bed. Adjust the person's hospital gown or pajamas as necessary to expose the wound. If necessary, use a bath blanket to provide additional warmth and modesty, leaving only the wound exposed. If necessary, place the bed protector under the wound site to keep the linens dry.
7. Fold down the top edges of the plastic bag to make a cuff. Place the cuffed bag on the over-bed table.
8. Put on the non-sterile gloves.
9. Loosen the tape that is securing the old dressing to the skin and remove the tape gently. Using a peeling action, carefully remove the soiled dressing. If the dressing sticks to the wound, apply a small amount of sterile saline to the dressing to moisten it. This will make the dressing easier to remove.

Step 9 Loosen and remove the tape that is securing the dressing.

(continued)

10. Being careful to keep the soiled side of the dressing out of the person's sight, observe the dressing for the amount, color, and odor of any drainage. Place the soiled dressing in the cuffed plastic bag. Do not let the dressing touch the outside of the bag.

11. Remove your gloves and dispose of them in a facility-approved waste container.

12. If the side rails are in use, return them to the raised position.

13. Wash your hands.

14. If the side rails are in use, lower the side rail on the working side of the bed.

15. Create the sterile field on the over-bed table using the sterile drape.

16. Add the sterile items to the sterile field:

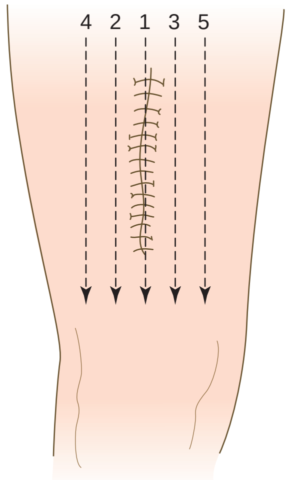
- **a.** Open the sterile dressing set onto the sterile field.
- **b.** Open the sterile dressings onto the sterile field.
- **c.** Open the sterile gauze sponges onto the sterile field.
- **d.** Open the sterile basin onto the sterile field.
- **e.** Open the sterile saline and pour some into the sterile basin.
- **f.** If needed, open the sterile bulb syringe onto the sterile field.

17. Put on the sterile gloves.

Step 17 Put on sterile gloves.

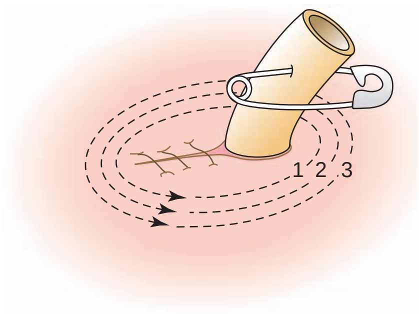
18. Clean the wound.

- **a. If there is no drain:** Pick up a gauze sponge using your gloved hands or sponge forceps. Moisten the gauze sponge with the sterile saline by dipping it into the basin. Place the saline-soaked gauze sponge at the top of the incision site and stroke downward. Place the soiled gauze sponge in the cuffed plastic bag, being careful not to touch the bag. Clean each side of the wound in the same manner using a clean saline-soaked gauze sponge for each stroke.



Step 18a Clean the wound by placing the saline-soaked gauze sponge at the top of the wound and stroking downward. Using a clean saline-soaked gauze sponge for each stroke, clean the incision site and then each side.

- **b. If there is a drain:** Pick up a gauze sponge using your gloved hands or sponge forceps. Moisten the gauze sponge with the sterile saline by dipping it into the basin. Place the saline-soaked gauze sponge next to the



Step 18b Clean around the drain by placing the saline-soaked gauze sponge next to the drain and moving it in a circular motion. Use a clean saline-soaked gauze sponge for each circle.

drain and move it in a circular motion around the drain. Move outward from the drain using a clean saline-soaked gauze sponge for each stroke.

c. **If the wound is to be irrigated (rinsed):** Hold several gauze sponges on the skin near the wound (to absorb the saline as it flows out of the wound). Draw up saline in the sterile bulb syringe and gently irrigate the wound. When you have finished irrigating the wound, place the sterile bulb syringe back in the basin and place the soiled gauze sponges in the cuffed plastic bag, being careful not to touch the bag.

19. Dry the wound using dry gauze sponges. Stroke from top to bottom or in a circular motion in the same manner that you used to clean the wound, using a clean gauze sponge for each stroke.
20. Observe the wound and surrounding tissues. Call the nurse to the bedside if you notice anything that may indicate an infection or separation of the wound edges.
21. If a medication or ointment has been ordered, apply it to the wound edges.
22. Apply the contact layer of the sterile dressing to the wound. If a drain is in place, use sterile scissors to cut a slit in the contact layer so it will fit around the drain site before placing the contact layer on the wound.

Step 22 Apply the contact layer of the dressing.

23. Apply the secondary layer of the sterile dressing to the wound.

Step 23 Apply the secondary layer of the dressing.

24. Remove the sterile gloves. Put on a clean pair of non-sterile gloves.
25. If the dressing will be secured with tape, cut four pieces of tape for securing the dressing. The tape should be long enough to extend 2 inches past the dressing material on each side. Hang the tape from the edge of the over-bed table.
26. Use the tape strips to secure the dressing by placing one piece of tape along each side of the dressing. Center each piece of tape equally over the dressing and the person's skin.
27. Remove your gloves and dispose of them in a facility-approved waste container. Wash your hands.
28. Re-cover the wounded area with the person's hospital gown or pajamas. Help him back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
29. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return them to the raised position on the working side of the bed.
30. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the area designated by your facility.

(continued)

Finishing Up

31. Complete the "Finishing Up" steps.

What You Document

- The amount, color, and odor (if present) of the drainage on the old dressing you removed
- The type of wound closure (staples or sutures) and whether there is gapping of the incision between the sutures or staples
- The presence of redness or swelling at the incision site or of the skin surrounding the incision
- Any bruising or other signs of irritation of the skin surrounding the incision
- If the skin near the incision site feels hot to the touch
- If the patient complains of excessive pain during the procedure
- The presence of drains, the condition of the skin where the drain tubing exits the wound, and the color and amount of drainage in the collection device, if one is being used
- Solutions used to clean the incision
- Ointments or other medications applied to the incision
- The type of dressing material used

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Wounds that occur as the result of an unexpected injury (such as trauma) are classified as:
   a. Intentional
   b. Chronic
   c. Unintentional
   d. Unplanned

2. The type of wound caused by tearing of the skin and tissue with a blunt or irregular instrument is known as a/an:
   a. Contusion
   b. Laceration
   c. Avulsion
   d. Abrasion

3. One symptom of a wound infection is the presence of what type of wound drainage?
   a. Serous
   b. Sanguineous
   c. Serosanguineous
   d. Purulent

4. A person who has an abdominal incision and is experiencing excessive coughing, vomiting, or other straining against the suture line is most likely to experience which complication?
   a. Wound infection
   b. Dehiscence
   c. Blood clot
   d. Infection

5. Closure of the wound edges is also known as:
   a. Evisceration
   b. Approximation
   c. Débridement
   d. Dehiscence

6. Which suturing technique involves placing sutures underneath the surface of the skin?
   a. Subcuticular
   b. Retention
   c. Invisible
   d. Second intention

7. The secondary layer of a wound dressing is intended to:
   a. Hold the contact layer in place
   b. Contact the wound surface
   c. Absorb drainage
   d. Provide medication or moisture

8. The use of fluids to flush or wash a wound is called:
   a. Débridement
   b. Granulation
   c. Instillation
   d. Irrigation

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** serous
_____ **2.** dehiscence
_____ **3.** sanguineous
_____ **4.** purulent
_____ **5.** débridement
_____ **6.** evisceration

a. an internal organ pushes through an incision
b. pus-containing
c. clear and watery
d. bloody
e. the partial or total disruption of wound layers at the incision site
f. removal of necrotic (dead) tissue

STOP and Think!

1. You are caring for Mrs. Hagen. She is 60 years old, weighs 280 pounds, has diabetes, and smokes. She had surgery 4 days ago to remove a diseased section of her colon. As you take Mrs. Hagen's vital signs, you notice that her temperature has increased to 102°F. Because of her history of smoking, Mrs. Hagen coughs a lot. After a rather severe coughing spell, she complains of pain at the incision site and says that she feels like her belly has "popped open." What should you check for, and what actions should you take? What are some factors that may affect the healing of Mrs. Hagen's large abdominal surgical wound?
2. This morning, Mrs. Johnston had surgery to remove her right breast. You work the evening shift. When you checked on Mrs. Johnston at the beginning of your shift, she was resting quietly in bed. You checked the dressing over her incision site and noted that there was no visible drainage on the dressing. You also noted that there was a small amount of bloody drainage in the collection device of the Jackson-Pratt drain. A few hours have passed, and Mrs. Johnston has asked if you could help her to the bathroom. As you are assisting her back to bed after using the bathroom, she tells you that she is having a lot of pain at the incision site. You check her dressing and note that there is an area of bloody drainage on the dressing that measures about 3 inches across. There also appears to be a lot more blood in the drainage collection device. What should you do?
3. Since accepting a new job at an advanced care facility, you have been trained to perform many new skills. You are excited about the challenges your new job brings you, and you are working hard to make sure you can perform your duties safely and competently. Today one of the nurses asks you to remove Mr. Edwards' sutures. You have been trained to do this procedure and have watched nurses do it a few times, but this will be the first time you will do the procedure on your own. You are a little bit nervous. What can you do to make sure you perform the procedure correctly?

CHAPTER

4

Advanced Urinary Care Skills

WHAT WILL YOU LEARN?

In some facilities, nursing assistants are provided with additional training that allows them to catheterize patients using a straight urinary catheter or an indwelling urinary catheter. In this chapter, you will learn how to insert and remove a urinary catheter, how to collect a sterile urine specimen, and how to irrigate an indwelling urinary catheter. When you are finished with this chapter, you will be able to:

1. Describe the different types of urinary catheters and give examples of why a person might need a urinary catheter.
2. Discuss risks associated with inserting a straight or indwelling urinary catheter.
3. Demonstrate proper technique for inserting a straight urinary catheter.

A nurse and a nursing assistant prepare to insert a urinary catheter.

4. Demonstrate proper technique for inserting an indwelling urinary catheter.
5. Demonstrate proper technique for collecting a urine specimen from a patient with an indwelling urinary catheter.
6. State the reasons for irrigating an indwelling urinary catheter.
7. Demonstrate proper technique for irrigating an indwelling urinary catheter using closed irrigation.
8. Demonstrate proper technique for removing an indwelling urinary catheter.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Urosepsis	Lumen	Aspiration port
Urinary meatus	Injection port	Aspirate

INTRODUCTION TO URINARY CATHETERIZATION

EQUIPMENT USED FOR URINARY CATHETERIZATION

A urinary catheter is inserted into the bladder through the urethra (or through an incision made in the abdominal wall) to allow the urine in the bladder to drain out. There are three main types of urinary catheters: straight, indwelling, and suprapubic (Table 4-1).

Urinary catheters are available in various sizes. They are sized according to their diameter using the French (Fr) scale. The smaller the French unit, the smaller the diameter of the catheter. For example, an 8-Fr catheter has a smaller diameter than a 20-Fr catheter. When catheterizing an adult, it is assumed that a 16-Fr catheter will be used unless otherwise specified. A catheter with a smaller French is used to catheterize a child because a child's urethra is much nararower than an adult's.

RISKS ASSOCIATED WITH URINARY CATHETERIZATION

Infection

Inserting a urinary catheter is a procedure that requires sterile technique because it involves putting a foreign object (that is, a urinary catheter) into a person's body. If sterile technique is not used, the urinary catheter can introduce infection-causing bacteria into the urinary tract. An infection can begin in the bladder and travel up the ureters to the kidneys. Urinary tract infection (UTI) as a result of catheterization is the most common type of health care–associated infection (HAI). Bacteria can also gain access to the bloodstream from the urinary tract, resulting in **urosepsis,** a potentially fatal illness.

Care Alert!

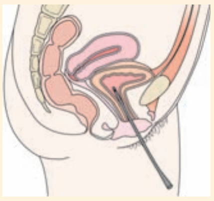
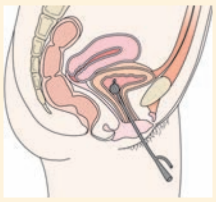
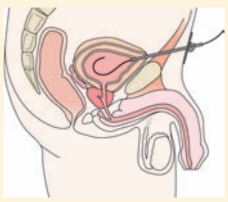
FAILURE to observe proper sterile technique when you are catheterizing a patient puts your patient at risk for a serious, possibly even fatal, infection.

Urethral Trauma

The urinary catheter must be passed through the urethra with care. Trying to force the catheter through the urethra can damage the mucosa that lines the urethra, leading to bleeding, swelling, and a higher risk of infection. Care must be taken with both men and women to avoid urethral trauma during urinary catheterization, but the risk for trauma is higher in men than in women. This is because the male urethra is long and curved, but the female urethra is short and straight. The length of the male urethra and its two curves make it more prone to damage during catheterization.

In addition, a common age-related change in older men is enlargement of the prostate gland, which surrounds the urethra. An enlarged prostate gland can make it difficult to insert a straight or indwelling urinary catheter without damaging the urethra, the prostate, or both. In this situation, the doctor may order a catheter with a specially shaped tip, called a *Coudé*

Table 4-1 Types of Urinary Catheters

CATHETER	HOW IT IS INSERTED	COMMON USES
Straight catheter 	The catheter is inserted into bladder, urine is allowed to drain out, and then the catheter is removed immediately.	● When it is necessary to obtain a sterile urine specimen ● When there is obstruction of the urethra caused by temporary pain or swelling (for example, following childbirth) ● When the person has a condition that affects his ability to sense the need to void (for example, after a spinal cord injury)
Indwelling catheter (retention, Foley) 	The catheter is inserted into the bladder through the urethra to provide continuous urine drainage; an inflated balloon holds the catheter in place.	● During surgery ● When it is necessary to carefully monitor urine output ● When a person is unable to urinate because of an obstruction in the urethra (for example, an enlarged prostate gland) ● When a person who is incontinent of urine has wounds or pressure ulcers that would be made worse by contact with urine
Suprapubic catheter 	The catheter is inserted into the bladder through an incision made in the abdomen to provide continuous urine drainage (*supra* "above +" *pubic,* "the pubic bone").	● When catheterization will be necessary for an extended period of time ● When the urethra is completely blocked

catheter. The doctor or nurse is usually responsible for inserting the Coudé catheter.

Care Alert!

WHEN catheterizing a patient with a straight or indwelling urinary catheter, never force the catheter if you meet resistance. If you are not able to easily pass the urinary catheter through the urethra, stop the procedure and call for a nurse.

GENERAL GUIDELINES FOR URINARY CATHETERIZATION

A doctor's order is required to insert a urinary catheter. In preparation for being catheterized, a female patient is usually positioned in the supine position with her legs apart and her knees slightly bent. A female patient can also be positioned on her side with her knees bent and her legs drawn toward her chest (Fig. 4-1). A male patient is usually just positioned in the supine position. General guidelines for catheterizing a patient using a straight or indwelling catheter are given in Guidelines Box 4-1.

Helping Hands and a Caring Heart

FOCUS ON HUMANISTIC HEALTH CARE

Before inserting a urinary catheter, make sure the patient understands why the catheter has been ordered and explain the procedure. Patients who have not been catheterized before may be afraid that the procedure will be painful. Catheterization is generally not painful, but the patient will feel pressure and some discomfort. Explaining what sensations the patient can expect to feel and letting the patient know that you will take steps to avoid embarrassment and exposure can be very reassuring.

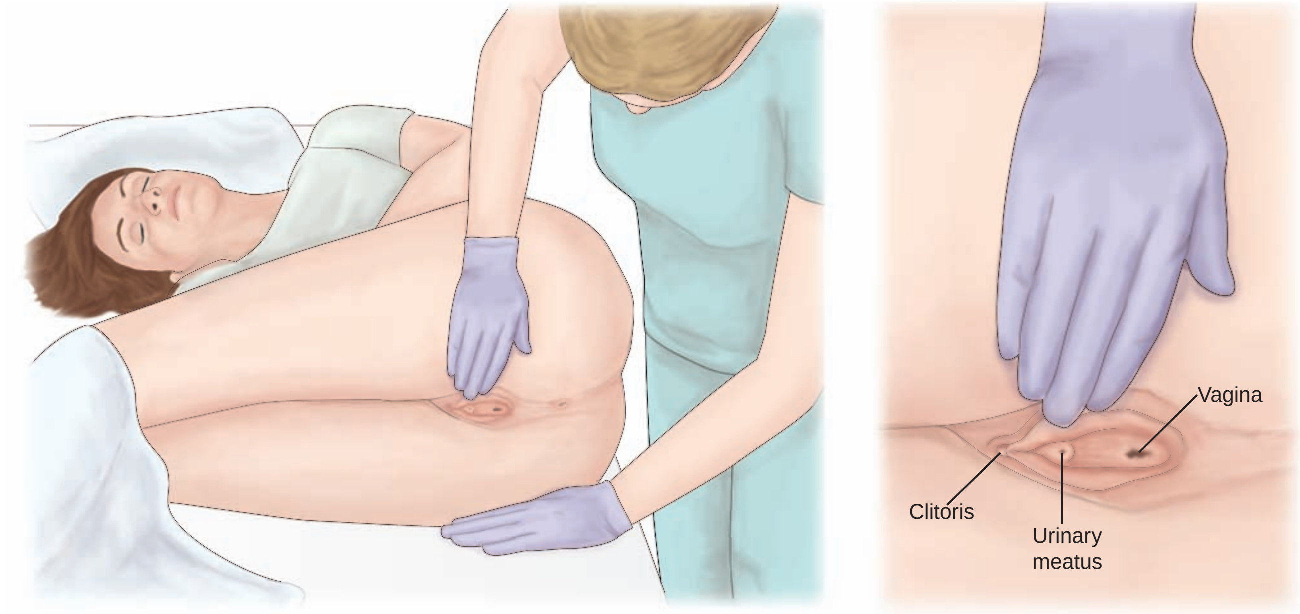


Figure 4-1
An alternative position for catheterizing a female patient. Some women may find the side-lying position more comfortable and easier to maintain throughout the procedure.

Guidelines Box 4-1 Guidelines for Catheterizing a Person Using a Straight or Indwelling Urinary Catheter

WHAT YOU DO	WHY YOU DO IT
Before catheterizing a person, make sure that you check the doctor's order to verify that you have the right person and the right type and size of urinary catheter.	Catheterizing a person who does not need to be catheterized is a serious medical error, as is catheterizing a person using the wrong type or size of catheter. The doctor decides what type and size of catheter to be used, depending on the reason the catheter is needed and the size of the person. If you catheterize a person with the wrong type or size of catheter, the catheter may not do what it is supposed to do, or the person may experience pain or discomfort.
Before beginning the procedure, make sure that the person understands why the catheter is being inserted.	Explaining why the catheter is being inserted before beginning the procedure confirms that the person understands why the catheter is necessary and facilitates cooperation.
Before beginning the procedure, explain the procedure to the person.	Many people find being touched in an intimate area by a stranger embarrassing, frightening, or even offensive. A person who has never been catheterized before may be afraid that the procedure will be painful. Explaining the procedure in a professional way helps to put the person at ease and reassures the person that she will be treated with respect.

Guidelines Box 4-1 Guidelines for Catheterizing a Person Using a Straight or Indwelling Urinary Catheter (*Continued*)

WHAT YOU DO	WHY YOU DO IT
Take care to protect the person's modesty.	Being catheterized can be very embarrassing. Properly draping the person may help to relieve some of the person's discomfort and feeling of being exposed.
Before inserting the urinary catheter, provide perineal care using proper technique.	Properly cleansing the perineal area before inserting the urinary catheter reduces the number of microbes in the area, lowering the person's risk of a health care–associated infection (HAI).
If the urinary catheter becomes contaminated at any point during the procedure, discard it and begin the procedure again with new supplies.	The use of a contaminated item during a procedure that requires sterile technique puts the patient at high risk for infection.
When catheterizing an uncircumcised man, remember to pull the foreskin back up over the head of the penis after inserting the urinary catheter.	If the foreskin is not pulled back into place, it can create a band around the penis, causing pain and swelling.
Never force a catheter. If the catheter will not easily pass through the urethra, stop the procedure and call the nurse.	Forcing the catheter against resistance can damage the urethra, leading to bleeding, swelling, and an increased risk for infection.
When inflating the balloon of an indwelling urinary catheter, make sure to use all of the sterile water in the pre-filled syringe. A 5-mL balloon needs 10 mL of water to inflate it properly (5 mL of the water remains in the lumen between the injection port and the balloon).	If the balloon is not inflated fully, it will move down into the bladder outlet, causing pain.

CATHETERIZATION WITH A STRAIGHT URINARY CATHETER

A straight urinary catheter is inserted through the urethral opening (**urinary meatus**) and passed into the bladder. The urine is allowed to drain out into a collection device (such as a urinal, sterile basin, or specimen container), and then the urinary catheter is removed.

The doctor may order catheterization with a straight catheter so that a sterile urine specimen can be obtained. The urine can be drained into a sterile basin and then poured into the specimen container, or it can be drained directly into the specimen container. If you are asked to obtain a sterile urine specimen, be sure to follow the general guidelines for specimen collection that you learned as part of your basic training (Guidelines Box 4-2). Procedure 4-1 describes how to catheterize a person using a straight urinary catheter.

Guidelines Box 4-2 Guidelines for Obtaining Specimens of Any Type

WHAT YOU DO	WHY YOU DO IT
Always make sure the specimen container is properly labeled with the person's name and room number.	Proper identification on the specimen container is necessary to ensure that the test results are matched with the correct patient. Otherwise, a person may be diagnosed with (and receive treatment for) a condition she does not have.
Before collecting a specimen, always ask yourself: • Do I have the right person? • Do I have the right paperwork? • What method is to be used to collect the specimen? • Do I have the right type of specimen container? • Is the specimen container properly labeled? • What are the correct date and time? • What storage and delivery method must I use?	Having the answers to these questions helps to ensure that the specimen will be correctly identified, collected, and transported or stored. This reduces the risk that another specimen will need to be obtained and the test repeated.
Avoid touching the inside of the specimen container or the inside of the lid. When placing the lid on a surface, place it with the inside facing up.	It is important to keep the inside of the specimen container free of contaminants that could alter the test results. Touching the inside of the specimen container or the inside of the lid or placing the lid face down on a surface can introduce bacteria into the specimen container.
Make sure that the specimen is handled correctly after you obtain it. For example, some specimens may need to be delivered to the laboratory while they are still warm or may need to be placed in a special transport bag. If a specimen is not being delivered to the laboratory right away, then it needs to be stored properly until the scheduled pick-up time.	Failing to deliver the specimen promptly (or store it properly until pick-up) can change the test results or make it impossible to use the specimen. In this case, another specimen will need to be obtained, which delays diagnosis and treatment, adds to costs, and is inconvenient for the patient.
Always remember to wear gloves when assisting with specimen collection and when handling specimen containers.	Specimens are body fluids and may contain pathogens.

CATHETERIZATION WITH AN INDWELLING URINARY CATHETER

Figure 4-2 shows an indwelling urinary catheter system. After inserting the indwelling catheter through the urinary meatus and passing it into the bladder, the balloon is inflated. The inflated balloon holds the catheter in place inside of the bladder. A length of tubing connects the catheter to the urine drainage bag. Urine flows through the catheter, into the tubing, and then into the bag.

An indwelling urinary catheter system is a closed system. Once the catheter is in place, there is no opening to the outside of the body (except the emptying spout on the urine drainage bag). This helps to keep the system sterile. However, to

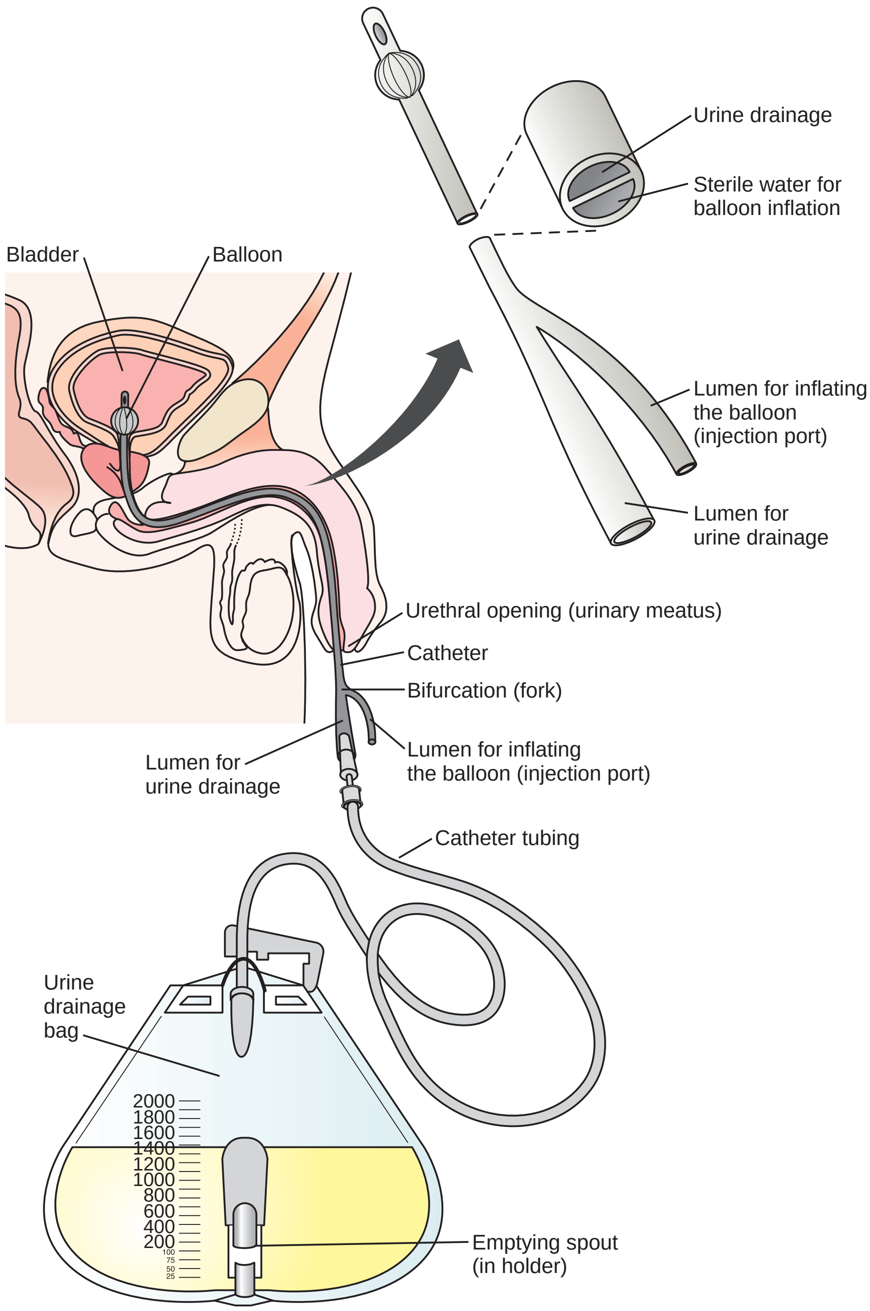


Figure 4-2
A double-lumen indwelling urinary catheter system.

perform some procedures, it may be necessary to disconnect the catheter tubing from the catheter. In this case, a sterile cap may be placed over the catheter tubing, or a sterile plug may be inserted into the catheter (Fig. 4-3) to reduce the risk of contamination while the closed system is open.

The catheter shown in Fig. 4-2 is a double-lumen indwelling urinary catheter. A **lumen** is a passageway. In a double-lumen indwelling urinary catheter, one lumen is used for urine drainage. The other lumen, sometimes called the **injection port,** is used to inject the sterile water that inflates the balloon. The balloons on indwelling urinary catheters vary in size from 5 mL to 30 mL. The milliliter designation refers to the amount of fluid that the balloon can hold.

The **aspiration port** on an indwelling urinary catheter is used to remove urine from the closed system (for example, when it is necessary to obtain a urine sample). To **aspirate** means to "draw something in"—in this case, to draw fluid into a syringe. A needle and syringe is inserted into the aspiration port, and the plunger on the syringe is pulled back, causing urine to flow into

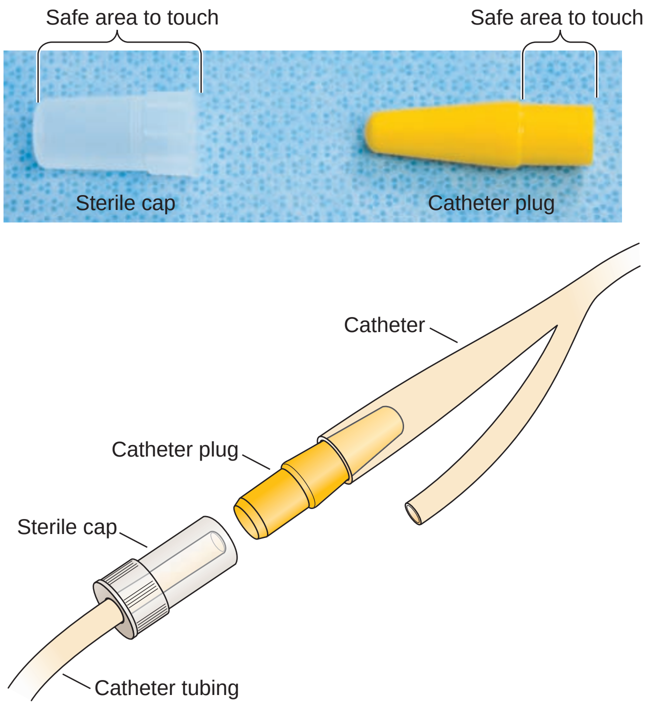


Figure 4-3
When it is necessary to disconnect the catheter and the catheter tubing, a sterile cap or a catheter plug may be used to reduce the risk of contamination while the system is open. A sterile cap is placed over the end of the catheter tubing. A catheter plug is placed inside the catheter. The inside of the sterile cap and the cone-shaped portion of the catheter plug are sterile, so it is important to avoid touching these areas when handling the sterile cap or catheter plug.

the syringe. Some aspiration ports are "needleless," which means that a needle is not required; the syringe is simply pushed into the port and turned to secure the connection. The aspiration port can also be used to inject irrigation fluid into the closed system.

INSERTING AN INDWELLING URINARY CATHETER

Procedure 4-2 describes how to catheterize a patient using an indwelling urinary catheter.

Care Alert!

WHEN inserting an indwelling urinary catheter, it is important to avoid inflating the balloon too soon. The catheter tip must be inserted all the way into the bladder before inflating the balloon. Inflating the balloon too soon can injure the urethra, leading to bleeding, swelling, and an increased risk of infection.

COLLECTING A URINE SPECIMEN FROM A PATIENT WITH AN INDWELLING URINARY CATHETER

You may be asked to obtain a urine specimen from a patient who has an indwelling urinary catheter. If you have just inserted the indwelling urinary catheter, you can drain urine from the urine drainage bag into the specimen container provided in the urinary catheter insertion kit. This is the only time that a specimen can be taken from the urine drainage bag. Urine that has been sitting in the urine drainage bag for any length of time is considered contaminated and cannot be used when a urine specimen is required.

To collect a urine specimen from a patient with an indwelling urinary catheter at other times, the catheter tubing is clamped below the aspiration port so that urine collects in the tubing. Then a sterile syringe is inserted into the aspiration port and used to withdraw the urine specimen. Procedure 4-3 explains how to obtain a sterile urine specimen using the aspiration port of an indwelling urinary catheter system. As always, be sure to follow the general guidelines for specimen collection (see Guidelines Box 4-2).

IRRIGATING AN INDWELLING URINARY CATHETER

Blood clots can form in the urine as a result of trauma (for example, after surgery), cancer, or kidney stones. Some urinary tract disorders increase the number of particles (such as cells shed from the lining of the urinary tract) in the urine, causing sediment to form. If the indwelling urinary catheter is blocked (or is at risk of becoming blocked) by blood clots or sediment, then it will have to be irrigated to keep the urine flowing out of the bladder. Sometimes the irrigation fluid contains medications that are placed into the bladder to prevent the formation of sediment or to prevent infection. The three main types of irrigation are open, closed, and continuous.

Open Irrigation

In open irrigation, the catheter is disconnected from the catheter tubing. Sterile irrigation fluid is drawn into a 60-mL catheter-tip syringe and then instilled into the catheter using slow, gentle

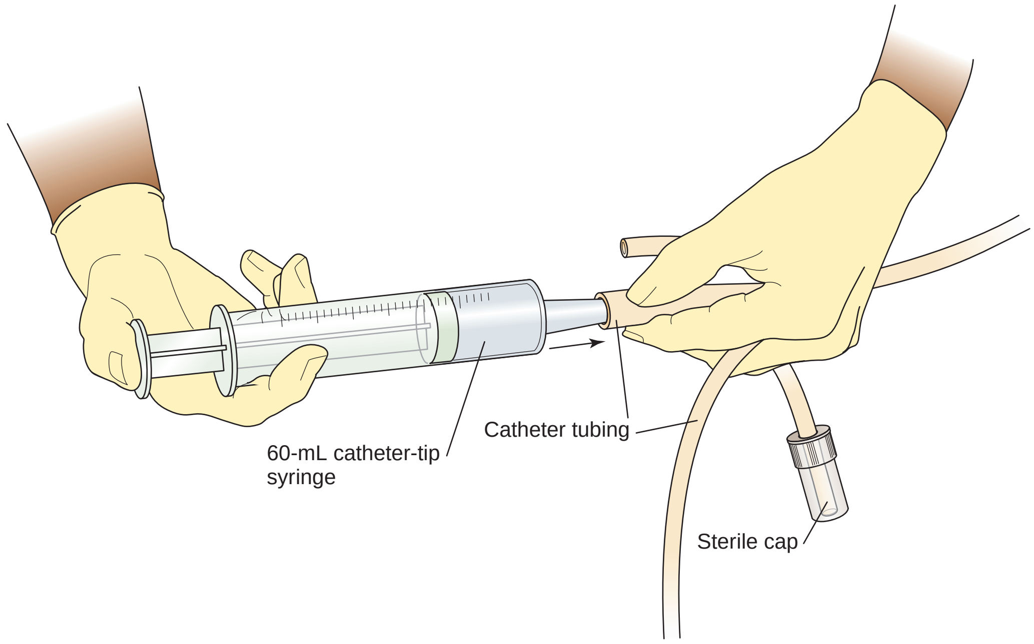


Figure 4-4
Open irrigation. The catheter is disconnected from the catheter tubing, and irrigation fluid is instilled into the catheter using a 60-mL catheter-tip syringe. A sterile cap is placed over the end of the catheter tubing to reduce the risk of contamination.

pressure (Fig. 4-4). The sterile irrigation fluid flows through the catheter and into the bladder, and then the syringe is removed and the irrigation fluid is allowed to drain out into a collection device.

Care must be taken during open irrigation to prevent the end of the catheter tubing from becoming contaminated. You should continue to hold on to the catheter tubing without touching the end, cover the end with a sterile cap, or place the catheter tubing on a sterile surface. If contamination occurs, a new urine drainage bag with new catheter tubing must be used.

The amount of irrigation fluid used for open irrigation depends on why the irrigation was ordered. Open irrigation is often ordered to dislodge a clot or clear sediment because the wide tip on the catheter-tip syringe and the wide opening of the catheter tubing allow for a greater amount of irrigation fluid to be instilled with more force. When the purpose of the irrigation is to dislodge a clot or clear sediment, the irrigation fluid (usually sterile water) is instilled and allowed to drain, and this action is repeated until the urine flows freely. When the irrigation fluid contains medication, the doctor's order will specify the amount of irrigation fluid to be used.

Care Alert!

As you are instilling irrigation fluid, it is important to observe the patient for signs of pain or discomfort. (The patient might express pain or discomfort by saying that he feels the need to urinate but cannot.) Pain or discomfort can result if too much irrigation fluid is instilled into the bladder, causing it to become distended (swollen with fluid). If the patient complains of pain or discomfort, stop the procedure and notify the nurse immediately.

The amount of irrigation fluid instilled into the bladder and the amount of fluid returned are documented. The amount of irrigation fluid that is placed into the bladder should equal the amount of irrigation fluid that is returned. If the amount of irrigation fluid that is returned is less than the amount of irrigation fluid that was instilled, then it is likely that the urinary catheter is blocked, preventing the irrigation fluid from draining properly. This can lead to distention of the bladder, which causes the patient pain and discomfort. If the urinary catheter is blocked, it needs to be removed and replaced with a new one.

Closed Irrigation

Closed irrigation is similar to open irrigation, but with closed irrigation, the catheter and catheter tubing are not disconnected. This significantly lowers the risk of contamination. The catheter tubing is clamped just distal to the aspiration port so the irrigation fluid goes into the bladder and not the urine drainage bag. Then the irrigation fluid is injected into the aspiration port using a syringe and needle (or just a syringe if the system is "needle-less") (Fig. 4-5). The sterile irrigation fluid flows through the catheter and into the bladder, and then the catheter tubing is unclamped to allow the irrigation fluid (and urine) to drain into the urine drainage bag.

Closed irrigation is often used to instill a medication or acetic acid (vinegar) to decrease sedimentation and prevent infection. In this case, the doctor orders the amount of irrigation fluid that is to be used. As with open irrigation, the amount of fluid instilled into the bladder and the amount of fluid returned are documented. Procedure 4-4 describes how to perform a closed catheter irrigation.

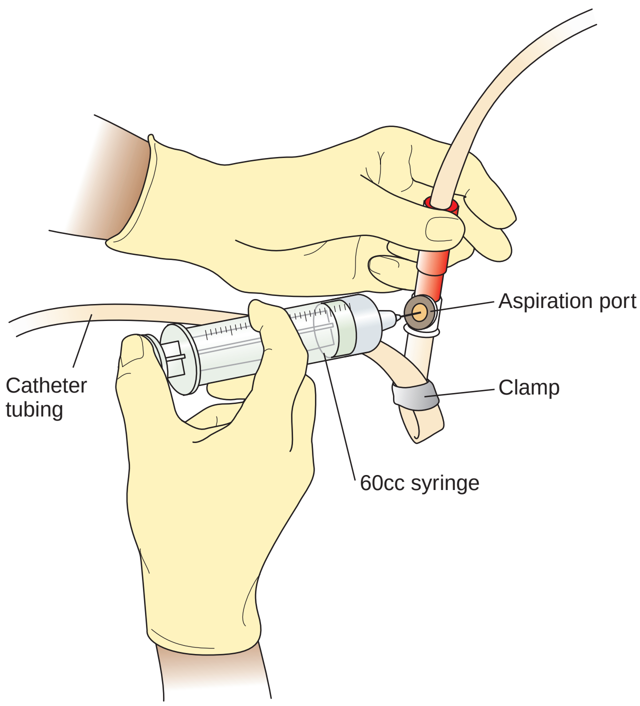


Figure 4-5
Closed irrigation. The catheter tubing is clamped, and irrigation fluid is instilled into the catheter through the aspiration port using a 60-mL syringe. Closed irrigation carries a lower risk than open irrigation for contamination because the system remains closed.

TELL THE NURSE !

When performing an open or closed irrigation, report the following observations to the nurse right away:

- The patient complains of pain or discomfort during or after the irrigation.
- The amount of fluid returned from the bladder is less than the amount of fluid instilled into the bladder.
- The catheter is blocked, and the irrigation is not successful in clearing the blockage.

Continuous Irrigation

Continuous irrigation is used when there is a high risk for the catheter becoming blocked (for example, after prostate surgery). Continuous irrigation requires a triple-lumen indwelling urinary catheter. A triple-lumen indwelling urinary catheter has a lumen for urine drainage, an injection port (for inflating the balloon), and an irrigation port (for instilling the irrigation fluid) (Fig. 4-6). Irrigation fluid flows from the irrigation bag, through the irrigation tubing, into the catheter, through the bladder, and then into the urine drainage bag (see Fig 4-6).

When continuous irrigation is in use, it is important to monitor the bag of irrigation fluid to make sure that it does not run dry. If you notice that the irrigation bag is nearly empty, tell the nurse so that she can replace it with a full one.

It is also important to monitor the urine drainage bag to make sure that it does not become too full. If the urine drainage bag overfills, it could burst. Overfilling of the urine drainage bag can also cause urine and irrigation fluid to be retained in the bladder, which increases the persons risk of infection.

Frequent emptying of the urine drainage bag allows close monitoring of how much irrigation solution is flowing into the bladder and how much is flowing out. If irrigation fluid is flowing into the bladder but the catheter or catheter tubing is blocked (preventing the irrigation fluid and urine from flowing out), the person's bladder could rupture. As a nursing assistant, you will be responsible for helping the nurse to monitor urine and irrigation fluid output. The amount of urine the person voids is determined by subtracting the amount of irrigation fluid that entered the system from the total amount of fluid in the urine drainage bag.

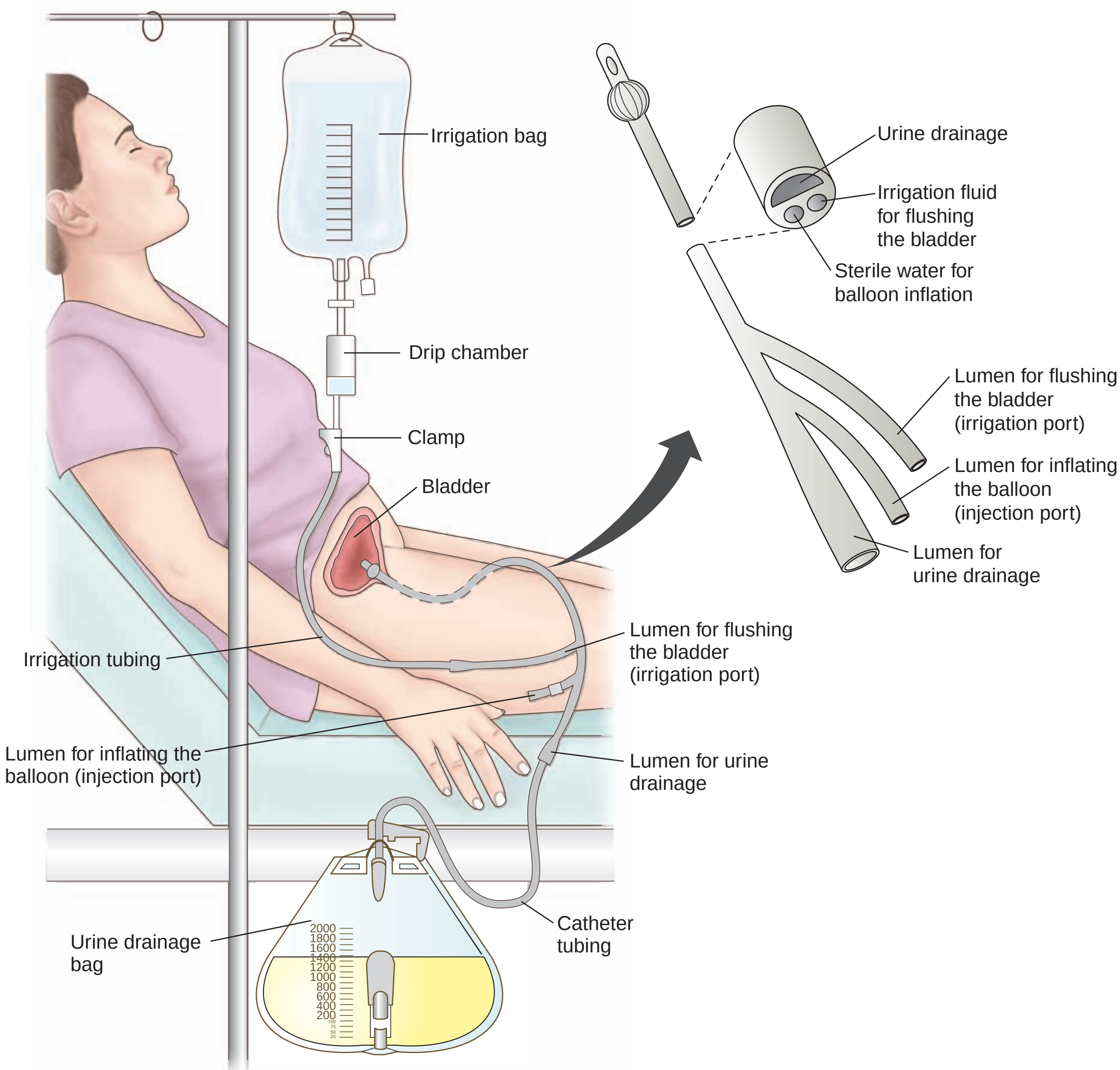


Figure 4-6
A triple-lumen indwelling catheter system is used to perform continuous irrigation.

TELL THE NURSE !

When caring for a patient who is receiving continuous irrigation, report the following observations to the nurse right away:

- The patient's abdomen over the bladder looks swollen or distended or the patient complains of pain or discomfort.
- The amount of fluid in the urine drainage bag is less than the amount of fluid instilled into the bladder.
- The irrigation bag is nearly empty.

REMOVING AN INDWELLING URINARY CATHETER

To remove an indwelling urinary catheter, the balloon is completely deflated and then the catheter is gently pulled out of the body. After removal of the urinary catheter, the patient may experience urinary retention (an inability to void). Temporary urinary incontinence is also common, especially if the catheter had been in place for a long time. To prepare the bladder for removal of the catheter and prevent temporary incontinence from developing, it is common to clamp the tubing of the catheter for a period of time to allow the bladder to fill with urine. The tubing is then unclamped, and the urine is allowed to drain from the bladder. This procedure is repeated over a period of time, with the time intervals between clamping and emptying becoming increasingly longer. Then the catheter is removed, and the patient is allowed to void normally. Procedure 4-5 describes how to remove an indwelling urinary catheter.

Care Alert!

MAKE sure that the patient knows to alert the nursing staff when he urinates for the first time after the indwelling urinary catheter has been removed. If the patient does not urinate within 6 to 8 hours after the indwelling urinary catheter has been removed, the doctor must be notified.

SUMMARY

- The three main types of urinary catheters are straight, indwelling, and suprapubic. Urinary catheters are sized according to their diameter, which is expressed in French (Fr) units. The smaller the French unit, the narrower the catheter.
- A doctor may order urinary catheterization for many different reasons. Patients who are having surgery are often catheterized. Catheterization may be necessary if the patient cannot void because of temporary pain or swelling of the urethra (for example, after childbirth) or if the urethra is blocked (for example, by an enlarged prostate gland). Catheterization may be ordered when it is necessary to closely monitor urine output (for example, for critically ill patients) or when it is necessary to obtain a sterile urine specimen. A person who is incontinent of urine and who has pressure ulcers or other skin conditions that would be aggravated by contact with urine may also need to be catheterized.
- Risks associated with urinary catheterization include infection and trauma to the urethra.
  - To reduce the risk of infection, sterile technique must be used when inserting a urinary catheter.
  - To reduce the risk of urethral trauma, the catheter must be passed gently through the urethra, and the procedure should be stopped if resistance is met. When removing an indwelling urinary catheter, the balloon must be completely deflated to prevent urethral trauma.
- Insertion of a urinary catheter requires a doctor's order. Before inserting a catheter, make sure that the patient understands why the catheter has been ordered and explain the procedure for inserting the catheter. Always provide for the patient's privacy.
- A sterile urine specimen can be obtained using a straight urinary catheter. If the patient already has an indwelling urinary catheter in place, a sterile urine specimen is obtained through the aspiration port. If the indwelling urinary catheter has just been inserted, a sterile urine specimen may be obtained from the urine drainage bag. No matter how the urine specimen is obtained, the basic guidelines for handling and transporting specimens should be followed.
- An indwelling urinary catheter system may need to be irrigated to keep the urine flowing freely. Irrigation may also be used to instill medications into the bladder. There are three methods of irrigating an indwelling urinary catheter system: open, closed, and continuous irrigation. With all types of irrigation, it is important to monitor and record how much irrigation fluid goes in and how much comes out.
  - Open irrigation is done using a catheter-tip syringe. Because the catheter is disconnected from the catheter tubing, open irrigation is associated with a high risk of contamination.
  - Closed irrigation is done by injecting fluid into the aspiration port with a needle and syringe.
  - Continuous irrigation is done using a triple-lumen catheter.
- To remove an indwelling catheter, the balloon is completely deflated and then the catheter is pulled out gently. After removing the indwelling urinary catheter, it is important to monitor for urinary retention or incontinence.

CHAPTER

4 PROCEDURES

PROCEDURE 4-1

Inserting a Straight Urinary Catheter

WHY YOU DO IT Catheterization with a straight urinary catheter may be ordered when a person needs to empty the bladder but cannot because of pain or swelling that is temporary or when it is necessary to obtain a sterile urine specimen.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Bed protector
- Perineal care supplies
- Bedpan
- Urinary catheter insertion kit:
  - Sterile gloves
  - Sterile drapes, one of which is fenestrated (has an opening)
  - Sterile straight urinary catheter
  - Antiseptic cleanser and cotton balls with forceps or antiseptic swabs
  - Lubricant
  - Specimen container
  - Basin (box of the kit)

Procedure

2. Place the catheterization supplies on a clean surface, such as the bedside table.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. Lower the head of the bed to a flat position (as tolerated). If the side rails are in use, lower the rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
4. Fanfold the linens to the foot of the bed. Position the person on his or her back. If the person is a woman, have her spread her legs apart and bend her knees slightly, if possible. (A woman can also be positioned on her side with her knees drawn to her chest.) Adjust the person's hospital gown or pajamas as necessary to expose the perineal area. Drape the person with the bath blanket. Position the bed protector under the person's buttocks to keep the bed linens dry.
5. Put on the non-sterile gloves and provide perineal care.
6. Dispose of the bed protector in a facility-approved waste container. Cover the perineal area, remove your gloves and dispose of them in a facility-approved waste container, and wash your hands. (If the side rails are in use, raise them before leaving the bedside.)
7. Return to the bedside. If the side rails are in use, lower the side rail on the working side of the bed. Expose the person's perineal area before creating your sterile field.
8. Using sterile technique, create a sterile field by opening the urinary catheter insertion kit on the work surface. (The paper wrapper becomes the sterile field.)
9. Remove the sterile glove package without touching the other items inside the urinary catheter insertion kit. Place the sterile glove package on the work surface next to the urinary catheter insertion kit.
10. **Position the first drape (the one without the opening).** Look for the edge of the sterile drape that is folded back to create a small area for you to grasp. Grasp the edge of the sterile drape with your thumb and index finger and lift the sterile drape straight up as you step back. Hold the sterile drape away from your body and allow it to unfold. Grasp the other top corner of the sterile drape with the thumb and index finger of your other hand and allow the sterile drape to unfold completely.

(continued)

  - **a.** Carefully fold the sterile drape in half lengthwise so that the sterile side is covering itself.
  - **b.** Open the drape. The non-sterile side will be resting on your forearms.
  - **c.** Ask the person to lift the buttocks. Position the sterile drape on the bed just under the buttocks with the sterile side facing up. Pull your arms out from under the sterile drape, being careful not to lean or reach over the sterile drape.

11. Put on the sterile gloves.

12. If needed, set up the specimen container by loosening or removing the lid. Leave the specimen container and lid on the sterile field.

13. **Position the fenestrated drape (if used).** Look for the edge of the sterile drape that is folded back to create a small area for you to grasp. Grasp the edge of the sterile drape with your thumb and index finger and lift the sterile drape straight up as you step back. Hold the sterile drape away from your body and allow it to unfold. Grasp the other top corner of the sterile drape with the thumb and index finger of your other hand and allow the sterile drape to unfold completely.

  - **a. Female patient:** Position the sterile drape over the perineum so that the labia are exposed, being careful not to touch anything but the fenestrated drape with your sterile gloves.

Step 13a For a female patient, position the fenestrated drape so that only the labia are exposed.

  - **b. Male patient:** Position the sterile drape with the opening over the penis, being careful not to touch anything but the fenestrated drape with your sterile gloves.

Step 13b For a male patient, position the fenestrated drape so that the opening is over the penis.

14. Pour antiseptic cleanser over the cotton balls or open the antiseptic cleansing swabs.

15. Open the packet of lubricant or uncap the lubricant syringe. Lubricate the tip of the catheter.

  - **a. Female patient:** Lubricate 1 to 2 inches.
  - **b. Male patient:** Lubricate 4 to 5 inches.

16. Clean the urinary meatus.

  - **a. Female patient:** Spread the labia apart using your non-dominant hand. (Your non-dominant hand is now contaminated.) Using your dominant hand, pick up an antiseptic swab or use the forceps to pick up an antiseptic-soaked cotton ball. Using a clean cotton ball or swab for each stroke, first clean one side, then the other side, and finally the middle, starting at the top and stroking downward. To avoid contaminating the meatus, you must continue to hold the labia apart until the catheter insertion is finished.

Watch & Learn **Step 16a** The female urinary meatus is cleaned in three strokes using a clean cotton ball or antiseptic swab for each stroke. Wipe in one direction, from top to bottom.

b. Male patient: Hold the penis using your non-dominant hand. (Your non-dominant hand is now contaminated.) Using your dominant hand, pick up an antiseptic swab or use the forceps to pick up an antiseptic-soaked cotton ball.

- **If the man is circumcised:** Place the cotton ball or the antiseptic swab at the tip of the penis and stroke in a circular motion downward to the base of the penis. Repeat two more times using a clean cotton ball or swab for each stroke.

Step 16b The male urinary meatus is cleaned in three strokes using a clean cotton ball or antiseptic swab for each stroke. Wipe in a circular motion, moving from the tip of the penis to the base.

- **If the man is uncircumcised:** Retract the foreskin by gently pushing the skin toward the base of the penis. Place the cotton ball or the antiseptic swab at the tip of the penis and stroke in a circular motion downward to the base of the penis. Repeat two more times using a clean cotton ball or swab for each stroke. To avoid contaminating the meatus, you must continue to retract the foreskin until the catheter insertion is finished.

17. Using your dominant hand, place the box holding the catheter between the person's legs. (The box will function as the basin to collect the urine.) Avoid touching the bed, the linens, or the person with your sterile dominant hand.

18. Insert the urinary catheter. Pick up the catheter, holding it about 2 inches from the end. Leave the other end in the box.

a. Female patient: Ask the patient to breathe deeply. Insert the catheter into the urinary meatus and advance it slowly until the catheter passes into the bladder and urine begins to flow (about 2 to 3 inches).

TIP: If you are catheterizing a woman and urine does not begin to flow, you probably inserted the catheter into the vaginal opening instead of the urinary meatus. (It is easy to confuse the vaginal opening and the urinary meatus, especially in older women.) Leave the catheter in place, obtain new supplies, and begin again. Leaving the first catheter in place will make it easier to identify the urinary meatus on your second attempt.

Step 18a Insert the end of the catheter into the urinary meatus.

b. Male patient: Ask the patient to breathe deeply. Insert the catheter into the urinary meatus and advance it slowly until the catheter passes into the bladder and urine begins to flow (about 6 to 7 inches).

Step 18b Insert the end of the catheter into the urinary meatus.

(continued)

19. If ordered, collect a sterile urine specimen. Hold the end of the catheter over the sterile specimen container and collect about 30 mL of urine. After collecting the specimen, pinch the catheter to stop the flow of urine. Move the specimen container aside and position the end of the catheter over the basin. Allow the rest of the urine to drain into the basin according to facility policy.
20. Gently remove the catheter from the body. If the patient is an uncircumcised man, pull the foreskin back up over the head of the penis.
21. Remove the sterile drapes and dispose of them in a facility-approved waste container.
22. Remove your gloves and dispose of them in a facility-approved waste container.
23. Adjust the person's hospital gown or pajama bottoms as necessary. Remove the bath blanket. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
24. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.
25. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the area designated by your facility. If a specimen was collected, take the specimen container to the designated location.

Finishing Up

26. Complete the "Finishing Up" steps.

What You Document

- The size of the catheter
- The amount of urine passed
- Any problems encountered
- How the patient tolerated the procedure

PROCEDURE 4-2

Inserting an Indwelling Urinary Catheter

WHY YOU DO IT Catheterization with an indwelling urinary catheter may be ordered when a person is unable to urinate using a toilet, bedpan, urinal, or bedside commode because of a disability or illness.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Bed protector
- Perineal care supplies
- Bedpan
- Urinary catheter insertion kit:
  - Sterile gloves
  - Sterile drapes, one of which is fenestrated (has an opening)
  - Sterile indwelling urinary catheter
  - Antiseptic cleanser and cotton balls with forceps or antiseptic swabs
  - Lubricant
  - Prefilled syringe of sterile water
  - Urine drainage bag and catheter tubing (if not already attached to the catheter)
  - Specimen container
  - Basin (box of the kit)
- Catheter strap or adhesive tape

Procedure

2. Place the catheterization supplies on a clean surface, such as the bedside table.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. Lower the head of the bed to a flat position (as tolerated). If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
4. Fanfold the linens to the foot of the bed. Position the person on his or her back. If the person is a woman, have her spread her legs apart and bend her knees slightly, if possible. (A woman can also be positioned on her side with her knees drawn to her chest.) Adjust the person's hospital gown or pajamas as necessary to expose the perineal area. Drape the person with the bath

blanket. Position the bed protector under the person's buttocks to keep the bed linens dry.

5. Put on the non-sterile gloves and provide perineal care.
6. Dispose of the bed protector in a facility-approved waste container. Cover the perineal area, remove your gloves and dispose of them in a facility-approved waste container, and wash your hands. (If the side rails are in use, raise them before leaving the bedside.)
7. Return to the bedside. If the side rails are in use, lower the side rail on the working side of the bed. Expose the perineal area before creating the sterile field.
8. Using sterile technique, create the sterile field by opening the urinary catheter insertion kit on the work surface. (The paper wrapper becomes the sterile field.)
9. Remove the sterile glove package without touching the other items inside the urinary catheter insertion kit. Place the sterile glove package on the work surface next to the urinary catheter insertion kit.
10. **Position the first drape (the one without the opening)**. Look for the edge of the sterile drape that is folded back to create a small area for you to grasp. Grasp the edge of the sterile drape with your thumb and index finger and lift the sterile drape straight up as you step back. Hold the sterile drape away from your body and allow it to unfold. Grasp the other top corner of the sterile drape with the thumb and index finger of your other hand and allow the sterile drape to unfold completely.
    a. Carefully fold the sterile drape in half lengthwise so that the sterile side is covering itself.
    b. Open the drape. The non-sterile side will be resting on your forearms.
    c. Ask the person to lift the buttocks. Position the sterile drape on the bed just under the buttocks with the sterile side facing up. Pull your arms out from under the sterile drape, being careful not to lean or reach over the sterile drape.
11. Put on the sterile gloves.
12. **Position the fenestrated drape (if used)**. Look for the edge of the sterile drape that is folded back to create a small area for you to grasp. Grasp the edge of the sterile drape with your thumb and index finger and lift the sterile drape straight up as you step back. Hold the sterile drape away from your body and allow it to unfold. Grasp the other top corner of the sterile drape with the thumb and index finger of your other hand and allow the sterile drape to unfold completely.
    a. **Female patient:** Position the sterile drape over the perineum so that the labia are exposed, being careful not to touch anything but the fenestrated drape with your sterile gloves.
    b. **Male patient:** Position the sterile drape with the opening over the penis, being careful not to touch anything but the fenestrated drape with your sterile gloves.
13. Test the balloon on the catheter tip. Insert the tip of the prefilled syringe of sterile water in the injection port. Push the plunger to inject the water into the injection port.
    a. If the balloon inflates properly, withdraw the water by pulling back on the plunger. Leave the syringe attached to the injection port.
    b. If the balloon does not inflate properly or if you are unable to withdraw the water back into the syringe, obtain a new indwelling urinary catheter.

Watch & Learn **Step 13** Test the balloon.

14. Pour antiseptic cleanser over the cotton balls or open the antiseptic cleansing swabs.
15. Open the packet of lubricant or uncap the lubricant syringe. Lubricate the tip of the catheter.
    a. **Female patient:** Lubricate 1 to 2 inches.
    b. **Male patient:** Lubricate 4 to 5 inches.

(continued)

16. Clean the urinary meatus.

a. Female patient: Spread the labia apart using your non-dominant hand. (Your non-dominant hand is now contaminated.) Using your dominant hand, pick up an antiseptic swab or use the forceps to pick up an antiseptic-soaked cotton ball. Using a clean cotton ball or swab for each stroke, first clean one side, then the other side, and finally the middle, starting at the top and stroking downward. To avoid contaminating the meatus, you must continue to hold the labia apart until the catheter insertion is finished.

b. Male patient: Hold the penis using your non-dominant hand. (Your non-dominant hand is now contaminated.) Using your dominant hand, pick up an antiseptic swab or use the forceps to pick up an antiseptic-soaked cotton ball.

- **If the man is circumcised:** Place the cotton ball or the antiseptic swab at the tip of the penis and stroke in a circular motion downward to the base of the penis. Repeat two more times using a clean cotton ball or swab for each stroke.
- **If the man is uncircumcised:** Retract the foreskin by gently pushing the skin toward the base of the penis. Place the cotton ball or the antiseptic swab at the tip of the penis and stroke in a circular motion downward to the base of the penis. Repeat two more times using a clean cotton ball or swab for each stroke. To avoid contaminating the meatus, you must continue to retract the foreskin until the catheter insertion is finished.

17. Using your dominant hand, place the box holding the catheter between the person's legs. Avoid touching the bed, the linens, or the person with your sterile dominant hand.

18. Insert the urinary catheter. Pick up the catheter, holding it about 2 inches from the end. Leave the other end in the box.

a. Female patient: Ask the patient to breathe deeply. Insert the catheter into the urinary meatus and advance it slowly until the catheter passes into the bladder and urine begins to flow (about 2 to 3 inches). Insert the catheter another 1 to 2 inches to ensure that the balloon passes into the bladder prior to inflation.

TIP: If you are catheterizing a woman and urine does not begin to flow, you probably inserted the catheter into the vaginal opening instead of the urinary meatus. (It is easy to confuse the vaginal opening and the urinary meatus, especially in older women.) Leave the catheter in place, obtain new supplies, and begin again. Leaving the first catheter in place will make it easier to identify the urinary meatus on your second attempt.

b. Male patient: Ask the patient to breathe deeply. Insert the catheter into the urinary meatus and advance it slowly until the catheter passes into the bladder and urine begins to flow (about 6 to 7 inches). Continue to insert the catheter up to the bifurcation (fork) to ensure that the balloon passes into the bladder before inflation.

19. Inflate the balloon by injecting the sterile water into the injection port. Use all of the fluid in the syringe and then remove the syringe. If the person complains of pain, stop immediately and withdraw the water by pulling back on the plunger. (The balloon may be in the urethra instead of the bladder.) Remove the catheter and start over with new supplies.

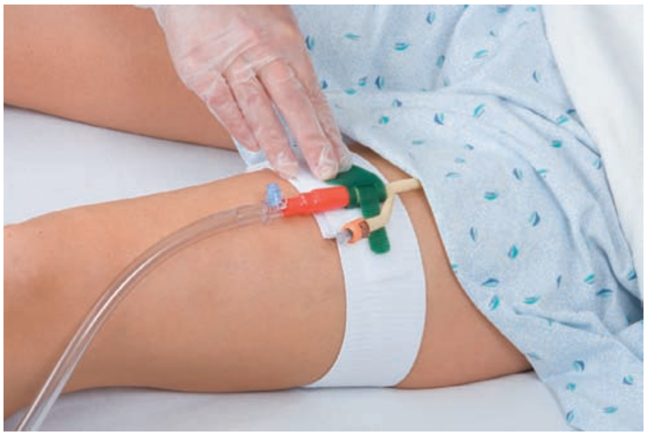
Step 19 Inflate the balloon.

20. Pull on the catheter gently until you meet resistance.

21. If the patient is an uncircumcised man, pull the foreskin back up over the head of the penis.

22. Loosely secure the catheter tubing to the person's body using the catheter strap or adhesive tape.

a. **Female patient:** Secure the catheter tubing to the inner thigh.
b. **Male patients:** Secure the catheter tubing to the inner thigh or lower abdomen.



Step 22 Secure the catheter tubing to the person's body, leaving some slack.

23. Gently coil the remaining length of catheter tubing and secure it to the bed linens with a plastic clip or safety pin. Secure the urine drainage bag to the bed frame.

Step 23 Secure the urine drainage bag to the bed frame.

24. Remove the sterile drapes and dispose of them in a facility-approved waste container.
25. Remove your gloves and dispose of them in a facility-approved waste container.
26. Adjust the person's hospital gown or pajama bottoms as necessary. Remove the bath blanket. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
27. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.
28. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the area designated by your facility. If a specimen was collected, take the specimen container to the designated location.

Finishing Up

29. Complete the "Finishing Up" steps.

What You Document

- The size of the catheter
- The size of the balloon
- The amount of urine passed
- Any problems encountered
- How the patient tolerated the procedure

PROCEDURE 4-3

Obtaining a Sterile Urine Specimen From a Patient With an Indwelling Urinary Catheter

WHY YOU DO IT A sterile urine specimen is often requested for urinalysis. Proper collection and handling of the urine specimen help ensure that the urinalysis results are accurate.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

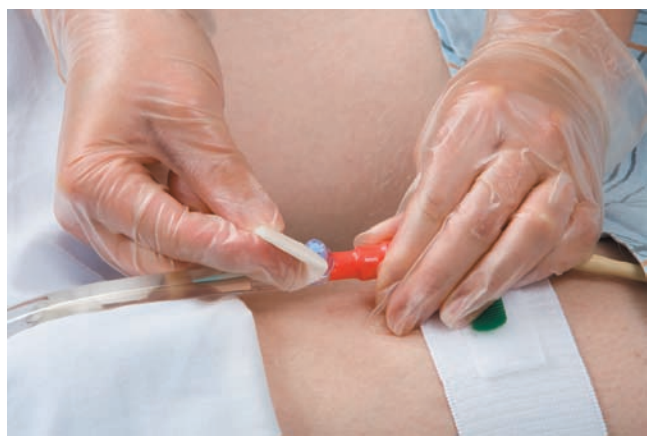
- Non-sterile gloves
- Alcohol wipes
- 18- or 19-gauge blunt needle (not needed if the aspiration port is "needle-less")
- 10-mL syringe
- Sterile specimen container and label
- Plastic transport bag

Procedure

2. Place the supplies on a clean surface, such as the bedside table. Complete the label with the person's name, room number, and other identifying information. Put the completed label on the specimen container. If the aspiration port is not "needle-less," attach the capped blunt needle to the 10-mL syringe.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
4. Fanfold the top linens to allow access to the aspiration port on the indwelling urinary catheter. Help the person to a comfortable position and adjust the person's hospital gown or pajamas as necessary to expose the aspiration port on the catheter. Remove the adhesive tape or catheter strap.
5. Put on the gloves.
6. Clamp the catheter tubing distal to the aspiration port.

Step 5 Clamp the catheter tubing.

7. Allow urine to collect in the catheter tubing. (This may take 10 to 30 minutes.)
8. Wipe the aspiration port with an alcohol wipe.



Step 8 Wipe the aspiration port with an antiseptic wipe.

9. If the aspiration port is not "needle-less," remove the cap from the needle and insert the needle and syringe into the aspiration port. If the aspiration port is "needle-less," attach the syringe to the aspiration port using a twisting motion. Withdraw 5 to 7 mL of urine by pulling back on the plunger.

Step 9 Withdraw the urine by pulling back on the plunger.

10. Remove the needle and syringe (or just the syringe if the aspiration port is "needle-less") from the aspiration port.
11. Open the specimen container and place the lid on the over-bed table, with the inside of the lid facing up. Gently push the plunger to empty the urine into the specimen container. Avoid touching the inside of the specimen container with the needle and syringe or your hands.
12. Discard the needle and syringe in a facility-approved sharps container.
13. Unclamp the catheter tubing so the urine can flow into the urine drainage bag.
14. Put the lid on the specimen container. Make sure that the lid is tight. Place the specimen container into the transport bag.
15. Remove your gloves and dispose of them in a facility-approved waste container. Dispose of disposable items in a facility-approved waste container.
16. Loosely secure the catheter tubing to the person's body using the catheter strap or adhesive tape.
17. Adjust the person's hospital gown or pajama bottoms as necessary. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
18. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.
19. Take the specimen container to the designated location.

Finishing Up

20. Complete the "Finishing Up" steps.

What You Document

- Completion of the procedure per the doctor's orders

PROCEDURE 4-4

Irrigating an Indwelling Urinary Catheter Using Closed Irrigation

WHY YOU DO IT Closed irrigation is frequently ordered to instill medications or other substances into the bladder to prevent infection or the formation of sediment. Closed irrigation may also be used to flush the catheter if the catheter is blocked (or is at risk for becoming blocked) by blood clots or sediment.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Paper towels
- Graduate
- Alcohol wipes
- 18- or 19-gauge blunt needle (not needed if the aspiration port is "needle-less")
- 30- to 60-mL syringe
- Bed protector
- Sterile irrigation fluid
- Sterile basin

Procedure

2. Place the supplies on a clean surface, such as the bedside table.
3. Put on the gloves. Empty the urine drainage bag and record the urine output according to

(continued)

facility policy. Empty and clean the graduate. Remove your gloves and dispose of them in a facility-approved waste container. Wash your hands.

4. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
5. Fanfold the top linens to allow access to the aspiration port on the indwelling urinary catheter. Help the person to a comfortable position and adjust the person's hospital gown or pajamas as necessary to expose the aspiration port on the catheter. Remove the adhesive tape or catheter strap.
6. Position the bed protector under the catheter and aspiration port to keep the linens dry.
7. Using sterile technique, create the sterile field by opening the sterile basin on the work surface. (The basin becomes the sterile field.)
8. Put on a clean pair of gloves.
9. Fill the sterile basin with sterile irrigation fluid. Place the tip of the syringe in the sterile basin and withdraw irrigation fluid by pulling back on the plunger.

Step 9 Draw the irrigation fluid into the syringe.

10. If the aspiration port is not "needle-less," attach the capped blunt needle to the syringe.
11. Wipe the aspiration port with an alcohol wipe.
12. Clamp the catheter tubing distal to the aspiration port.
13. If the aspiration port is not "needle-less," remove the cap from the needle and insert the needle and syringe into the aspiration port. If the aspiration port is "needle-less," attach the syringe to the aspiration port using a twisting motion. Push the plunger to inject the irrigation fluid into the aspiration port. Repeat as many times as ordered or necessary.

Step 13 Insert the needle and syringe into the aspiration port.

14. Discard the needle and syringe in a facility-approved sharps container.
15. Unclamp the catheter tubing so that the urine can flow into the urine drainage bag.

Step 15 Unclamp the catheter tubing.

16. Remove your gloves and dispose of them in a facility-approved waste container. Dispose of disposable items in a facility-approved waste container.
17. Loosely secure the catheter tubing to the person's body using the catheter strap or adhesive tape.

18. Adjust the person's hospital gown or pajama bottoms as necessary. Remove the bed protector. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
19. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.

Finishing Up

20. Complete the "Finishing Up" steps.

What You Document

- The type of irrigation fluid used
- How much irrigation fluid was used
- How much irrigation fluid was returned
- The appearance of the returned irrigation fluid
- How much urine was returned
- The appearance of the urine
- How the patient tolerated the procedure

PROCEDURE 4-5

Removing an Indwelling Urinary Catheter

WHY YOU DO IT An indwelling urinary catheter is removed when the person no longer needs it or when it is necessary to replace it. Removing the indwelling urinary catheter properly prevents urethral trauma.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Paper towels
- Graduate
- Bed protector
- Perineal care supplies
- 10- or 30-mL syringe (depending on the size of the balloon; check the person's care plan or the notation on the injection port)

Procedure

2. Place the supplies on a clean surface, such as the bedside table.
3. Put on the gloves. Empty the urine drainage bag and record the urine output according to facility policy. Empty and clean the graduate. Remove your gloves and dispose of them in a facility-approved waste container. Wash your hands.
4. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. Lower the head of the bed to a flat position (as tolerated). If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.
5. Fanfold the top linens to the foot of the bed. Position the person on his or her back. If the person is a woman, have her spread her legs apart and bend her knees slightly, if possible. (A woman can also be positioned on her side with her knees drawn to her chest.) Adjust the person's hospital gown or pajamas as necessary to expose the perineal area. Drape the person with the bath blanket. Position the bed protector under the person's buttocks to keep the bed linens dry.
6. Remove the adhesive tape or catheter strap.
7. Put on a clean pair of gloves.
8. Deflate the balloon on the catheter tip: Insert the tip of the syringe in the injection port. Withdraw the water in the balloon by pulling back on the plunger. Make sure to withdraw all of the water (remember that some balloons hold up to 30 mL of water).

(continued)

Step 8 Deflate the balloon on the catheter tip.

9. Gently pull the catheter out of the bladder. If the person experiences pain or if there is resistance, stop and make sure that the balloon is completely deflated. If the balloon is completely deflated but the person is still experiencing pain or there is resistance, call for the nurse.
10. Discard the catheter, syringe, catheter tubing, and urine drainage bag in a facility-approved waste container.
11. Provide perineal care. Remove your gloves and dispose of them in a facility-approved waste container. Wash your hands.
12. Adjust the person's hospital gown or pajama bottoms as necessary. Remove the bed protector. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
13. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.

Finishing Up

14. Complete the "Finishing Up" steps.

What You Document

- The time the indwelling urinary catheter was removed
- Any problems encountered
- How the patient tolerated the procedure
- The amount of urine in the urine drainage bag

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. You are caring for Mrs. Wight. The nurse tells you that the doctor has requested a sterile urine specimen from Mrs. Wight and asks you to catheterize her to obtain it. What kind of urinary catheter will you use?
   a. Suprapubic catheter
   b. Indwelling catheter
   c. Foley catheter
   d. Straight catheter

2. The nurse has asked you to catheterize Mr. Slotnik with an indwelling urinary catheter. You know you have inserted the catheter far enough to inflate the balloon when:
   a. Urine begins to flow through the catheter tubing
   b. You have inserted the catheter all the way to the bifurcation
   c. You have inserted the catheter 1 to 2 inches farther after urine begins to flow through the catheter tubing
   d. You feel certain that you must be in the bladder

3. You have an order to insert an indwelling urinary catheter for Mrs. Jackson. The doctor has ordered an 18-Fr catheter. You recognize that the catheter the doctor ordered is different than the catheter that is included in the standard urinary catheter insertion kit. The catheter the doctor has ordered is:
   a. Larger in diameter than the standard 16-Fr catheter
   b. Smaller in diameter than the standard 16-Fr catheter
   c. Longer than the standard 16-Fr catheter
   d. Shorter than the standard 16-Fr catheter

4. A nurse asks you to irrigate Mrs. Yee's urinary catheter using the aspiration port. What type of irrigation is the nurse asking you to perform?
   a. Continuous irrigation
   b. Sterile irrigation
   c. Open irrigation
   d. Closed irrigation

5. You notice that when you irrigate Mrs. Yee's urinary catheter, the irrigation fluid goes into the bladder but there is very little return. Mrs. Yee tells you that she needs to urinate. What should you do?
   a. Wait for a few minutes; the irrigation fluid should start to drain
   b. Stop the procedure and notify the nurse right away
   c. Tell Mrs. Yee to breathe deeply
   d. Irrigate the catheter some more

6. Why are urinary catheters irrigated?
   a. To prevent or clear blockage by sediment or blood clots
   b. To keep the bladder clean and smelling good
   c. To obtain a sterile urine specimen
   d. To dilute the urine

7. What is the purpose of clamping the catheter tubing when collecting a sterile urine specimen from the aspiration port?
   a. To keep the urine sterile
   b. To prevent the urine from draining into the urine drainage bag
   c. To prevent the catheter tubing from becoming tangled
   d. You should never clamp the catheter tubing

8. You are trying to remove Mrs. Warrick's indwelling urinary catheter, but you are feeling resistance when you attempt to pull the catheter from the bladder, and Mrs. Warrick tells you that it hurts when you pull. What should you do?

a. Reassure Mrs. Warrick that it is normal to feel pain when an indwelling urinary catheter is removed
b. Call the doctor immediately
c. Leave the catheter in place for now and try again later
d. Double check to make sure that the balloon has been properly deflated

9. After an indwelling urinary catheter has been removed, what should you do next?

a. Discard the catheter and provide perineal care
b. Check that the balloon on the catheter is working
c. Notify the nurse that you have accomplished your task
d. Remove your gloves and wash your hands

STOP and Think!

1. Mr. Cartwright is a 60-year-old man who is experiencing urinary frequency and trouble starting the stream of urine. As a result, the doctor has ordered placement of an indwelling urinary catheter. Mr. Cartwright has never been catheterized before, and he is afraid that the procedure is going to be painful. What can you do to reduce Mr. Cartwright's anxiety?

2. One of your patients, Mr. Jordan, has just had surgery to treat an enlarged prostate that was pressing against his urethra. The doctor has ordered continuous irrigation to prevent clots from obstructing the urethra. What will you monitor as you are caring for Mr. Jordan, and why? What steps can you take to prevent complications from developing?

3. Mrs. Hammity has had abdominal surgery, and the doctor wants her to get out of bed and walk. Mrs. Hammity is obese and has difficulty getting up. She has to urinate frequently and is occasionally incontinent. The nursing assistant who is responsible for caring for Mrs. Hammity has told you that she is going to ask the nurse to get an order from the doctor so an indwelling urinary catheter can be placed. Do you think catheterization is appropriate in this situation? Why or why not? Do you have any ideas about what your coworker could do to make things easier for herself and for Mrs. Hammity?

CHAPTER

5

Advanced Nutrition Skills

WHAT WILL YOU LEARN?

Proper nutrition and hydration are essential for health and healing. Many patients who are being cared for in advanced care settings are unable to take food and fluids through the mouth and require nutritional support. In this chapter, you will learn about two major methods of providing nutritional support (enteral nutrition and total parenteral nutrition). You will also learn about your role in caring for patients who are receiving nutritional support. We will also discuss how to monitor blood glucose levels. When you are finished with this chapter, you will be able to:

1. Explain why enteral nutrition is the next best option when taking food and fluids through the mouth is not possible.

Many patients in advanced care settings require nutritional support. (Photograph courtesy of Pamela Malone.)

2. Explain how a nasogastric or nasointestinal tube is used to provide enteral nutrition and describe some of the risks associated with the use of a nasogastric or nasointestinal tube.
3. Demonstrate the proper technique for removing a nasogastric tube.
4. Explain how a gastrostomy or jejunostomy tube is used to provide enteral nutrition.
5. Describe three ways of administering enteral nutrition.
6. Describe the different schedules that are used to administer enteral nutrition.
7. Describe the different ways enteral feeding formulas may be packaged.
8. Explain the nursing assistant's role in caring for a person who is receiving enteral nutrition.
9. List complications that can occur when a person is receiving enteral nutrition and describe ways that the nursing team helps to prevent these complications from occurring.
10. List signs and symptoms that a person who is receiving enteral nutrition may have that should be reported to the nurse right away.
11. Explain how total parenteral nutrition (TPN) differs from enteral nutrition and explain why a person might require TPN.
12. Explain the nursing assistant's role in caring for a person who is receiving TPN.
13. Explain why a person might need to have his blood glucose levels monitored.
14. Demonstrate proper technique for monitoring a person's blood glucose level.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Bolus intermittent feeding	Intermittent feeding	Continuous feeding	Cyclic feeding
			Lancet

ENTERAL NUTRITION

You should remember from your basic training how the gastrointestinal system works. Food is ingested (taken in through the mouth) and digested (broken down into simple elements, or nutrients). Digestion begins in the mouth and continues in the stomach. As the chyme (the liquid substance produced by digestion of the food in the stomach) passes through the small and large intestines, absorption (the transfer of nutrients from the digestive tract into the bloodstream) occurs, leaving only waste products behind. Eventually, these waste products are passed from the body in the form of feces.

Obtaining nutrients and fluids through the normal processes of ingestion, digestion, and absorption is always best. However, some patients may have conditions that affect their ability to chew and swallow. As a result, these patients are not able to ingest the fluids and nutrients they need. If the patient's stomach and intestines are still working normally, then the next best option for obtaining nutrition is enteral nutrition. With enteral nutrition, food is placed directly in the stomach or intestines (eliminating the need for the person to ingest the food), but the processes of digestion and absorption occur as they normally would.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Think for a moment what it would be like not to be able to swallow. Your mouth and throat would feel dry and uncomfortable, and your teeth would feel like they needed to be brushed. You might crave a big, cold glass of water more than anything else in the world, but you can't have one. Depending on your condition, you might not even be able to ask for someone to help you. Simple acts, such as providing frequent oral care or offering ice chips, promote comfort and can help make enteral nutrition more bearable for the person receiving it.

A. Inserted through nose

B. Inserted through abdominal opening

Figure 5-1
Enteral nutrition can be delivered (**A**) through a tube passed through the nose or (**B**) through a tube inserted through a surgically made opening in the abdomen.

FEEDING TUBES FOR ENTERAL NUTRITION

Enteral nutrition is sometimes called "tube feeding" because food, in the form of a formula-like fluid, is delivered through a tube that has been passed into the digestive tract. The tube may be passed through the nose, or it may be inserted through an incision in the abdomen (Fig. 5-1).

Tubes Inserted Through the Nose

Naso- means "nose." A nasogastric tube is inserted through the nose, down the throat, and into the stomach. A nasointestinal tube is inserted through the nose, down the throat, and into the small intestine. Because tubes inserted through the nose are very irritating to the inside of the nose and the back of the throat, they are only meant to be used for a short time (for example, a few days or weeks).

Nasogastric and nasointestinal tubes can be easily displaced, especially if the person vomits, coughs, or pulls on the tube. Tape is used to secure the tube to the nose or cheek. Pressure sores can develop inside the nose if the tube is pulled tight against the nostril. When applying tape to secure a nasogastric or nasointestinal tube, it is important to make sure that the tube is secure but not pulled tightly against the nostril.

Nasogastric and nasointestinal tubes can cause irritation and crusting of mucus around the nostrils. Gently removing the mucus crust with a warm, wet washcloth and applying a lubricant can help to keep the person comfortable.

Nursing assistants are not usually trained to insert nasogastric or nasointestinal tubes because inserting the tube incorrectly can have very serious consequences. If the tube is accidentally passed into the lungs instead of the stomach or intestines, anything that is put into the tube (formula, water, or medications) will go into the lungs instead of the digestive tract. As a result, the person may experience difficulty breathing, aspiration pneumonia, respiratory arrest, or even death.

After the nurse inserts the nasogastric or nasointestinal tube, an x-ray is obtained to make sure that the end of the tube is where it is supposed to be (that is, in the stomach or small intestine). Because it is easy for the tube to change position, the nurse must confirm that the tube is still in the correct place each time anything is going to be administered through the tube. There are several methods the nurse uses to confirm the placement of the tube:

- The nurse measures the length of tubing that extends out of the body (from the nostril to the end of the tube). If the length has changed since the tube was inserted, the tube may not be in the correct place.
- The nurse withdraws a sample of the stomach contents using a large syringe and tests the sample's pH. The contents of the stomach and the contents of the intestines each have

a specific pH, so if the pH of the sample is different from what is expected, the tube may not be in the correct place.

- The nurse injects air through the feeding tube using a 60-mL syringe while listening over the stomach with a stethoscope. If the nurse does not hear the air entering the stomach, the tube may not be in the correct place. Although this method of checking tube placement is commonly used, it is not reliable enough to be used alone. This method of checking tube placement should only be used in combination with another method.

Although inserting a nasogastric or nasointestinal tube is outside of your scope of practice, you may receive additional training to learn how to remove a nasogastric tube (Procedure 5-1). A doctor's order is necessary to remove a nasogastric tube.

Tubes Inserted Through a Surgical Incision

-Stomy means a "surgically made opening." A gastrostomy tube is inserted into the stomach through a surgically made opening in the abdomen. (A percutaneous endoscopic gastrostomy [PEG] tube is a special type of gastrostomy tube.) A jejunostomy tube is inserted into the jejunum (part of the small intestine) through a surgically made opening in the abdomen. Tubes that are inserted through a surgically made opening in the abdomen are used when the person requires nutritional support for longer than a few weeks (for example, months or years). The doctor is responsible for inserting and removing gastrostomy tubes, PEG tubes, and jejunostomy tubes.

When caring for a person with a gastrostomy, PEG, or jejunostomy tube, check the skin around the insertion site for redness, drainage, or leaking formula. A small amount of mucus around the insertion site is normal. The insertion site can be cleaned with mild soap and water according to the person's care plan. Be sure to rinse well and pat the area dry. If needed, a gauze pad can be taped into place to absorb the small amount of mucus that may ooze around the insertion site. Be sure to document the care you provide and report your observations about the condition of the insertion site to the nurse.

ADMINISTERING ENTERAL NUTRITION

Depending on where you work, you may be permitted to assist the nurse with administering tube feedings.

Methods of Administering Enteral Nutrition

There are several different ways of administering enteral nutrition.

- **By syringe.** The end of a 60-mL syringe is inserted into the open end of the patient's feeding tube, and formula is poured into the syringe. The syringe is held up, and the formula is allowed to flow into the feeding tube. The rate at which the formula flows into the feeding tube is controlled by adjusting the height at which the syringe is held (Fig. 5-2A).
- **By feeding bag.** The formula is poured into a feeding bag, which is hung on an intravenous (IV) pole. A length of tubing connects the feeding bag to the patient's feeding tube. The rate at which the formula flows into the feeding tube is controlled by adjusting a clamp on the tubing (see Fig. 5-2B).
- **By feeding pump.** The formula is poured into a feeding bag, which is hung on an IV pole. The tubing from the feeding bag is threaded through the feeding pump and then connected to the patient's feeding tube (see Fig. 5-2C). The rate at which the formula flows into the tubing is controlled by the feeding pump.

General guidelines for administering enteral nutrition are given in Guidelines Box 5-1.

Enteral Feeding Schedules

Formula may be administered to the person according to many different types of schedules. Feedings may be bolus intermittent, intermittent, continuous, or cyclic. Nurses administer bolus intermittent and intermittent feedings. You may be asked to assist a nurse with continuous or cyclic feedings by hanging or refilling the feeding bag.

- In **bolus intermittent feeding,** the person receives a large amount of formula over a relatively short period of time (for example, less than 30 minutes) several times during the day or night. (A *bolus* is a large amount

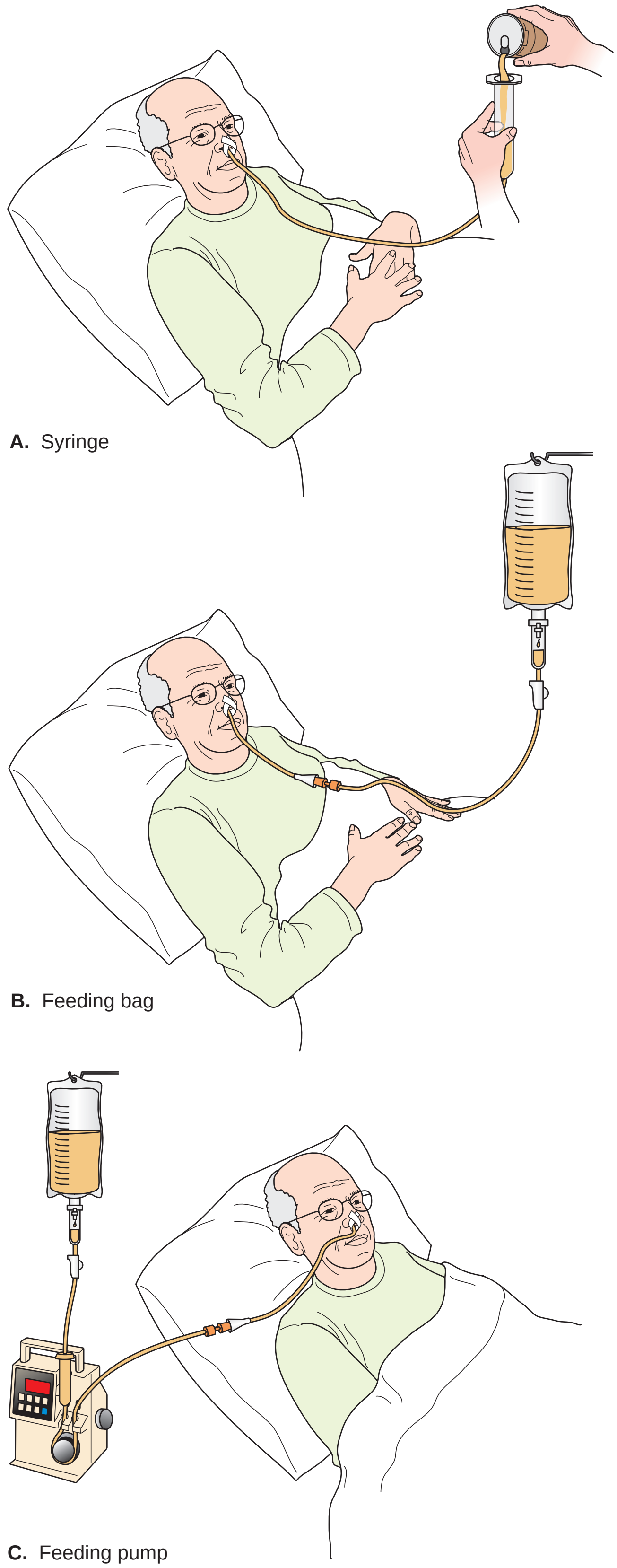


Figure 5-2
Enteral nutrition can be administered by (**A**) a syringe, (**B**) a feeding bag, or (**C**) a feeding pump.

of something, such as formula or medication, that is given over a short period of time.) Bolus feedings are usually administered using a syringe or a feeding bag. Bolus feedings are inexpensive and allow greater mobility for the patient. However, because the patient receives a large amount of formula over a very short period of time, the patient may experience abdominal distention (swelling) and bloating, diarrhea, or other complications.

- In **intermittent feeding,** the person receives a large amount of formula, but it is administered over a slightly longer period of time (for example, 30 to 60 minutes), several times during the day or night. Like bolus intermittent feedings, intermittent feedings are usually administered using a syringe or a feeding bag. Intermittent feedings have the same advantages and disadvantages of bolus intermittent feedings, but because the feeding is administered over a longer period of time, the patient may experience fewer complications, such as bloating or diarrhea.
- In **continuous feeding,** the person receives a small amount of formula constantly, 20 to 24 hours a day. A feeding pump is used to administer continuous feedings. This type of feeding provides the maximum amount of calories and nutrition with a minimal amount of complications.
- In **cyclic feeding,** the person receives a small amount of formula constantly for 8 to 12 hours (usually at night), and then the person is disconnected from the feeding pump. While the person is disconnected from the feeding pump, he may be able to take some food and fluids through the mouth. Cyclic feeding is often used to ensure that the person receives adequate nutrition while transitioning back to taking food and fluids through the mouth.

Enteral Feeding Formulas

Many different types of enteral feeding formulas are available. For example, special formulas are available for people with specific health conditions, such as diabetes or kidney disease. The doctor decides which formula to use according to the patient's nutritional needs, medical condition, and other factors. The doctor also specifies

Guidelines Box 5-1 Guidelines for Administering Enteral Nutrition

WHAT YOU DO	WHY YOU DO IT
Always check the label on the can, packet, or bottle of formula to make sure that you have the formula that was ordered for the person.	Many different types of formulas are available. In addition, one or more forms of a specific brand of formula may be available (for example, "Brand X plain," "Brand X with fiber"). The type of formula is ordered by the doctor according to the patient's specific needs. Administering the wrong formula to a patient could cause the patient to become very sick.
Before administering anything through a nasogastric or nasointestinal feeding tube, make sure that the nurse has confirmed proper placement of the feeding tube.	It is easy for a feeding tube to become displaced. If the feeding tube is not where it is supposed to be and formula, fluids, or medications are administered through the tube, serious consequences (such as aspiration pneumonia, respiratory arrest, or death) could result.
Avoid touching the inside of the enteral feeding bag or the "spike" for the tubing that is inserted into a bottle of formula.	Enteral feeding formulas have a high concentration of sugars, making them the perfect place for bacterial growth. Any bacteria that are introduced into the formula will multiply rapidly. If this occurs, the person receiving the feeding will become very ill.
Before you attach the tubing to the person's feeding tube, prime the tubing by running formula through the tubing. This removes any air from the tubing.	Priming the tubing prevents air from entering the person's stomach. Excess air in the stomach causes discomfort.
Make sure that the head of the bed is elevated at least 30 degrees during the feeding and for a period of time afterward. Keep the head of the bed elevated at least 30 degrees at all times if the patient has a nasogastric or nasointestinal tube in place.	Patients who are receiving enteral nutrition are at high risk of aspiration. Elevating the head of the bed helps prevent regurgitation and aspiration.
If a feeding pump is in use, make sure that the rate set on the pump is the rate ordered by the doctor. Tell the nurse if the rate on the feeding pump does not match the ordered rate. Many facilities require the nurse to adjust the rate of feeding.	If the rate is too slow or too fast, the patient will not receive the ordered amount of formula.
After the feeding is complete, flush the feeding tube with water. (Remember to record the amount of water as fluid intake.)	Flushing the feeding tube with water helps prevent the tube from becoming clogged. If the tube becomes clogged, it will have to be replaced.
Discard any leftover or expired formula.	Bacteria can multiply quickly in formula. Contaminated formula can cause food poisoning.

what strength the formula should be. For example, if the doctor's order is for the formula to be given at "half strength," then the ordered amount of formula is diluted by adding an equal amount of water. Always check the label on the formula container before administering the formula to make sure that you have the formula that was ordered for the patient.

Formulas can be packaged in cans, packets, or bottles:

- **Cans.** The contents of the can are shaken and poured into a syringe or feeding bag.
- **Packets.** The contents of the packet are mixed in a blender with the amount of water specified on the doctor's order or the label and then poured into a syringe or feeding bag.
- **"Ready-to-hang" bottles.** A sharp point on the end of the special tubing that is supplied along with the formula is used to puncture ("spike") the top of the bottle. The bottle is then hung upside down from an IV pole, and the tubing is threaded through the feeding pump and attached to the patient's feeding tube. A feeding bag is not required.

GENERAL CARE MEASURES FOR A PERSON WHO IS RECEIVING ENTERAL NUTRITION

As a nursing assistant working in an advanced care setting, you will care for many patients who are receiving enteral nutrition. Even if assisting with administering feedings is not in your scope of practice, you will play a very important role in helping to keep your patients comfortable and safe.

Providing Oral Care

Patients who are receiving enteral nutrition require frequent oral care (at least every 2 hours). When a person is not taking food or fluids through the mouth, saliva production decreases. The resulting "dry mouth" is very uncomfortable. In addition, decreased saliva production puts the person at risk for tooth decay. For these reasons, good oral care provided on a regular basis is especially important when a person is receiving enteral nutrition.

Monitoring Bowel Movements

A person who is receiving enteral nutrition may have multiple (for example, two to four) loose bowel movements each day. You may need to assist the person by providing gentle, thorough skin care after each bowel movement to prevent skin breakdown. In addition, you may be responsible for keeping track of the number of bowel movements, as well as the amount of stool that is passed with each one. Be sure to notify the nurse of any changes in the person's bowel elimination habits (for example, an increase or decrease in the number of bowel movements) or changes in the quality or amount of stool.

Preventing Complications

When caring for a person who is receiving enteral nutrition, it is important to be observant for signs and symptoms of complications from the feeding and to take measures to prevent complications from developing.

Aspiration

People who are receiving enteral nutrition are at increased risk for aspiration (inhalation of foreign material into the lungs). Aspiration can occur if the person regurgitates (vomits) the feeding formula and it goes down the windpipe and into the lungs. The formula can damage the lung tissue, causing the alveoli to fill with fluid. The formula can also carry bacteria into the lungs, leading to bacterial pneumonia. Difficulty breathing, respiratory arrest, or death could result.

Important steps that the nursing team takes to help prevent aspiration include:

- Ensuring that a nasogastric or nasointestinal feeding tube is properly positioned before administering anything through the tube
- Positioning the person in Fowler's or semi-Fowler's position during the feeding and for a short time afterward (a person with a nasogastric or nasointestinal tube should be positioned in the semi-Fowler's position at all times)
- Taking measures to prevent vomiting (such as giving small, frequent feedings)

Health care–associated infection

Enteral feeding formulas provide good nutrition for bacteria as well as for people! Bacteria can grow and multiply rapidly in formula. Feeding a person contaminated formula can make the person very ill. To help prevent bacterial contamination of the feeding formula:

- Always wash your hands before handling any part of the feeding system and be careful not to touch the inside of the tube feeding bag or the "spike" used to insert the tubing into a "ready-to-hang" bottle.
- Check the expiration date of the formula before using it. Do not use formula that is past its expiration date.
- Remember to label new feeding bags and feeding bottles with the date and time. All tubing, feeding bags, and feeding bottles must be changed every 24 hours. Leftover formula should be discarded.

Dehydration

Enteral feeding formulas are very concentrated. As a result, they draw water out of the body's tissues and into the intestines. This can cause the person to become dehydrated. Dehydration can cause kidney failure, heart dysrhythmias, and death if it is not treated.

If the person is unable to drink water, the nurse must give the person water through the feeding tube to prevent dehydration from occurring. Accurate recording of intake and output (I & O) measurements is very important for patients who are receiving enteral nutrition. Dry mucous membranes, decreased urine output, or very concentrated urine are signs of dehydration that should be reported to the nurse right away.

"Dumping syndrome"

"Dumping syndrome" occurs when water is pulled into the intestines to dilute the concentrated feeding formula. The extra water in the intestines causes the person to feel bloated and nauseous, and the person may develop diarrhea. The rapid "dumping" of formula into the intestine causes the pancreas to release insulin, which may result in hypoglycemia (low blood sugar).

TELL THE NURSE !

If a person who is receiving enteral nutrition shows any of the following signs or reports any of the following symptoms, notify the nurse right away:

- Coughing or wheezing
- Difficulty breathing
- A low reading on the pulse oximeter (a device used to measure the amount of oxygen in the blood)
- Cyanosis
- Nausea or vomiting
- Diarrhea or constipation
- Fever
- Abdominal pain or bloating
- Dry mucous membranes
- Decreased or very concentrated urine

TOTAL PARENTERAL NUTRITION

If possible, it is always best for a person to receive and digest food through the digestive tract. However, people who are very ill, injured, or recovering from surgery (especially gastrointestinal surgery) may not be able to tolerate food in the digestive tract. Some patients (such as those with head injuries or severe wounds) require an extremely high number of calories to heal. For these people, nourishment is delivered directly into the bloodstream through a central line (a large IV catheter inserted into a large vein in the neck, chest, or groin). This method of nutrient delivery is called total parenteral nutrition (TPN) or hyperalimentation.

The central line used to administer TPN ends in one of the two large veins that empty directly into the heart (that is, the superior vena cava or the inferior vena cava; Fig. 5-3). Because the TPN solution does not pass through the digestive tract and therefore is not digested, the nutrients it contains must be in their smallest form. A central line is necessary for TPN because the TPN solution is very concentrated. The high concentration of many of the substances in the TPN solution can irritate the lining of the vein. Administering the TPN solution into a large vein such as the superior vena cava allows for rapid dilution of the solution by the blood, which helps prevent irritation from occurring.

The TPN solution is made by a pharmacist under sterile conditions. The solution contains

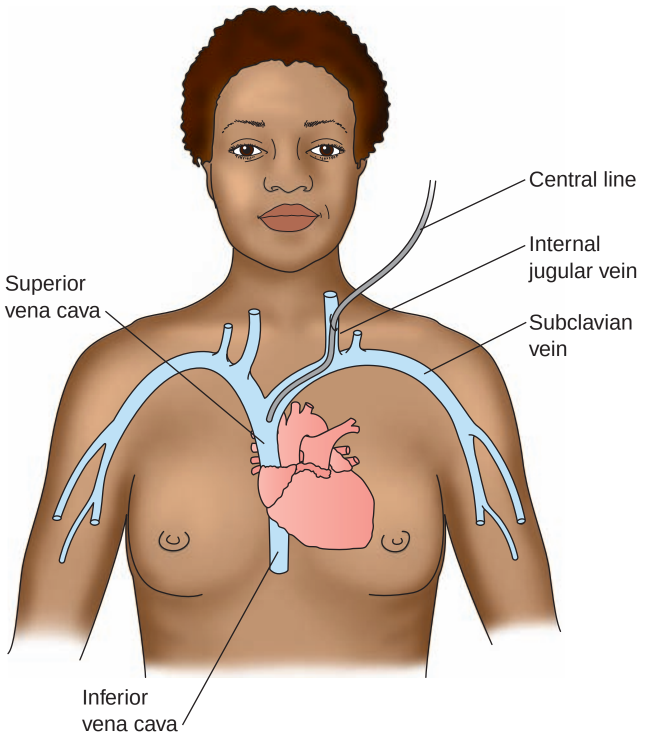


Figure 5-3
Total parenteral nutrition (TPN) is administered through a central line. The TPN solution flows through the central line into either the superior vena cava or the inferior vena cava. These veins empty directly into the heart.

vitamins, minerals, proteins, fats, and glucose. Because the TPN solution contains large amounts of glucose, insulin may also be added to the formula. The doctor orders the TPN solution based on what the person needs and what the dietician recommends.

Administering TPN is outside of the scope of practice for nursing assistants. However, you may care for patients who are receiving TPN. When caring for a patient who is receiving TPN, make sure to check the dressing over the central line insertion site. It should be clean and dry. If the dressing is wet, soiled, or loose, notify the nurse right away so that a new dressing can be applied.

You may also be trained to monitor the blood glucose levels of a patient who is receiving TPN. People receiving TPN should have their blood glucose levels checked every 6 hours. The TPN solution is very concentrated and contains a great deal of glucose. Because the TPN solution is administered directly into the bloodstream, the body has difficulty monitoring and regulating the blood glucose level. Patients who have just been taken off TPN also need to have their blood glucose levels monitored because many people develop hypoglycemia after being taken off TPN. Monitoring blood glucose levels is discussed in detail in the next section.

MONITORING BLOOD GLUCOSE LEVELS

As you know, glucose (sometimes called "blood sugar") is the body's most basic source of fuel. Glucose comes from carbohydrate-containing foods, such as bread, cereal, fruit, vegetables, and of course, table sugar. Glucose passes quickly from the digestive tract into the bloodstream. The blood carries glucose to all of the cells of the body. The cells use glucose to "run," much like cars use gas.

Normally, the body maintains the blood glucose level within a certain range. The pancreas secretes the hormone insulin, which allows glucose to be transported from the bloodstream into the individual cells. In this way, insulin lowers the blood glucose level. The pancreas also produces the hormone glucagon, which releases glycogen (stored glucose) into the bloodstream. Insulin and glucagon work together to keep the body's blood glucose levels stable.

It is important for blood glucose levels to remain within the normal range. Hypoglycemia occurs when the blood glucose level is excessively low. Hyperglycemia occurs when the blood glucose level is excessively high. Acutely, both hypoglycemia and hyperglycemia can cause confusion, loss of consciousness, and possibly even death. Untreated hyperglycemia can also lead to several long-term complications, such as kidney disease, blindness, and nerve damage.

People who have diabetes and are receiving insulin injections need to have their blood glucose levels monitored carefully. It is also necessary to monitor the blood glucose levels of patients who are receiving TPN or who are having problems with hyperglycemia or hypoglycemia. You may work in a facility that allows nursing assistants to monitor blood glucose levels. If monitoring blood glucose levels is part of your job description, make sure you have been adequately trained in how to use the equipment in use at your facility and record your findings. A normal blood glucose level is between 70 and 120 mg/dL. A blood glucose level out of that range should be reported to the nurse immediately.

A blood glucose meter is used to monitor blood glucose levels. A **lancet** (a sharp instrument used to puncture the skin) is used to obtain a drop of blood from the patient's fingertip (or other site, as specified by the manufacturer of the blood glucose meter). The drop of blood is placed on a test strip, which is inserted into the blood glucose meter. The meter "reads" the amount of glucose in the blood. You may be required to document the reading in the person's medical record, or the blood glucose meter may send the reading directly to the facility's computer system. Blood glucose meters that communicate with the facility's computer system are often used in hospitals.

Quality control (QC) tests are performed regularly on all blood glucose meters to ensure that the readings they give are accurate. Your facility will have a policy stating how frequently QC tests should be performed (usually every 24 hours if the blood glucose meter is used daily). Some blood glucose meters do not permit you to perform a blood glucose check until the QC test is completed. To perform a QC test, special testing solutions (one with a high glucose content and one with a low glucose content) are used. When performing a QC test, remember to shake the solution thoroughly and check the expiration date. The solution must not be used if it is past its expiration date. Record the results of the QC test per your facility's policy.

General guidelines for monitoring blood glucose levels are given in Guidelines Box 5-2. Procedure 5-2 gives step-by-step instructions for monitoring blood glucose levels.

Guidelines Box 5-2 Guidelines for Monitoring Blood Glucose Levels

WHAT YOU DO	*WHY YOU DO IT*
Ensure that the blood glucose meter is properly calibrated (that is, it returns accurate readings for the testing solutions).	A blood glucose meter that is not properly calibrated will yield inaccurate test results.
Use the testing strips specified by the manufacturer of the blood glucose meter.	The testing strips are specific to the blood glucose meter. Using the wrong kind of testing strips will yield inaccurate test results.
Remove the testing strip from the bottle right before you are going to use it. Replace the lid on the bottle of testing strips immediately after removing the testing strip you are going to use.	Testing strips are sensitive to light and humidity. Exposure to light and humidity affects their quality, which in turn affects the accuracy of the test results.
Note the expiration date on the bottle of testing strips. Do not use testing strips past their expiration date.	Using expired testing strips will yield inaccurate test results.
When opening a new bottle of testing strips, write the date on the bottle.	The testing strips are only good for 3 to 4 months after opening the bottle. Facility policy dictates how long an opened bottle of testing strips can be kept before it must be discarded. Using old testing strips may yield inaccurate test results.
Wear gloves when obtaining a blood glucose sample.	Blood puts you at risk for exposure to bloodborne pathogens.

Guidelines Box 5-2 Guidelines for Monitoring Blood Glucose Levels (*Continued*)

WHAT YOU DO	WHY YOU DO IT
Use a new lancet for each patient.	The lancet comes in contact with the patient's blood. Using the same lancet on multiple patients could put the patients at risk for bloodborne illnesses, such as HIV or hepatitis.
After use, dispose of the lancet in a sharps container.	Proper disposal of sharps (such as lancets) helps to limit others' exposure to bloodborne pathogens.
Before obtaining the blood sample, have the patient wash her hands with warm, soapy water.	Washing with warm, soapy water helps remove pathogens that might be on the surface of the skin, lowering the patient's risk of infection. Washing with warm, soapy water also removes any sugars that might be on the surface of the skin, preventing a false high reading.
Do not use alcohol to clean the area where the lancet will be inserted.	Alcohol can alter the test results, and it may also cause nerve damage.
Insert the lancet on the side of the fingertip instead of in the center.	The center of the fingertip contains the highest number of nerve endings. If you obtain the blood sample from the side of the fingertip, the person will experience less pain.
If possible, avoid taking blood from the thumb or index finger.	The thumb and index finger are the fingers we use most frequently to perform day-to-day activities (for example, grasping small objects, buttoning a shirt). If these fingers are sore from blood glucose testing, the person will experience pain every time he tries to use the fingers.
Apply the correct amount of blood to the testing strip. The manufacturer of the blood glucose meter will specify how much blood to apply to the testing strip.	Applying too much or not enough blood to the testing strip may result in inaccurate test results.

SUMMARY

- Patients who cannot take food and fluid through the mouth require nutritional support.
  - In enteral nutrition, formula is placed directly into the stomach or small intestine via a nasogastric, nasointestinal, gastrostomy, or jejunostomy tube.
  - In total parenteral nutrition (TPN), nutrients are placed directly into the bloodstream via a central line.
- The tubes used to administer enteral nutrition may be passed through the nose (nasogastric or nasointestinal tubes) or inserted through a surgically made opening

in the abdomen (gastrostomy or jejunostomy tubes).
- Nasogastric and nasointestinal tubes are used when enteral nutrition is only required for a short time. Nasogastric and nasointestinal tubes can be irritating to the nose and throat. Frequent oral care promotes comfort.
  - Nursing assistants are not usually responsible for inserting nasogastric tubes, but they may be responsible for removing them.
  - Before administering anything through a nasogastric or nasointestinal tube, it is very important to confirm that the tube is in the correct place. Otherwise, the formula, water, or medication could go into the respiratory tract instead of the digestive tract. This may result in aspiration pneumonia, respiratory arrest, or death.
- Gastrostomy and jejunostomy tubes are used when enteral nutrition will be required for a longer period of time. Gastrostomy and jejunostomy tubes must be inserted surgically and removed by a doctor.

- You may be trained to assist the nurse with enteral feedings.
  - Enteral feedings may be administered using a syringe, feeding bag, or feeding pump.
  - Enteral feedings may be bolus intermittent, intermittent, continuous, or cyclic.
  - Enteral feeding formulas may be packaged in cans, packets, or "ready-to-feed" plastic bottles.
- Nursing assistants who care for patients receiving enteral nutrition play an important role in observing for signs of complications, as well as preventing complications from developing in the first place. Complications associated with enteral feedings include aspiration, health care–associated infection (HAI), dehydration, and "dumping syndrome."
  - The patient is positioned in the Fowler's position or semi-Fowler's position during the feeding and for a short time afterward to help prevent aspiration. A patient who is receiving enteral nutrition through a nasogastric or nasointestinal tube should always be positioned in the semi-Fowler's position. Signs and symptoms of aspiration may include difficulty breathing, coughing or wheezing, cyanosis, or a low pulse oximetry reading.
  - Care must be taken to avoid introducing bacteria into the feeding bag and the formula. Bags and tubing must be changed every 24 hours to prevent bacterial growth that could make the person sick. Signs and symptoms of HAI may include nausea, vomiting, diarrhea, or fever.
  - Dry mucous membranes, decreased urine output, or very concentrated urine are signs of dehydration that should be reported to a nurse right away.
  - Dumping syndrome can result in diarrhea, nausea, bloating, and hypoglycemia.
- Total parenteral nutrition (TPN) is required when a person cannot tolerate food in the digestive tract or when the person requires extremely large amounts of calories to heal.
  - TPN solution contains glucose, vitamins, minerals, proteins, and fats in their most basic form. The solution is mixed by a pharmacist under sterile conditions and administered by a nurse.
  - When caring for a patient who is receiving TPN, it is important to check the dressing over the central line insertion site to make sure that it is clean and dry. Nursing assistants may also be taught how to monitor patients' blood glucose levels.
- People who have diabetes and are taking insulin and people who are receiving TPN need to have their blood glucose levels monitored on a regular basis.
  - Blood glucose levels that are too high or too low can result in serious acute and chronic problems.
  - A blood glucose meter is used to monitor blood glucose levels. If monitoring blood glucose levels is part of your job description, make sure you have been trained in the proper use of the machine at your facility and always take standard precautions.

CHAPTER

5 PROCEDURES

PROCEDURE 5-1

Removing a Nasogastric Tube

WHY YOU DO IT A nasogastric tube is removed when the person no longer requires enteral nutrition. It may also be necessary to remove and replace the nasogastric tube if the tube becomes clogged.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Bed protector (disposable)
- Tissues
- Oral hygiene supplies

Procedure

2. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up. Raise the head of the bed to the semi-Fowler's or Fowler's position.

3. Place the disposable bed protector across the person's chest. Have the emesis basin nearby in case the person gags or vomits.

4. Put on the gloves.

5. Unpin the tube from the person's gown and remove the tape from the person's nose.

6. Ask the person to take a deep breath and hold it while you pull out the nasogastric tube. (Holding the breath prevents the person from inhaling as the tube is pulled out. If the person inhales as the tube is being pulled out, stomach contents could be aspirated into the lungs.) Pull out the tube in one continuous motion.

7. Dispose of the nasogastric tube in a facility-approved waste container.

Step 6 Pull the tube out in one continuous motion.

8. Offer tissues to the person so that she can blow her nose, if desired. Assist the person with oral care.

9. Remove your gloves and dispose of them in a facility-approved waste container.

10. If the side rails are in use, return them to the raised position. Lower the head of the bed as the person requests. Make sure that the bed is lowered to its lowest position and that the wheels are locked.

Finishing Up

11. Complete the "Finishing Up" steps.

What You Document

- The time the nasogastric tube was removed
- Any problems encountered
- How the patient tolerated the procedure
- That oral care was provided

PROCEDURE 5-2

Monitoring the Blood Glucose Level

WHY YOU DO IT Blood glucose monitoring is necessary for people who are at risk of having blood glucose levels that are too high or too low (for example, people with diabetes and people who are receiving total parenteral nutrition [TPN]).

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Blood glucose meter
- Non-sterile gloves
- Sterile lancet
- Testing strips
- Cotton ball or tissue
- Wash basin and warm water
- Soap
- Washcloth
- Towel

Procedure

2. Put on the gloves.
3. Help the person to wash his hands with the soap and water. Dry the person's hands with the towel.
4. Turn the blood glucose meter on and wait until the "ready" sign appears on the display screen.
5. Remove a testing strip from the bottle. Immediately replace the cap on the bottle. Make sure that the code on the testing strip matches the code on the blood glucose meter. Depending on the type of blood glucose meter you are using, you may be required to insert the testing strip into the meter now.

Step 5 Compare the code on the testing strip with the code on the blood glucose meter.

6. Prepare the lancet by removing the safety cap. Grasp the person's finger and hold the lancet at a 90-degree angle to the skin. (Try to avoid the middle of the finger pad because this area has the highest concentration of nerve endings.) Press the lancet straight down to pierce the person's skin.

Step 6 Pierce the person's skin with the lancet.

7. Gently squeeze the site until a drop of blood forms.

Step 7 Gently squeeze the site to encourage a drop of blood to form.

8. Transfer the drop of blood from the person's finger to the testing strip by gently rolling the person's finger over the testing strip or by gently touching the person's finger to the testing strip. Make sure to apply an adequate amount of blood to the testing strip, but not too much.

Step 8 Transfer the drop of blood to the testing strip.

9. If the testing strip is not already in the blood glucose meter, insert the testing strip into the blood glucose meter, according to the manufacturer's instructions.

Step 9 Insert the testing strip into the blood glucose meter.

10. Apply pressure to the puncture site using tissue or a cotton ball.
11. Record the reading on the blood glucose meter. Turn off the blood glucose meter if it does not automatically turn itself off.
12. Dispose of the lancet in a sharps container. Dispose of the test strip in a facility-approved waste container.
13. Remove your gloves and dispose of them according to facility policy. Wash your hands.

Finishing Up

14. Complete the "Finishing Up" steps.

What You Document

- The patient's blood glucose level

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. In report, you are told that the patient you will be caring for is receiving Jevity (an enteral feeding formula) half strength at 40 mL/hr by nasogastric tube. You know that this means the formula is:
   a. Mixed with an equal amount of water
   b. Mixed with another formula
   c. To be given at a rate of 80 mL/hr
   d. To be given at a rate of 20 mL/hr

2. The nurse has just inserted a nasogastric feeding tube for Mrs. Watson. When can the feeding that the doctor has ordered be started?
   a. After the formula is mixed
   b. After an x-ray has been obtained to confirm the placement of the tube
   c. Immediately
   d. At the beginning of the next shift

3. What is the difference between a gastrostomy tube and a nasogastric tube?
   a. Gastrostomy tubes deliver formula to the small intestine, and nasogastric tubes deliver formula to the stomach
   b. Gastrostomy tubes require the use of total parenteral nutrition (TPN) solution, and nasogastric tubes require the use of an enteral feeding formula
   c. Gastrostomy tubes are for short-term use only, and nasogastric tubes are for long-term use
   d. Gastrostomy tubes are inserted through a surgically made opening in the abdomen, and nasogastric tubes are inserted through the nose

4. Why is it important to avoid touching the inside of the feeding bag?
   a. Administering enteral nutrition is a sterile procedure
   b. Touching the inside of the feeding bag can contaminate the formula with bacteria from your hands
   c. Touching the inside of the feeding bag can contaminate your hands with formula
   d. All of the above

5. One of your patients, Ms. Sykes, has been started on enteral nutrition because she is unable to swallow. While you are emptying her urine drainage bag, you notice that there is only a small amount of urine, and it is very dark. You also notice that Ms. Sykes' mucous membranes are dry. What should you do?
   a. Nothing; this is normal when a person is receiving enteral nutrition
   b. Stop the feeding and call the doctor
   c. Administer water through Ms. Sykes' feeding tube
   d. Report your observations to the nurse immediately

6. When removing a nasogastric tube you ask the patient to take a deep breath and hold it while you remove the tube. Why?
   a. To prevent aspiration of stomach contents
   b. To minimize the patient's discomfort and anxiety
   c. To make it easier to pull out the nasogastric tube
   d. To deflate the balloon at the end of the nasogastric tube

7. Which of the following statements about total parenteral nutrition (TPN) is true?
   a. TPN is mixed by the pharmacist under sterile conditions
   b. Nursing assistants are permitted to administer TPN
   c. TPN is administered through a nasogastric tube
   d. All of the above

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Total parenteral nutrition (TPN)

_____ **2.** Lancet

_____ **3.** Blood glucose meter

_____ **4.** Testing strip

a. Sensitive to light and humidity
b. Administered in a central line
c. Must be disposed of in the sharps container
d. Measures the level of glucose in the blood

STOP and Think!

1. You are doing the morning 24-hour quality control (QC) check on the unit's blood glucose meter. The "high" check gives you a low reading, resulting in a failure of the QC check. What are the possible reasons for this failure? What should be your next action? What consequences could there be for a patient if a blood glucose meter that has failed the QC check is used to test the patient's blood glucose level? What consequences could there be for the facility?
2. You come onto your shift and notice that Mrs. Wilson's tube feeding bag is dated from the day before yesterday (48 hours ago). It is nearly full of formula. What should you do? What are the possible consequences for Mrs. Wilson?
3. It is 7 AM, and you are checking morning blood glucose levels on your patients with diabetes. Mr. Rodriguez has had type 1 diabetes for many years. When you check his blood glucose level, it is 42 mg/dL. Mr. Rodriguez appears tired but seems fine otherwise. What should you do? Assuming that the blood glucose measurement is correct, why do you think Mr. Rodriguez seems fine anyway? Is hypoglycemia harmful if the person does not have any symptoms?

CHAPTER

6

Advanced Respiratory Care Skills

WHAT WILL YOU LEARN?

Many of the patients you will care for in an advanced care setting will need help meeting their need for oxygen. In this chapter, you will learn more about interventions the health care team uses to help patients meet their need for oxygen. You will also learn about your role in caring for these patients. When you are finished with this chapter, you will be able to:

1. Describe how the respiratory and cardiovascular systems work together to supply the body with oxygen and rid the body of carbon dioxide.
2. Discuss how a disorder or situation that affects ventilation, gas exchange, or oxygen transport can affect a person's ability to meet his need for oxygen.
3. Explain two methods of monitoring blood oxygen levels.
4. Describe devices that can be used to deliver supplemental oxygen.

A nursing assistant uses a pulse oximeter to check a patient's blood oxygen levels.

5. Describe the nursing assistant's role in caring for a patient who is receiving supplemental oxygen.
6. Explain the purpose of suctioning the airway.
7. Describe when an oropharyngeal or a nasopharyngeal airway may be used.
8. Discuss when endotracheal intubation may be necessary, and the care of a person with an endotracheal tube.
9. Discuss when tracheostomy may be necessary, and the care of a person with a tracheostomy.
10. Demonstrate proper technique for providing tracheostomy site care.
11. Explain why a person might need mechanical ventilation and describe the nursing assistant's role in caring for a person who is receiving mechanical ventilation.
12. Explain why a person might need a chest tube drainage system and describe the nursing assistant's role in caring for a person with a chest tube.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Pulse oximetry	Phlegm	Intubation
Arterial blood gas (ABG) analysis	Hypoxemia	Extubation

As you remember from your basic training, the respiratory and cardiovascular systems work together to supply the body with oxygen and to remove carbon dioxide (a waste product of metabolism) from the body.

The respiratory system handles respiration, which is the process the body uses to obtain oxygen from the environment and remove carbon dioxide from the body. Every time we inhale, air containing oxygen fills the alveoli of the lungs. Every time we exhale, air containing carbon dioxide leaves the body. The mechanical process of moving air in and out of the body is called *ventilation*. Remember that ventilation has two phases: inhalation and exhalation. When we inhale, the diaphragm (the strong muscle that separates the chest cavity from the abdominal cavity) contracts, moving downward and making the chest cavity bigger. Air flows into the lungs, filling the alveoli and causing them to expand. When we exhale, the diaphragm relaxes, moving upward and pushing the air in the alveoli out of the lungs. Ventilation can be affected by:

- Neuromuscular disorders that cause the skeletal muscles, such as the diaphragm, to become more and more weak over time
- Neurologic disorders that interfere with the nervous system's ability to stimulate the diaphragm to contract and relax, such as paralysis
- Trauma that results in blocking of the airway or collapse of the lung
- Disorders, such as chronic bronchitis or cancer, that result in blocking of the airway

Gas exchange takes place in the alveoli of the lungs. The oxygen molecules in the alveolus move (diffuse) across the wall of the blood vessel and attach to hemoglobin, a special protein on the red blood cells, for transport to the rest of the body. At the same time, carbon dioxide molecules are released from the hemoglobin, and they move across the wall of the blood vessel into the alveolus. Carbon dioxide is removed from the body when we exhale. Disorders or situations that affect gas exchange also affect a person's ability to meet the need for oxygen. Gas exchange can be affected by:

- Disorders that cause the alveoli to fill with fluid, such as pneumonia
- Disorders that cause the alveoli to collapse, such as atelectasis (a common complication after surgery) or emphysema
- Disorders that prevent blood from entering the lungs to receive oxygen, such as pulmonary embolism (blocking of the pulmonary artery by a blood clot)

The cardiovascular system is responsible for transporting oxygen to the cells of the body and taking carbon dioxide away from them. The hemoglobin molecule on each red blood cell can carry many oxygen or carbon dioxide molecules. As the blood circulates through the body, the hemoglobin gives off oxygen molecules and takes on carbon dioxide molecules. By the time the blood completes it circuit of the body and returns to the lungs, it contains very few oxygen molecules and many carbon dioxide molecules. Disorders that affect the cardiovascular system's ability to transport oxygen to the tissues of the body also affect a person's ability to meet the need for oxygen. The body's ability to transport oxygen can be affected by:

- A low red blood cell count (anemia)
- Disorders that affect the body's ability to circulate blood throughout the body, such as heart failure
- Disorders that affect the hemoglobin's ability to carry oxygen, such as carbon monoxide poisoning

A problem with any of the three main parts of this process—ventilation (the mechanical process of moving air in and out of the lungs), gas exchange (the transfer of oxygen into the blood and carbon dioxide out of it), or oxygen transport (the delivery of oxygen to the tissues)—affects the person's ability to meet the need for oxygen (Fig 6-1).

MONITORING BLOOD OXYGEN LEVELS

For many patients, it is important for the health care team to know how much oxygen is in their blood. Some patients, such as those who are critically ill, require constant monitoring. Others only need to have their blood oxygen levels monitored at regular intervals. There are two main ways of monitoring blood oxygen levels—pulse oximetry and arterial blood gas (ABG) analysis.

PULSE OXIMETRY

In **pulse oximetry,** a device called a *pulse oximeter* is applied to the person's finger, toe, earlobe, nose, or forehead (or to the toe or foot in babies) (Fig. 6-2). Light is passed through the tissue to a sensor on the other side of the device. The amount of light that reaches the sensor is translated into a measurement of how much oxygen the arterial blood is carrying. A normal reading is between 95% and 100%. Readings below 85% indicate that the person's tissues are not receiving enough oxygen. An alarm will usually sound if the person's blood oxygen level is too low.

Several factors can affect the accuracy of the pulse oximetry reading:

- **Dark fingernail polish.** Because light must be able to pass through the tissue, dark fingernail polish can affect the reading if the pulse oximeter is clipped to the person's finger.
- **Using the same arm to measure blood pressure.** If the pulse oximeter is clipped to a person's finger and you try to measure the blood pressure in that arm as well, the pulse oximetry reading may be falsely low because inflating the cuff decreases blood flow to the finger where the pulse oximeter is clipped.
- **Poor circulation.** If circulation to the site where the pulse oximeter is clipped is poor (for example, as a result of aging, cold hands, or heart disease), it may be difficult to get an accurate pulse oximetry reading. Many pulse oximeters show a waveform on the monitor. The waveform shows the arterial pulse with every heart beat. A poor waveform indicates that the monitor is not getting a good reading. In this case, the sensor should be moved to a new site. If you are unable to find a site that gives a good waveform, inform the nurse. The nurse can help troubleshoot to find out if the problem is with the person or the pulse oximeter.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

In a "high-tech" environment such as an advanced care setting, it is easy to fall into the trap of relying on what the monitor is saying and overlooking what the patient is telling us. A basic premise of health care is "treat the patient, not the monitor." Although technology can make our jobs easier, the information provided by technology needs to be put into the proper context. There is just no substitute for basic observation and listening skills. Always look at the whole picture and take into account what you know about each individual patient. In this way, you will truly be providing humanistic health care.

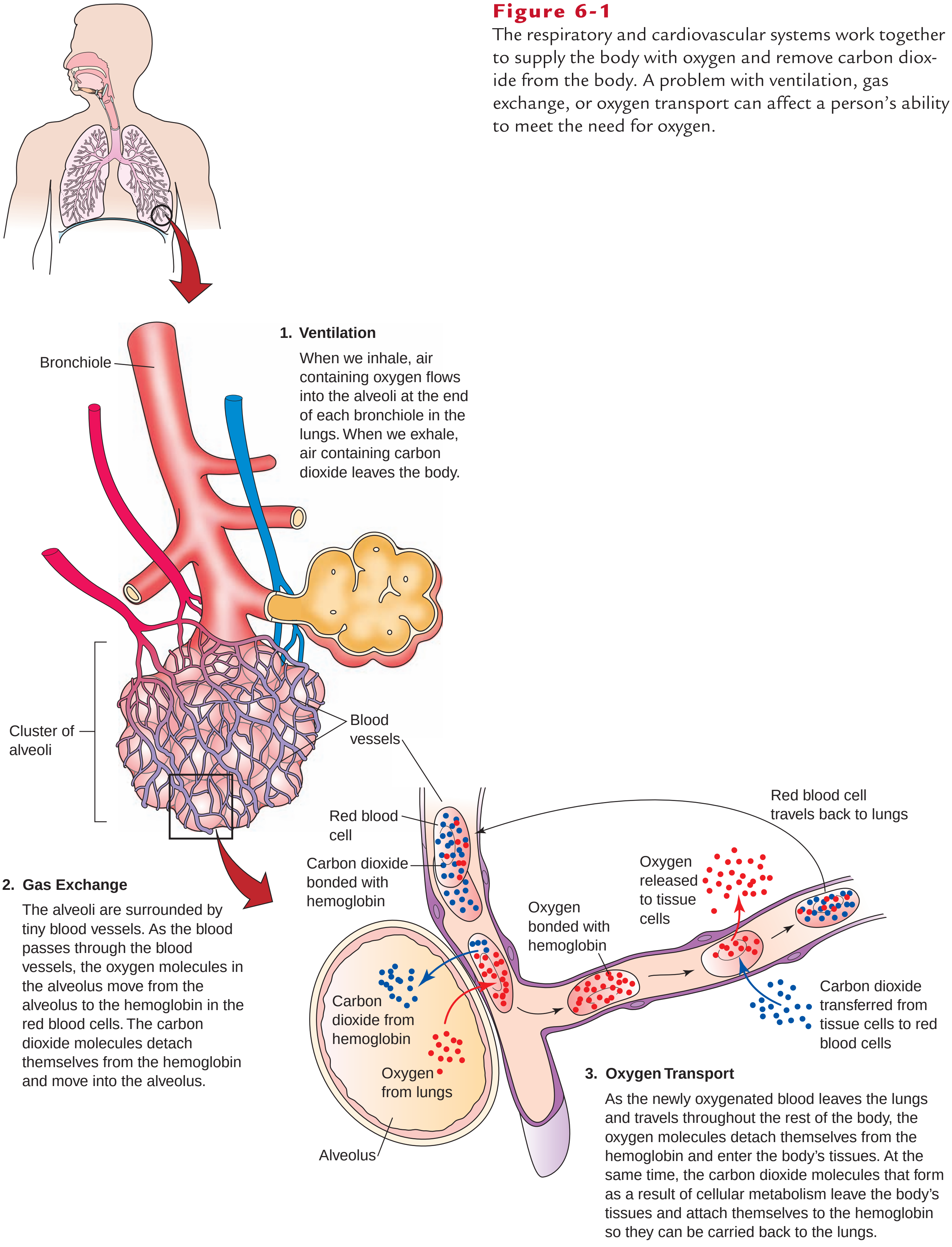


Figure 6-1
The respiratory and cardiovascular systems work together to supply the body with oxygen and remove carbon dioxide from the body. A problem with ventilation, gas exchange, or oxygen transport can affect a person's ability to meet the need for oxygen.

A. Adult

B. Infant

Figure 6-2
Pulse oximetry is used to monitor the oxygen content of the blood. In adults (**A**), the sensor is often attached to the finger. In babies (**B**), the sensor is usually attached to the toe.

ARTERIAL BLOOD GAS ANALYSIS

Pulse oximetry provides a good estimate of the oxygen content of the blood. However, when it is necessary to have a very accurate measurement of the person's blood oxygen level, the doctor may order an **arterial blood gas (ABG) analysis**. ABG analysis is much more accurate than pulse oximetry, but it is also much more invasive and painful for the patient. ABG analysis requires a sample of the arterial blood, which is drawn by a trained respiratory therapist, nurse, or doctor. The blood sample is usually drawn from the radial artery in the wrist (Fig. 6-3). After the blood has been drawn, direct pressure is applied to the site for 5 to 10 minutes to stop the bleeding, and the blood sample is sent to the laboratory for analysis. The laboratory report provides information about the oxygen and carbon dioxide content of the blood, as well as its acidity (pH).

Although you will not be responsible for drawing blood for ABG analysis, you may be asked to assist a trained respiratory therapist, nurse, or doctor with this procedure. In addition, when you are caring for a patient who has had blood drawn for ABG analysis, you will play an important role in observing the patient for complications after the procedure.

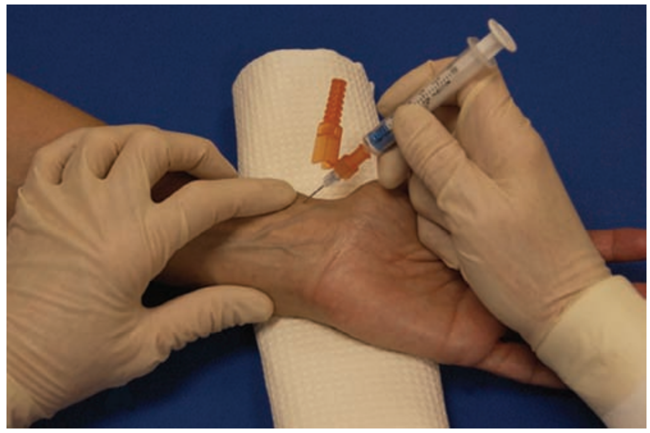


Figure 6-3
Blood for arterial blood gas (ABG) analysis is usually drawn from the radial artery in the wrist. (*Photograph used with permission from McCall RE & Tankersley CM:* Phlebotomy Essentials, *3rd ed. Philadelphia, Lippincott Williams & Wilkins, 2003*.)

TELL THE NURSE !

Complications can develop when blood is drawn for ABG analysis. These complications are considered medical emergencies. Be sure to report any of the following signs or symptoms, which could indicate a potential complication, to the nurse right away:

- There is bleeding or swelling around the site where the blood was drawn.
- The patient complains of numbness or tingling in the hand.
- The hand is pale or blue.
- The hand is cold compared with the other hand.

OXYGEN THERAPY

For patients who are having problems with gas exchange or oxygen transport, the doctor may order supplemental (extra) oxygen. Oxygen is a medication that requires a doctor's order to be used. The doctor determines the rate at which the oxygen should be delivered and how it should be given.

A nurse or respiratory therapist is usually responsible for setting up and adjusting oxygen therapy. You may be asked to assist with this procedure by gathering the necessary supplies, such as a nasal cannula or a facemask, a humidity bottle, or an oxygen tank and flow rate meter. Always transport oxygen tanks in a "cage" or carrier made for that purpose. The cage helps prevent the oxygen tank from being knocked over. If the oxygen tank is not in a cage, it should be placed flat on the floor to reduce the risk of its being knocking over. Knocking over an unprotected oxygen tank may cause an explosion because the oxygen is under pressure.

Always make sure you are familiar with your specific job responsibilities regarding oxygen therapy. And, as always, when caring for a patient who is receiving oxygen therapy, be sure to follow the safety precautions related to oxygen therapy that you learned as part of your basic training.

METHODS OF EXPRESSING THE OXYGEN "DOSE"

The amount of oxygen being administered can be expressed in two ways. The most common way of expressing how much oxygen is being administered is in *liters per minute* (L/min). Oxygen can be delivered at a rate ranging from 0.5 to 15 L/min. The other way of expressing how much oxygen is being administered is as a percentage of the air inhaled. This is called the *fraction of inspired oxygen* (F_{IO_2}). For example, normal room air is about 21% oxygen. Therefore, the F_{IO_2} of normal room air is 21%. Supplemental oxygen can be delivered at an F_{IO_2} that ranges from 21% to 100%.

The term used to express how much oxygen is being delivered often depends on the method used to deliver the oxygen. When the oxygen is being delivered through a nasal cannula or facemask, the amount is usually expressed in liters per minute. When the oxygen is being delivered by a mechanical ventilator, the amount is usually expressed as an F_{IO_2}. Although F_{IO_2} is more specific than liters per minute, the measurements do correspond. The higher the liters per minute, the higher the F_{IO_2}. For example, a facemask that is delivering oxygen at a rate of 15 L/min is administering 100% F_{IO_2}.

METHODS OF DELIVERING OXYGEN

Nasal Cannula

A nasal cannula is the most common method of delivering oxygen. The oxygen is delivered through two soft plastic prongs inserted into the nostrils. The prongs are held in place by a length of tubing that wraps over the ears and is secured underneath the chin (Fig. 6-4).

Oxygen can be delivered at a rate of 1 to 6 L/min using a nasal cannula. If a person requires oxygen to be delivered at a rate above 6 L/min, then another delivery method (such as a facemask) must be used. Or as an alternative to the facemask, the doctor may order a special type of nasal cannula called a high-flow nasal cannula, which allows for oxygen to be delivered at a rate of up to 15 L/min. However, one of the drawbacks of a high-flow nasal cannula is that delivery of oxygen at a high flow rate through a nasal cannula is very drying to the mucous membranes in the nasal cavity.

Figure 6-4
The tubing for the nasal cannula is looped over the ears and secured under the chin. It is important to watch for signs of skin irritation under the person's nose, over the cheeks, and behind the ears.

A nasal cannula is the oxygen delivery system of choice because it allows the person to eat, drink, and talk normally and is less likely to create a feeling of suffocation. However, the tubing can irritate the skin around the nostrils and cheeks and behind the ears. When you are caring for a person with a nasal cannula, be sure to regularly check the skin under the person's nose, over the cheeks, and behind the ears. These are common spots for pressure ulcers to develop. In addition, bloody noses are common with nasal cannula use because the oxygen flowing over the mucous membranes is drying. A humidity bottle is often used to add moisture to the oxygen before it is delivered to the patient to help reduce drying of the mucous membranes. Check the humidity bottle frequently for the presence of bubbles, which indicate that the oxygen is flowing freely. You should also check the water level often to make sure that it does not drop too low. Your facility policy will specify how often the humidity bottle should be changed.

TELL THE NURSE !

When caring for a patient with a nasal cannula, be sure to report any of the following signs or symptoms to the nurse immediately:

- The person repeatedly tries to pull out the nasal cannula.
- The skin under the person's nose, over the cheeks, or behind the ears is red or irritated.
- A sore has developed under the person's nose, over the cheeks, or behind the ears.
- The person complains of pain or discomfort caused by the tubing.
- The person's nose is bleeding.

Facemask

Simple facemask

For people who require oxygen to be delivered at a rate of 6 to 10 L/min, a simple facemask can be used. The simple facemask fits over the person's mouth and nose and is secured by an elastic strap that goes around the back of the head (Fig. 6-5A). Holes in the sides of the mask allow room air in and carbon dioxide out. When using a simple facemask, oxygen must be delivered at a rate of at least 6 L/min so the carbon dioxide the person breathes out is forced out of the holes. If oxygen is delivered at a lower rate, the carbon dioxide is not forced out of the holes, and the person will breathe the carbon dioxide back in.

TELL THE NURSE !

When caring for a patient with a facemask, be sure to report any of the following signs or symptoms to the nurse immediately:

- The person repeatedly tries to remove the facemask.
- The person's level of consciousness is decreased or the person is difficult to arouse.
- The person is having trouble breathing.
- The pulse oximetry reading is less than 90%.

Helping Hands and a Caring Heart

FOCUS ON HUMANISTIC HEALTH CARE

Think for a moment how it would feel to have a big plastic mask covering your nose and mouth. Would you feel like you couldn't call for help if you needed it? Would the close fit make you feel like you were suffocating? Most people do not like to have their nose and mouth covered for any reason. When caring for a person with a facemask, simple actions, such as checking on the person frequently, answering the call light promptly, and spending extra time with the person, can be very reassuring.

Non-rebreather mask

A non-rebreather mask (see Fig. 6-5B) is used when a person urgently needs large amounts of oxygen. A non-rebreather mask administers oxygen at a rate of 10 to 15 L/min. Like the simple facemask, the non-rebreather mask fits over the person's mouth and nose and is secured by an elastic strap that goes around the back of the head (see Fig. 6-5B). However, instead of holes, the non-rebreather mask has a one-way valve that lets carbon dioxide out without permitting

A. Simple facemask

B. Non-rebreather mask

C. Continuous positive airway pressure (CPAP) mask

Figure 6-5
Facemasks come in a variety of styles. (**A**) A simple facemask delivers oxygen at a rate of 6 to 10 L/min. Holes in the side of a simple facemask let room air in and carbon dioxide out. (**B**) A non-rebreather mask delivers oxygen at a rate of 10 to 15 L/min. A valve lets carbon dioxide out without letting in room air. The oxygen flows through the bag. (**C**) A continuous positive airway pressure (CPAP) mask delivers air and oxygen under pressure. The pressure keeps the airways open and enhances gas exchange in the alveoli. (© *Custom Medical Stock Photo.*)

room air to enter. This change in venting makes it possible to administer 100% oxygen.

With a non-rebreather mask, the oxygen flows through the bag (see Fig. 6-5B). When caring for a person with a non-rebreather mask, make sure to observe the bag. It should be partially inflated at all times.

A non-rebreather mask is meant for short-term use only. Paramedics frequently use non-rebreather masks to make sure that the people they are caring for have enough oxygen while they are being transported to the hospital. As soon as the health care team takes action to address the underlying cause of the person's respiratory distress, the person's condition is expected to improve within a relatively short period of time (for example, 12 to 24 hours). If the person does not begin to improve within that time frame, then the doctor may consider using a continuous positive airway pressure (CPAP) mask (see next section) or placing the person on a ventilator.

TELL THE NURSE !

When caring for a patient with a non-rebreather mask, be sure to report any of the following signs or symptoms to the nurse immediately:

- The person repeatedly tries to remove the non-rebreather mask.
- The person's level of consciousness is decreased or the person is difficult to arouse.
- The person's respiratory rate is increased.
- The person's blood pressure is decreased.
- The pulse oximetry reading is less than 90%.

Continuous positive airway pressure mask

A CPAP mask is used for people who are having difficulty breathing but do not necessarily need a ventilator. The CPAP mask forms an airtight seal over the person's nose (or nose and mouth) (see Fig. 6-5C). Air and supplemental oxygen are pushed through the mask under pressure. The pressure keeps the lungs expanded and the alveoli open, promoting gas exchange. In addition, the person does not have to work as hard to breathe because less pressure is required to open the alveoli each time the person inhales.

A CPAP mask is used for people who are in severe respiratory distress and need more support than the non-rebreather mask can provide but who are not necessarily to the point of needing the ventilator. Similar to a non-rebreather mask, the CPAP mask is a short-term treatment for respiratory distress. A CPAP mask may be used for a few hours to a few days. If the underlying problem does not improve or if the person begins to require more help with breathing, then the person will have to be placed on a mechanical ventilator.

People with sleep apnea may also use a CPAP mask. Sleep apnea is a disorder that causes the person to stop breathing for varying periods of time while she is asleep. When the person's blood oxygen level gets very low, the person wakes up and starts breathing again. Because the person's sleep is interrupted many times during the night, the person wakes up feeling tired and irritable in the morning. The CPAP mask keeps the airways open so that better gas exchange occurs in the alveoli. This keeps the person's blood oxygen level at an acceptable level, allowing the person to sleep through the night.

TELL THE NURSE !

A CPAP mask can cause breakdown around the nose and on the face because of the pressure that is applied. When caring for a patient with a CPAP mask, be sure to report any of the following signs or symptoms to the nurse immediately:

- The skin around the nose and on the face is red or there is skin breakdown.
- The person complains of tenderness, discomfort, or pain as a result of the mask.

MAINTAINING AN OPEN AIRWAY

The nasal cavity, pharynx, larynx, trachea, bronchi, and bronchioles are collectively referred to as the "airway." The purpose of the airway is to conduct air from the outside of the body to the lungs and from the lungs to the outside of the body. If the airway is not clear, ventilation will be affected, and the person will not be able to meet the need for oxygen.

SUCTIONING

Normally, the mucous membrane that lines the airway secretes mucus. Mucus helps keep the respiratory tract moist. Mucus also traps foreign particles, such as dirt, dust, and microbes. If mucus starts to build up in the airway, the person's reaction is to cough. Coughing clears the airway naturally.

People often need help removing mucus and other respiratory tract secretions from the airway. A person who is in a coma or heavily sedated may not have an intact cough reflex, so mucus and other respiratory tract secretions accumulate in the airway. Some patients are so weak and ill that they are not able to cough. Some patients have medical conditions that result in the production of large amounts of **phlegm** (abnormally thick mucus produced by the respiratory tract). Phlegm builds up in the respiratory tract, making it difficult to breathe. In these situations, suctioning is necessary to keep the airway clear.

Suctioning is done by a nurse or respiratory therapist using a suction catheter and sterile technique. Sterile technique is used because it is important to avoid introducing potentially harmful microbes into the respiratory tract. Suctioning puts the person at risk for **hypoxemia** (a low blood oxygen level) because it removes oxygen along with the secretions. In addition, suctioning can stimulate the vagal nerve, an important nerve that begins in the brain and sends branches to the heart, lungs, stomach, and rectum. Stimulation of the vagal nerve may temporarily decrease the person's heart rate and blood pressure, which can be dangerous. Because of these serious risks for the patient, nursing assistants are not usually trained to perform this procedure. However, you are responsible for letting the nurse know when suctioning may be needed, and you may be asked to assist during the procedure.

TELL THE NURSE !

A person may need suctioning if:

- The person cannot stop coughing.
- The person is having trouble breathing.
- The person asks to be suctioned.
- The pulse oximetry reading is less than 90% and the heart rate is increased.

NASOPHARYNGEAL AND OROPHARYNGEAL AIRWAYS

In a person who is unconscious or heavily sedated, the lower jaw falls open and the tongue falls backward into the throat, blocking the passage of air into the body. In this case, a nasopharyngeal airway or an oropharyngeal airway may be used.

A nasopharyngeal airway is a soft rubber tube that is inserted through the person's nostril (Fig 6-6A). It extends back toward the throat, providing an opening through which air can flow. In some situations (for example, if the patient requires frequent suctioning of the airway), a nasopharyngeal airway may be left in place for several days. The nasopharyngeal airway helps protect the nasal passages during suctioning.

An oropharyngeal airway is a hard plastic device that is inserted through the person's mouth (see Fig. 6-6B). The oropharyngeal airway stops the tongue from falling back into the throat, keeping the airway open. The oropharyngeal airway is for short-term use only (that is, a few hours). An oropharyngeal airway must be removed as soon as the person regains conscious-

A. Nasopharyngeal airway

B. Oropharyngeal airway

Figure 6-6
A nasopharyngeal airway or an oropharyngeal airway may be inserted to ensure a clear airway. (**A**) A nasopharyngeal airway is a flexible tube that is inserted through the nostril. It extends to the pharynx, providing a clear passageway so air can reach the lungs. (**B**) An oropharyngeal airway is a hard plastic device that is inserted in the mouth. It also extends to the pharynx. The oropharyngeal airway prevents the tongue from falling back into the throat and blocking the airway.

ness or the sedation starts to wear off because it causes choking and gagging in a person who is alert.

Inserting and removing a nasopharyngeal or oropharyngeal airway is outside of the scope of practice for nursing assistants, even those who have received advanced training.

ENDOTRACHEAL TUBE

An endotracheal tube is a flexible plastic tube that is inserted through the person's mouth or nostril. The endotracheal tube extends to the trachea, where a balloon cuff on the end holds it in place and prevents secretions that drain from the mouth from entering the lungs (Fig. 6-7). Insertion of the tube is called **intubation**.

An endotracheal tube is inserted when a person requires mechanical ventilation for only a short time (for example, 3 weeks or less). The mechanical ventilator delivers oxygen through the endotracheal tube.

Endotracheal intubation is uncomfortable for a person who is alert. The tube is hard on the teeth and mouth and can make the person gag or vomit. Because the endotracheal tube makes it impossible to take food or fluids through the mouth, the mouth becomes dry and uncomfortable. In addition, the person is unable to talk because the endotracheal tube passes through the larynx (voice box).

The doctor may order wrist restraints for a person who is intubated to keep the person from reaching up and removing the endotracheal tube from the airway. The wrist restraints can add to the person's discomfort and anxiety, but accidental **extubation** (removal of the tube) can have serious consequences, including death. Remember that when physical restraints are in use, you must pay special attention to the person's physical and emotional needs. Frequent monitoring and repositioning are necessary to keep the person safe and comfortable and to relieve some of the anxiety the person may feel as a result of being restrained.

Frequent oral care can help relieve some of the dryness and discomfort caused by having an endotracheal tube in place. Depending on facility policy, a nurse or respiratory therapist may need to assist you with providing oral care to ensure that the endotracheal tube stays in place during the procedure.

The endotracheal tube irritates the mucous membrane that lines the respiratory tract, leading to the production of extra mucus and secretions. These secretions can block the endotracheal tube if they are not removed. The nurse or respiratory therapist is responsible for suctioning the endotracheal tube.

TRACHEOSTOMY

A tracheostomy is a surgically created opening in the neck that opens into the trachea. A short tube, called a tracheostomy or "trach" tube, is inserted into the opening. The tracheostomy

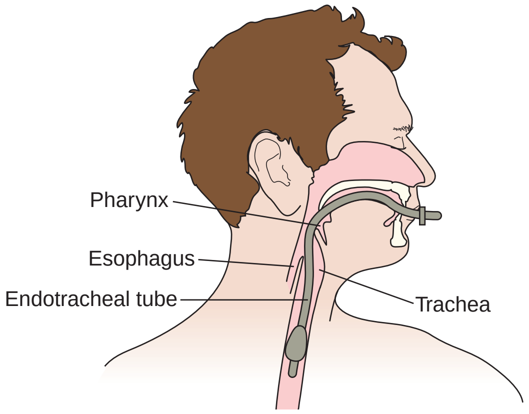


Figure 6-7
An endotracheal tube is inserted through the person's mouth or nose. The endotracheal tube extends to the trachea. The endotracheal tube ensures a clear airway so air can reach the lungs. A person who is on a ventilator will either have an endotracheal tube or a tracheostomy.

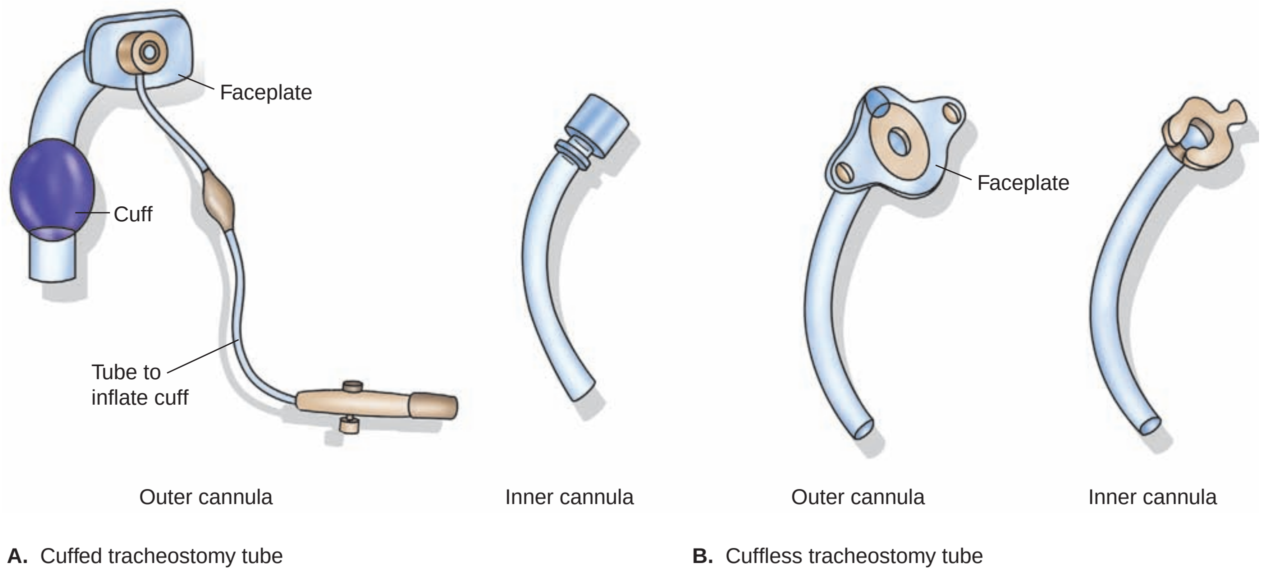


Figure 6-8
A tracheostomy tube may be cuffed (**A**) or cuffless (**B**). All tracheostomy tubes have an outer cannula, which remains in the trachea, and an inner cannula, which slides inside the outer cannula and can be removed to be cleaned or replaced.

tube may be cuffed or cuffless (Fig. 6-8). Like an endotracheal tube, a cuffed tracheostomy tube has a balloon cuff on the end that helps hold the tube in place and prevent secretions from entering the respiratory tract. When the cuff is inflated, the person is unable to talk. A cuffless tracheostomy tube does not have a balloon cuff, and because it permits speech, it is often used for people who will have the tracheostomy tube in place for a long period of time.

Both types of tracheostomy tubes have two parts, an inner cannula and an outer cannula (see Fig. 6-8). The inner cannula fits inside the outer cannula. The outer cannula stays in place in the trachea, and the inner cannula is removed to be cleaned (if it is not disposable) or replaced (if it is disposable). Both types of tracheostomy tubes are secured around the person's neck with ties or a special collar device to prevent the person from coughing out the tube (Fig. 6-9).

A tracheostomy may be necessary if the upper airway is blocked and endotracheal intubation is not possible (for example, as a result of trauma to the face or mouth). Tracheostomy is also used for people who must remain on a mechanical ventilator for longer than 3 weeks. The mechanical ventilator is connected directly to the tracheostomy tube. A trach mask (a mask that is placed over the tracheostomy tube to provide supplemental oxygen) may be used if the person does not require ventilator support to breathe but still needs supplemental oxygen (Fig. 6-10).

Depending on the situation, a tracheostomy can be temporary or permanent. Temporary tracheostomy is used if the person will require mechanical ventilation for longer than 3 weeks (but not for the rest of his life). However, a person who is paralyzed and will need to be on a ventilator for the rest of his life will have a permanent tracheostomy. People with certain medical conditions (such as laryngeal cancer) will also have a permanent tracheostomy because after removal of the larynx, the airway between the pharynx and trachea is no longer complete.

A tracheostomy tube is much more comfortable for the person than an endotracheal tube. The person is able to eat and drink normally. However, the doctor may order wrist restraints for a patient who is confused and disoriented to prevent accidental removal of the tracheostomy tube. Patients who are alert during the day may only need wrist restraints when they are sleeping. Remember that frequent monitoring and repositioning are essential whenever restraints are in use.

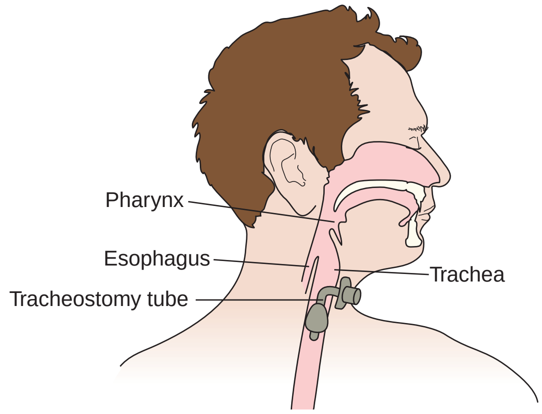


Figure 6-9
A tracheostomy tube is inserted through a surgically made opening in the throat to provide a way for air to reach the lungs. The tracheostomy tube is secured with ties or a special collar.

Suctioning a Tracheostomy

Tracheostomies require frequent suctioning. Most facilities only allow licensed personnel to suction tracheostomies. If your facility allows nursing assistants to suction tracheostomies, you must make sure that you have been trained how to do this task properly and that it is in your job description.

Providing Tracheostomy Care

Tracheostomy care involves regular cleaning or replacement of the inner cannula. Usually, only licensed personnel are allowed to clean or replace the inner cannula, but in some facilities, nursing assistants are trained to do these tasks. If your facility allows nursing assistants to clean or replace the inner cannula, you must make sure that you have been trained how to do this task properly and that it is in your job description.

In other facilities, your role in providing tracheostomy care may be limited to caring for the tracheostomy site (that is, cleaning the skin around the tracheostomy tube and changing the dressing and ties). Tracheostomy site care is provided at least once a day and more frequently if needed. Mucus often oozes around the edges of the tracheostomy tube. Cleaning the mucus off the skin and then drying the site well prevents skin breakdown. After the skin is cleaned and dried, the dressing under the faceplate and the ties are replaced. A special commercially made tracheostomy dressing with a slit for the tracheostomy tube is used (Fig. 6-11). Procedure 6-1 gives step-by-step instructions for providing tracheostomy site care.

Figure 6-10
A trach mask is a mask that is placed over a tracheostomy tube to provide supplemental oxygen.

Care Alert!

WHEN caring for the tracheostomy site, take care not to dislodge the tube. Dislodging the tube is painful for the person and may result in extubation (removal of the tube) or blocking of the airway.

Figure 6-11
The dressing used under the tracheostomy faceplate is a special tracheostomy dressing. Do not try to make your own tracheostomy dressing by cutting a slit in a gauze sponge. This puts the person at risk for inhaling loose threads through the tracheostomy tube. If a commercially made tracheostomy dressing is not available, gauze sponges can be folded in half and placed under each side of the faceplate.

Figure 6-12
A mechanical ventilator (seen on the *right*) breathes for a critically ill patient who cannot breathe on his own. (*Photographer: Chris Gregerson.*)

Care Alert!

WHEN replacing the dressing and ties, never remove the old ties that are holding the tube in place without replacing them with new ties first. If the tube is not secured, it can pop out if the person coughs. Extubation can have serious consequences for the person, including death.

MECHANICAL VENTILATION

In mechanical ventilation, a machine called a *ventilator* breathes for a person who cannot breathe on her own (Fig. 6-12). The ventilator forces air into the person's lungs. The air is delivered through an endotracheal tube or a tracheostomy tube that has been inserted into the person's airway.

How much the ventilator does depends on what the person requires. The ventilator can control the rate of breathing and the depth of breathing. It can also be used to administer supplemental oxygen. Some people only need the ventilator for a short period of time, but others may need the ventilator for the rest of their lives.

Mechanical ventilation is often used during surgery and for a period of time afterward until the anesthesia wears off and the person is able to breathe on her own. A person who is taking a great deal of pain medication because of severe injuries resulting from trauma may need to be put on a mechanical ventilator. In addition, many different medical conditions can make the use of a ventilator necessary, such as:

- A serious head injury, stroke, or drug overdose that affects the breathing control centers in the brain
- A spinal cord injury or neurologic disorder that interferes with the nerve impulses that cause the diaphragm to contract and relax automatically
- An acute disorder, such as a respiratory infection or heart attack

As a nursing assistant, you may care for patients who are on mechanical ventilators. Many facilities require a respiratory therapist or nurse to assist you with providing routine personal care to patients on ventilators to ensure that the endotracheal or tracheostomy tube stays in place during the procedure. If you are uncomfortable or unsure about caring for a person on a ventilator, ask for help. Keeping the patient safe is very important.

Mechanical ventilators have many different alarms that will sound to alert the health care team to changes in the patient's status. If you will be caring for patients who are on mechanical ventilators, you need to be familiar with the different alarms and what they mean so you will know what is an emergency and what is not and who to call in the event of an emergency. As a nursing assistant, you will not be responsible for setting or adjusting the ventilator controls, but you will assist the health care team in making sure that the patient's airway is maintained and that the ventilator is connected to the patient.

CHEST TUBES

Chest tubes are used to drain fluid (such as blood) or air that may build up in the chest cavity as a result of disease, trauma, or surgery. The build-up of air in the space between the lungs and the chest wall is called *pneumothorax*. The build-up of blood in the space between the lungs and the chest wall is called *hemothorax*. Pneumothorax and hemothorax are often complications of chest trauma. A severe lung infection can also cause a build-up of pus and fluid around the lung, making insertion of a chest tube necessary.

Fluid or air that builds up in the space between the lungs and the chest wall prevents the lungs from expanding fully. As a result, ventilation and gas exchange are affected, and the person is not able to meet the need for oxygen. In this situation, the doctor will insert a chest tube and connect it to a chest tube drainage system to remove the fluid or air that is preventing the lungs from fully expanding (Fig. 6-13). The chest tube drainage system may drain the fluid or air by gravity, or suction may be applied. In addition to inserting a chest tube, the doctor may prescribe supplemental oxygen.

Guidelines for caring for a person with a chest tube are given in Guidelines Box 6-1.

Figure 6-13
A chest tube drainage system is used to remove fluid (such as blood) or air that may build up in the chest cavity as a result of disease, injury, or surgery. The chest tube drainage system should remain upright and below the level of the patient's chest at all times.

Guidelines Box 6-1 Guidelines for Caring for a Person with a Chest Tube

WHAT YOU DO	WHY YOU DO IT
Take care to place the chest tube drainage system where it cannot be accidentally kicked or knocked over.	The chest tube drainage system must remain in an upright position at all times. If the chest tube drainage system tips over, the water seal can be broken, allowing air or fluid back into the space between the lungs and the chest wall.
Make sure that the chest tube drainage system is always below chest level.	If the chest tube drainage system is above the chest, then the drainage will run back into the space between the lungs and the chest wall.
Never disconnect the chest tube from the chest tube drainage system.	Disconnecting the chest tube from the chest tube drainage system will allow air to enter the space between the lungs and the chest wall, creating a pneumothorax and a potentially life-threatening situation.

(*continued*)

Guidelines Box 6-1 Guidelines for Caring for a Person with a Chest Tube (*Continued*)

WHAT YOU DO	WHY YOU DO IT
If suction is being used, never disconnect the chest tube drainage system from the suction without a doctor's order.	If the suction is disconnected, then the fluid or air will stop draining, and the patient's recovery will be delayed.
Make sure that the tubing that connects the chest tube to the chest tube drainage system is not coiled or kinked.	Coils or kinks in the tubing prevent the fluid or air from draining properly.
When positioning a person with a chest tube in the lateral position, use pillows to provide comfort and prevent the person from lying directly on the tubing.	Lying directly on the tubing would be uncomfortable for the person. In addition, the weight of the person's body on the tubing could stop the free flow of air or fluid into the drainage collection device.

TELL THE NURSE !

When caring for a patient with a chest tube, be sure to report any of the following observations to the nurse:

- The person is short of breath or is having difficulty breathing.
- The chest tube drainage system has been knocked over.
- The chest tube has been pulled out.
- The dressing over the insertion site is soiled, loose, or missing.
- The amount of drainage has suddenly increased.

SUMMARY

- The respiratory and cardiovascular systems work together to supply the body with oxygen and rid the body of carbon dioxide. A person will not be able to meet the need for oxygen if there is a problem with ventilation, gas exchange, or oxygen transport.
  - Ventilation is the mechanical process of moving air in and out of the lungs.
  - Gas exchange is the transfer of oxygen into the blood and carbon dioxide out of it.
  - Oxygen transport is the delivery of oxygen to the tissues.
- The amount of oxygen in a person's blood can be monitored using pulse oximetry or arterial blood gas (ABG) analysis.
  - Pulse oximetry is a noninvasive way of measuring the amount of oxygen in a person's blood. Light is passed through the tissue to a sensor on the other side of the device. The amount of light that reaches the sensor is translated into a measurement of how much oxygen the blood is carrying.
  - ABG analysis is a more accurate, but more painful, way of measuring the amount of oxygen in a person's blood. A sample of arterial blood is drawn and sent to the laboratory for analysis.
- For patients who are having trouble with gas exchange or oxygen transport, the doctor may order supplemental oxygen.
  - The amount of oxygen that is being administered to a person can be stated in terms of liters per minute (L/min) or in terms of fraction of inspired oxygen (FIO_2).
  - Supplemental oxygen may be administered by a nasal cannula, a facemask, or a mechanical ventilator.

- If the airway (the series of passages that lead from the outside of the body to the lungs) is blocked, the person will have trouble meeting the need for oxygen.
  - Suctioning involves the use of a suction catheter to remove mucus and secretions from the airway.
  - Nasopharyngeal and oropharyngeal airways are used to keep the upper airway open.
    - A nasopharyngeal airway is inserted through the nostril and extends to the pharynx, providing a passage for air to flow through.
    - An oropharyngeal airway is inserted through the mouth and extends to the pharynx. The oropharyngeal airway stops the tongue from falling back into the throat, keeping the airway open.
    - An endotracheal tube is inserted through the mouth or nose and extends to the trachea, providing a passage for air to flow through.
    - A tracheostomy tube is inserted through a surgically made opening in the neck.
- A mechanical ventilator inflates and deflates the lungs and can be used to administer supplemental oxygen. The ventilator can control the rate of breathing, the depth of breathing, or both.
- A chest tube drainage system is used to remove fluid or air that has accumulated in the area between the lung and chest wall. Common causes of fluid or air accumulation include hemothorax, pneumothorax, and severe lung infections.

CHAPTER 6 PROCEDURES

PROCEDURE 6-1

Providing Tracheostomy Site Care

WHY YOU DO IT Mucus can accumulate around the edges of the tracheostomy tube. Changing soiled dressings and keeping the skin around the tracheostomy site clean and dry helps prevent skin breakdown and promote comfort.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Sterile saline or sterile water
- Sterile basin
- Sterile cotton-tipped applicators
- Sterile gauze sponges
- Tracheostomy dressing
- Tracheostomy ties
- Scissors

Procedure

2. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up. Raise the head of the bed to the semi-Fowler's or Fowler's position.
3. Put on the gloves.
4. Remove the soiled dressing by sliding it out from underneath the faceplate. Dispose of the soiled dressing in a facility-approved waste container.
5. Remove your gloves and dispose of them in a facility-approved waste container. Wash your hands.
6. Remove one of the sterile basins from its package, being careful not to touch the inside of the basin. Pour sterile saline or sterile water into the sterile basin.
7. Put on a clean pair of gloves.
8. Dip a cotton-tipped applicator or a gauze sponge into the sterile saline or sterile water. Gently lift up the faceplate and clean the skin around the tracheostomy by placing the moistened cotton-tipped applicator or gauze sponge next to the tracheostomy tube and moving it in a circular motion around the tracheostomy tube. Move outward from the tracheostomy tube using a clean moistened cotton-tipped applicator or gauze sponge for each stroke.

Step 8 Use a clean applicator or sponge for each circular stroke.

9. Pat the skin dry with a sterile gauze sponge.

Step 9 Pat the skin dry.

10. Slide the clean tracheostomy dressing under the faceplate.

Step 10 Slide a clean tracheostomy dressing under the faceplate.

11. Change the tracheostomy ties:

a. Take a piece of tracheostomy tie approximately 18 to 24 inches long. Trim the ends of the tie on the diagonal.

b. Insert one end of the tie through the opening on the faceplate next to the old tie. Pull the end of the new tie until the ends are even.

Step 11b Insert one end of the tie through the opening on the faceplate and pull it through until the ends are even.

c. Bring both ends of the new tie behind the person's neck and insert one end through the opening on the faceplate on the other side. Tie the ends of the tie in a double square knot. Make sure the tie is snug but not too tight. You should be able to slide your finger between the tie and the person's neck.

Step 11c Insert one end of the new tie through the face-plate opening on the other side and then tie the ends of the new tie together using a double square knot.

d. Carefully remove the old tie by untying it or cutting it.

Step 11d Remove the old tie after the new tie is securely in place.

12. Remove your gloves and dispose of them in a facility-approved waste container.

13. If the side rails are in use, return them to the raised position. Lower the head of the bed as the person requests. Make sure that the bed is lowered to its lowest position and that the wheels are locked.

14. Dispose of disposable items in a facility-approved waste container.

Finishing Up

15. Complete the “Finishing Up” steps.

What You Document

- The amount, color, and odor (if present) of the mucus
- Any redness or skin breakdown
- Any complaints of pain or discomfort

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. The nurse tells you that Mr. Weyland, a new patient you will be caring for, is receiving supplemental oxygen at a rate of 5 L/min. When you go to meet Mr. Weyland, you would expect him to be wearing a:
   a. Simple facemask
   b. High-flow nasal cannula
   c. Nasal cannula
   d. Non-rebreather mask

2. Ms. Takamoto's pulse oximetry reading is low. You notice that the waveform on the pulse oximeter is poor. What are some possible reasons for the low reading?
   a. Ms. Takamoto has poor circulation in her hands
   b. Ms. Takamoto has very warm hands
   c. You are new at this and nervous
   d. Ms. Takamoto has short fingernails

3. Pulse oximetry measures:
   a. Oxygen and carbon dioxide levels in the blood
   b. How much oxygen is being administered to the patient
   c. Oxygen levels in the blood
   d. The acidity of the blood

4. In report you learn that Mr. Wysocki, one of your new patients, has a tracheostomy. Mr. Wysocki is wearing a trach mask that delivers oxygen at a rate of 5 L/min. You know this means:
   a. Mr. Wysocki is going to be very demanding
   b. Mr. Wysocki is on a mechanical ventilator
   c. Mr. Wysocki will need tracheostomy site care
   d. Mr. Wysocki is unable to breathe on his own

5. When providing tracheostomy site care, it is important to:
   a. Make sure that the skin is clean and dry to prevent skin breakdown
   b. Remove the old ties before inserting the new ones
   c. Cut a slit in a gauze sponge so that it will fit around the tracheostomy tube
   d. Remove the tracheostomy tube during the procedure

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Non-rebreather mask

_____ **2.** Simple facemask

_____ **3.** Continuous positive airway pressure (CPAP) mask

_____ **4.** Nasal cannula

_____ **5.** Tracheostomy tube

_____ **6.** Endotracheal tube

_____ **7.** Oropharyngeal airway

_____ **8.** Nasopharyngeal airway

a. A tube that is inserted through the nose or mouth and extends to the trachea to provide a clear airway

b. Pushes air into the lungs under pressure to make breathing easier and promote gas exchange

c. Oxygen flows through prongs inserted in the nostrils

d. A soft, flexible tube that is inserted in the nostril and extends to the pharynx to provide a clear airway

e. A one-way valve prevents room air from entering and allows carbon dioxide to escape

f. A hard plastic device that is inserted in the mouth and extends to the pharynx to provide a clear airway

g. A tube that is inserted through a surgically created opening in the neck

h. Holes on the side let room air in and carbon dioxide out

STOP and Think!

1. Mr. Cody has his call light on again. He puts his call light on every few minutes, it seems. This time, when you go to his room, Mr. Cody asks you to empty his urinal. Mr. Cody has end-stage emphysema and has been hospitalized with pneumonia. Why do you think Mr. Cody is always putting his call light on? What are some things you could do to help meet his needs while also meeting the needs of the other patients on the unit?

2. Mrs. Harnish has an endotracheal tube and is on a mechanical ventilator. She is alert but unable to speak or eat. She is receiving enteral nutrition and intravenous fluids. You know that Mrs. Harnish's mouth must be terribly dry and uncomfortable, and you offer to provide oral care. What precautions should you take before providing oral care to Mrs. Harnish? Why is good oral care especially important for a patient who cannot take food or fluids by mouth?

3. Mrs. James was in a car accident. She has three broken ribs and a hemothorax. A chest tube drainage system attached to suction is being used to treat the hemothorax. Mrs. James asks you if you can help her walk down the hall to see her husband, who was also injured in the accident. What problems might you have in meeting Mrs. James' request? What are possible solutions to these problems?

CHAPTER

7

Advanced Vascular Access Skills

WHAT WILL YOU LEARN?

Blood is the life-giving fluid of our bodies. Blood carries oxygen, nutrients, and hormones to the cells of the body and waste products away. The vascular system, which is made up of the blood vessels, transports the blood throughout the body. Many treatments and diagnostic tests involve either placing substances (such as fluids or medications) into the vascular system or removing substances (such as blood) from the vascular system. Depending on where you work, you may receive additional training that enables you to assist with procedures involving the vascular system, such as obtaining a blood specimen for testing or removing an intravenous (IV) line. When you are finished with this chapter, you will be able to:

1. Describe how a needle and syringe or a vacuum tube system can be used to obtain a blood specimen.

Many of your patients will have an intravenous (IV) line. (Photo courtesy of Idaho State Journal.)

2. Demonstrate how to properly apply a tourniquet and discuss the safety precautions that must be followed when using a tourniquet.
3. Name the veins that are commonly used for venipuncture.
4. Describe some of the characteristics of a suitable vein for venipuncture.
5. Demonstrate proper technique for performing venipuncture using a vacuum tube system.
6. Explain what intravenous therapy is used for.
7. Explain the difference between a peripheral line and a central line.
8. Explain the nursing assistant's role in caring for a person who is receiving intravenous therapy.
9. Demonstrate proper technique for removing a peripheral line.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Phlebotomy	Vacuum tube	Infiltration	Implanted venous access device
Venipuncture	Additives	Central line	Bacteremia
Phlebotomist	Tourniquet	Peripherally inserted central catheter (PICC) line	Fungemia
Syringe	Antecubital space		Air embolism
Needle	Peripheral line		
Vacuum	Phlebitis		

VENIPUNCTURE

Phlebotomy is the act of obtaining blood from a vein for therapeutic or diagnostic purposes. The word *phlebotomy* comes from the Greek words *phlebos-* (veins) and *-tome* (incision). Phlebotomy has been practiced for centuries. Ancient doctors believed that phlebotomy, or "bloodletting," was an effective treatment for many disorders. The vein was cut, and blood was allowed to drain into a bowl (Fig. 7-1A). Today, phlebotomy is still used as a treatment for some disorders, but it is more commonly used to obtain blood specimens for laboratory analysis. Also, today, instead of cutting the vein, a needle is used to pierce (puncture) the vein and withdraw the blood (see Fig. 7-1B). The use of a needle to pierce a vein and withdraw blood is called **venipuncture**.

In many health care facilities, a specialist called a **phlebotomist** is responsible for collecting blood specimens. However, some facilities teach nurses and nursing assistants how to do some tasks usually handled by phlebotomists, such as collecting a blood specimen. In facilities where drawing blood is part of the nurse's or nursing assistant's scope of practice, extra training is usually provided, and a certificate in phlebotomy may be awarded when the training is successfully completed. Before collecting a blood specimen, always make sure that the task is within your scope of practice and that you have received the proper training, per your facility's policy.

EQUIPMENT USED FOR VENIPUNCTURE

The blood specimen can be collected using a needle and syringe or using a vacuum tube system. A tourniquet is also used during the venipuncture procedure.

Needle and Syringe

A **syringe** is a device used to inject or withdraw fluids. A syringe consists of a plunger, a barrel, and a tip (Fig. 7-2). If you pull back on the plunger, fluid flows into the barrel through the tip. If you push the plunger in, the fluid in the barrel flows out of the tip.

A **needle** (a slender, hollow steel tube with a sharp end used for piercing) can be attached to the syringe. The hub of the needle attaches to the tip of the syringe (see Fig. 7-2). There are many different types of needles. The bevel (the slanted end of the needle; see Fig. 7-2) can be long or short. The shaft can also be long or short, and it can vary in diameter (gauge). The smaller the gauge, the larger the diameter of the needle. If you need to use a

A

B

Figure 7-1
Phlebotomy in the 18th century (**A**) and today (**B**). (*Part A, Custom Medical Stock Photo. Part B, Getty Images.*)

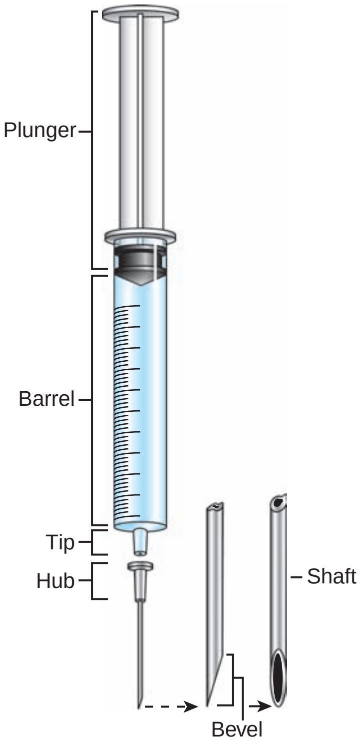


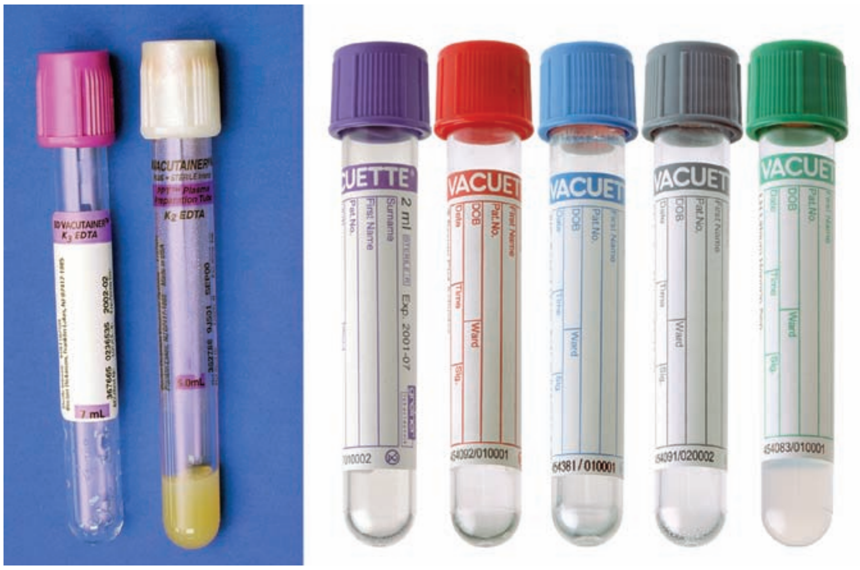
Figure 7-2
A syringe and needle. The syringe has three parts: the plunger, barrel, and tip. The needle also has three parts: the hub, shaft, and bevel.

needle and syringe, the nurse will tell you what type of needle to use. A 20- to 23-gauge needle is usually used to draw a blood sample.

When you remove a needle from its sterile packaging, you will see that the bevel and shaft are covered with a plastic needle cover. This cover helps to protect you from a needlestick injury, and it also prevents the needle from becoming contaminated. After you attach the needle to the syringe and before using the needle, remove the needle cover by pulling it straight off the needle. Never touch an uncovered needle.

Many needles in use today have built-in safety features that allow you to cover the needle after it has been used without touching it. You should never try to re-cover a used needle with the original needle cover because this increases your risk for a needlestick injury. All used needles should be placed directly into a sharps container after use.

When venipuncture is performed using a needle and syringe, the needle is inserted into the vein. Pulling back on the plunger creates a **vacuum** (negative pressure), which causes blood to flow into the syringe. When the required amount of blood



A B

Figure 7-3 Vacuum tubes are sealed tubes from which the air has been removed. Common brands of vacuum tubes include (**A**) BD Vacutainer® (Becton, Dickinson and Company, Franklin Lakes, NJ) and (**B**) Vacuette® (Greiner Bio-One, Kremsmünster, Austria). (*Part A courtesy of Becton, Dickinson and Company. Part B courtesy of Greiner Bio-One.*)

has been obtained, the needle is removed from the vein. The blood must then be transferred into a collection tube for transport to the laboratory.

Vacuum Tube System

A **vacuum tube** is a sealed glass or plastic tube from which the air has been removed (Fig. 7-3). Removing the air from the tube creates a vacuum. The vacuum causes the tube to automatically fill with blood when the needle is inserted into the vein. Blood stops flowing into the tube when the vacuum runs out.

Vacuum tubes are available in different sizes and with different degrees of vacuum. Vacuum tubes may also contain one or more **additives** (substances added in small amounts to something else to improve, strengthen, or otherwise alter it). For example, an additive may be used to prevent the blood sample from clotting. The color of the rubber stopper indicates the type of additive in the tube (see Fig. 7-3). The vacuum tube is selected according to the tests that have been ordered. Most manufacturers of vacuum tubes provide "tube guides" for reference purposes (Fig. 7-4). However, if you are still unsure of what tube to use, ask a nurse or laboratory technician to help you.

A vacuum tube system is used more frequently than a needle and syringe for collecting a blood specimen. With the vacuum tube system, it is not necessary to transfer the blood specimen into another collection tube. In addition, with the vacuum tube system, many tubes of blood can be collected without removing the needle from the person's arm.

A vacuum tube system consists of a vacuum tube, a tube holder, and a special needle called a multi-sample needle (Fig. 7-5). The multi-sample needle has bevels on both ends. The long bevel is used to enter the vein. The short bevel, which is covered with a rubber sleeve, is used to pierce the stopper on the vacuum tube. To assemble the system, the multi-sample needle is placed in one end of the tube holder, and the vacuum tube is placed in the other end. When the vacuum tube is pushed onto the needle, it pushes up the rubber sleeve covering the short beveled end, and the bevel pierces the rubber stopper. After the blood specimen is drawn and the vacuum tube is removed, the rubber sleeve comes back down over the end of the needle, preventing blood from leaking out. If more than one blood specimen is needed, a new vacuum tube can be added to the system without removing the needle from the person's vein.

Tourniquet

A **tourniquet** (a long, flat strip of stretchy latex or vinyl) is used during the venipuncture procedure to assist in identifying a suitable vein and to make it easier to insert the needle into the vein. The tourniquet is applied 3 to 6 inches above the site where the needle will be inserted. The tourniquet blocks venous blood flow away from the area, causing the veins to bulge. Figure 7-6 shows the proper way to apply a tourniquet.

BD Vacutainer® Venous Blood Collection

Tube Guide

For a full line of BD Vacutainer® Specimen Collection Products, visit www.bd.com/vacutainer.

BD Vacutainer® Tubes with BD Hemogard™ Closure	BD Vacutainer® Tubes with Conventional Stopper	Additive	Inversions at Blood Collection*	Laboratory Use	Your Lab's Draw Volume/Remarks
Gold	Red/ Black	• Clot activator and gel for serum separation	5	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.** Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 30 minutes.	
Light Green	Green/ Gray	• Lithium heparin and gel for plasma separation	8	BD Vacutainer® PST™ Tube for plasma determinations in chemistry. Tube inversions prevent clotting.	
Red		• None (glass) • Clot activator (plastic)	0 5	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.** Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 60 minutes.	
Orange	Gray/ Yellow	• Thrombin	8	For stat serum determinations in chemistry. Tube inversions ensure complete clotting, which usually occurs in less than 5 minutes.	
Royal Blue		• Clot activator (plastic serum) • K_2EDTA (plastic)	8 8 0 5 8	For trace-element, toxicology, and nutritional-chemistry determinations. Special stopper formulation provides low levels of trace elements (see package insert).	
Green		• Sodium heparin • Lithium heparin	8 8	For plasma determinations in chemistry. Tube inversions prevent clotting.	
Gray		• Potassium oxalate/ sodium fluoride • Sodium fluoride/Na_2 EDTA • Sodium fluoride (serum tube)	8 8 8	For glucose determinations. Oxalate and EDTA anticoagulants will give plasma samples. Sodium fluoride is the antiglycolytic agent. Tube inversions ensure proper mixing of additive and blood.	
Tan		• K_2EDTA (plastic)	8 8	For lead determinations. This tube is certified to contain less than .01 µg/mL(ppm) lead. Tube inversions prevent clotting.	
	Yellow	• Sodium polyanethol sulfonate (SPS) • Acid citrate dextrose additives (ACD): **Solution A -** 22.0 g/L trisodium citrate, 8.0 g/L citric acid, 24.5 g/L dextrose **Solution B -** 13.2 g/L trisodium citrate, 4.8 g/L citric acid, 14.7 g/L dextrose	8 8 8	SPS for blood culture specimen collections in microbiology. Tube inversions prevent clotting. ACD for use in blood bank studies, HLA phenotyping, and DNA and paternity testing.	
Lavender		• Liquid K_3EDTA (glass) • Spray-coated K_2EDTA (plastic)	8 8	K_2EDTA and K_3EDTA for whole blood hematology determinations. K_2EDTA may be used for routine immunohematology testing and blood donor screening.*** Tube inversions prevent clotting.	
White		• K_2EDTA with gel	8	For use in molecular diagnostic test methods (such as but not limited to polymerase chain reaction [PCR] and/or branched DNA [bDNA] amplification techniques).	
Pink	New	• Spray-coated K_2EDTA	8	For whole blood hematology determinations. May be used for routine immunohematology testing and blood donor screening.*** Designed with special cross-match label for patient information required by the AABB. Tube inversions prevent clotting.	
Light Blue	Clear	• Buffered sodium citrate 0.105 M (≈3.2%) glass 0.109 M (≈3.2%) plastic • Citrate, theophylline, adenosine, dipyridamole (CTAD)	3-4 3-4	For coagulation determinations. CTAD for selected platelet function assays and routine coagulation determination. Tube inversions prevent clotting.	
Clear	New Red/ Gray	• None (plastic)	0	For use as a discard tube or secondary specimen collection tube.	
Partial-draw Tubes (2 mL and 3 mL: 13 x 75 mm)	**Small-volume Pediatric Tubes** (2 mL: 10.25 x 47 mm, 3 mL: 10.25 x 64 mm)				
Red		• None	0	For serum determinations in chemistry. May be used for routine blood donor screening, immunohematology testing,*** and diagnostic testing of serum for infectious disease.** Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 60 minutes.	
Green		• Sodium heparin • Lithium heparin	8 8	For plasma determinations in chemistry. Tube inversions prevent clotting.	
Lavender		• Spray-coated K_2EDTA (plastic)	8 8	For whole blood hematology determinations. May be used for routine immunohematology testing and blood donor screening.*** Tube inversions prevent clotting.	
Light Blue		• 0.105 M sodium citrate (≈3.2%)	3-4	For coagulation determinations. Tube inversions prevent clotting.	

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* Invert gently, do not shake
** The performance characteristics of these tubes have not been established for infectious disease testing in general; therefore, users must validate the use of these tubes for their specific assay-instrument/reagent system combinations and specimen storage conditions.
*** The performance characteristics of these tubes have not been established for immunohematology testing in general; therefore, users must validate the use of these tubes for their specific assay-instrument/reagent system combinations and specimen storage conditions.

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Figure 7-4

Most manufacturers of vacuum tubes provide "tube guides" that explain the tubes' color coding system. (*Courtesy of Becton, Dickinson and Company*)

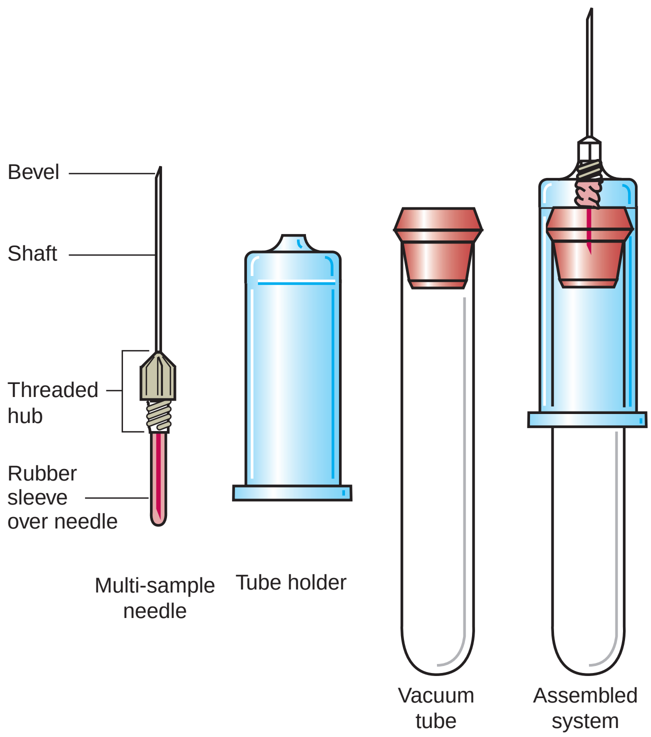


Figure 7-5
A vacuum tube system consists of a multi-sample needle, a tube holder, and a vacuum tube.

Applying the tourniquet in this way allows you to release the tourniquet quickly when the procedure is completed or if the patient experiences problems.

A tourniquet that is too tight or that is left in place for too long can block arterial blood flow, which in turn can lead to tissue or nerve damage. After applying a tourniquet, check the person's radial pulse. If you cannot feel the radial pulse, then the tourniquet is too tight. Never leave a tourniquet in place for more than 2 to 3 minutes. If you use a tourniquet to assist in vein selection, release the tourniquet and wait at least 2 minutes before beginning the procedure and reapplying the tourniquet.

VEINS USED FOR VENIPUNCTURE

The veins in the **antecubital space** (the inner aspect of the elbow) are most frequently used for venipuncture. Several large veins in this area lie close to the surface of the skin (Fig. 7-7). Veins of the hand and arm can also be used, but these veins tend to be smaller and more difficult to access. It is important to use a vein, not an artery, for venipuncture. Using an artery instead of a vein puts the person at risk for excess bleeding and clot formation.

A tourniquet applied 3 to 6 inches above the site where you intend to place the needle will block the flow of venous blood away from the area, causing the veins to bulge. Have the person make a fist. This causes the vein to swell with blood and makes it easier to identify a suitable vein. A good vein for venipuncture bulges when the tourniquet is applied and lies flat when the tourniquet is released. When the tourniquet is on, the vein feels full and "springy," like a cooked spaghetti noodle. The vein should not feel hard or cord-like. You should not feel any pulsations in a vein. If you do, it's an artery, not a vein!

Conditions that can make it hard to find a suitable vein include obesity, dehydration, and treatment with medications that can damage the veins (such as those used for chemotherapy). Many elderly people have fragile veins that tend to "roll," making them hard to access. If you are having difficulty accessing the vein, stop and get help.

Care Alert!

IF your first attempt at entering the vein is not successful, you may attempt venipuncture again in an alternative site (for example, the other arm). But limit yourself to two attempts. Any more than that, and you are putting the patient at risk for unnecessary pain and injury.

RISKS ASSOCIATED WITH VENIPUNCTURE

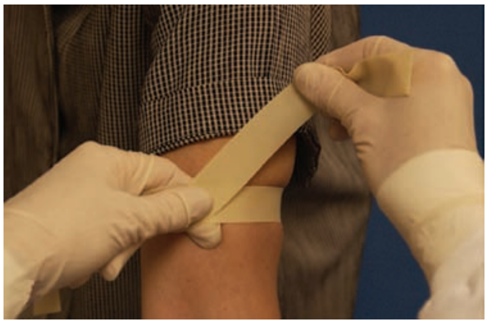
Hematoma

A hematoma is a collection of blood caused by a break in a blood vessel wall. A hematoma can form as a result of venipuncture if the blood vessel breaks, the needle is not inserted into the vein properly, or not enough pressure is applied to the insertion site after withdrawing the needle. Blood seeps from the damaged blood vessel into the surrounding tissue, causing a hematoma to

1

Position the tourniquet around the person's arm.

2

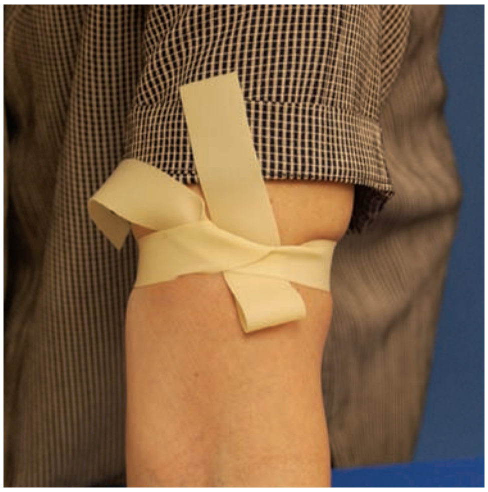


Pull the ends tightly in opposite directions across each other, making an "X". Hold both ends of the tourniquet together in your left hand, near the patient's arm.

3

Tuck the end that is on top under the end that is on the bottom, forming a loop.

4



Now both the loose ends are pointing up. Pulling gently on the loop will release the tourniquet.

Figure 7-6
Properly tying a tourniquet allows you to release it quickly.

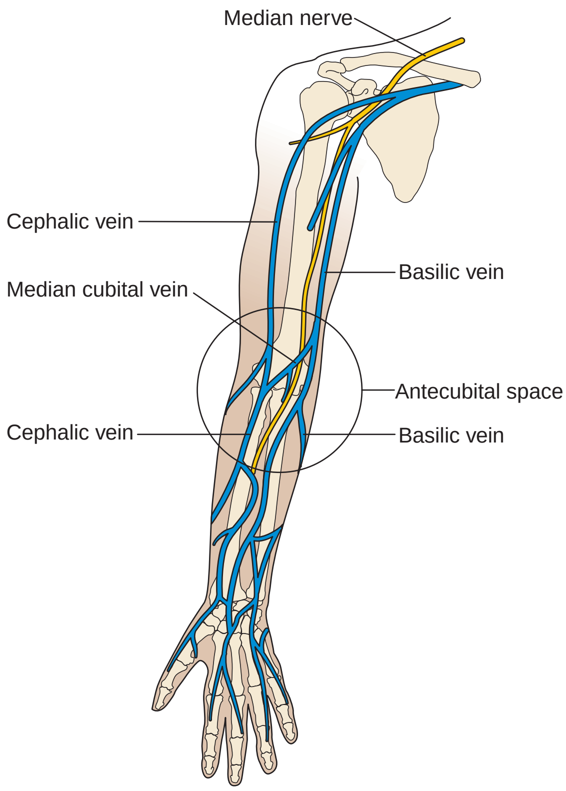


Figure 7-7
The antecubital space is the most common site for performing venipuncture because it contains several large veins that are easy to find in most people. The median cubital, cephalic, and basilic veins are all good veins to use for venipuncture.

form. Swelling and black-and-blue discoloration of the skin occur. The hematoma is painful for the person. In addition, if enough blood collects under the skin, it could put pressure on nearby nerves, possibly leading to permanent nerve damage.

If a hematoma starts to form while you are drawing blood, immediately release the tourniquet, withdraw the needle, and apply pressure to the site for at least 2 minutes or until the bleeding stops. Be sure to report the hematoma to the nurse so that she can follow up as necessary.

Infection

A risk of infection is always present whenever the skin is broken. To reduce the patient's risk of infection as a result of venipuncture, wash your hands before beginning, clean the site where the needle will be inserted, and take care to keep the needle sterile. To reduce your risk of infection, always take standard precautions.

GENERAL GUIDELINES FOR VENIPUNCTURE

Venipuncture is done with the person seated or in the supine position. The person's arm should be fully extended and pointed slightly downward. The arm should be supported on a firm surface, such as the over-bed table (if the person is seated) or the mattress (if the person is lying supine in bed).

The needle should be placed so that it follows the path of the vein with the bevel pointing up and in the same direction as blood flow (that is, toward the heart, not away from it). The needle is inserted into the vein at a 15- to 30-degree angle to the skin (Fig. 7-8). You will know the needle is

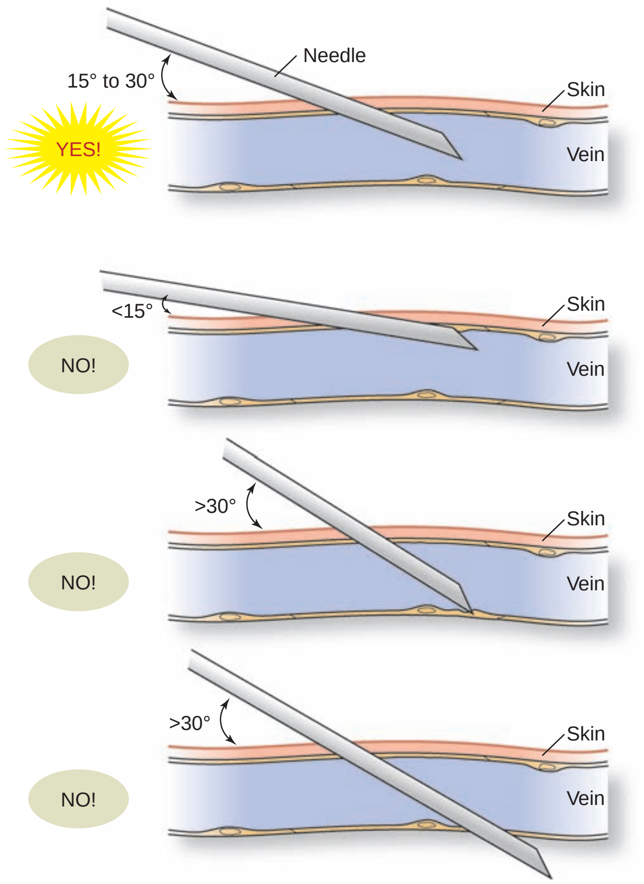


Figure 7-8
Inserting the needle into the vein at a 15- to 30-degree angle to the skin positions the bevel of the needle correctly so that blood can enter the needle. Inserting the needle at an angle less than 15 degrees causes the bevel to press against the upper wall of the vein, blocking the flow of blood into the needle. Inserting the needle at an angle of more than 30 degrees causes the bevel to press against the lower wall of the vein, blocking the flow of blood into the needle. It can also cause the needle to pass right through the vein.

in the vein when you feel a "pop" or a slight decrease in resistance.

General guidelines for performing venipuncture are given in Guidelines Box 7-1. The basic steps for performing venipuncture using a vacuum tube system are described in Procedure 7-1.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Most people do not like to have their blood drawn. Some people grow faint or queasy at the sight of blood, especially their own blood. Others are afraid of needles or expect that the procedure will be very painful. Many patients have had to endure several blood draws in a short period of time, performed by health care workers with varying degrees of skill. All of these factors can cause patients to be very anxious about having their blood drawn.

If you are expected to perform venipuncture, there are several things you can do to help relieve any anxiety the patient may be feeling. Be polite, explain why the procedure is necessary, and be honest about the amount of pain or discomfort the person can expect to feel. If the person tells you that a certain site is not a good site for drawing blood, listen to what the person is telling you! This is valuable information, and listening to the person lets him know that you respect and value his input. If the person voices concern about fainting, perform the procedure with the person in the supine position. Offering the person a cool compress to hold on the face or neck can also be reassuring. Finally, take the time to identify a suitable vein before inserting the needle, and insert the needle correctly. If you are having trouble identifying a suitable vein or if you have trouble inserting the needle in the vein, stop and get help. Knowing your limits and getting help when you need it lets the patient know you are acting in his best interest and helps him build trust in you.

Making an effort to understand a patient's concerns about a procedure and taking steps to ease these concerns are essential parts of providing health care with a humanistic focus.

INTRAVENOUS THERAPY

Intravenous (IV) therapy involves administering fluids, medication, nutrition, or blood products directly into the patient's bloodstream. The catheters used for IV therapy are inserted by a nurse or doctor. A nurse administers the therapy. However, you will be responsible for caring for many patients who have IV catheters, or "lines." The two main types of IV lines are peripheral lines and central lines.

PERIPHERAL LINES

Peripheral means "toward the outside." A **peripheral line** is a small IV catheter that is about 2 to 3 inches long that is inserted into a small vein in the hand or arm (Fig. 7-9). A peripheral line is used to administer fluids and some types of medications (such as certain antibiotics or pain medications). Blood is sometimes given through a

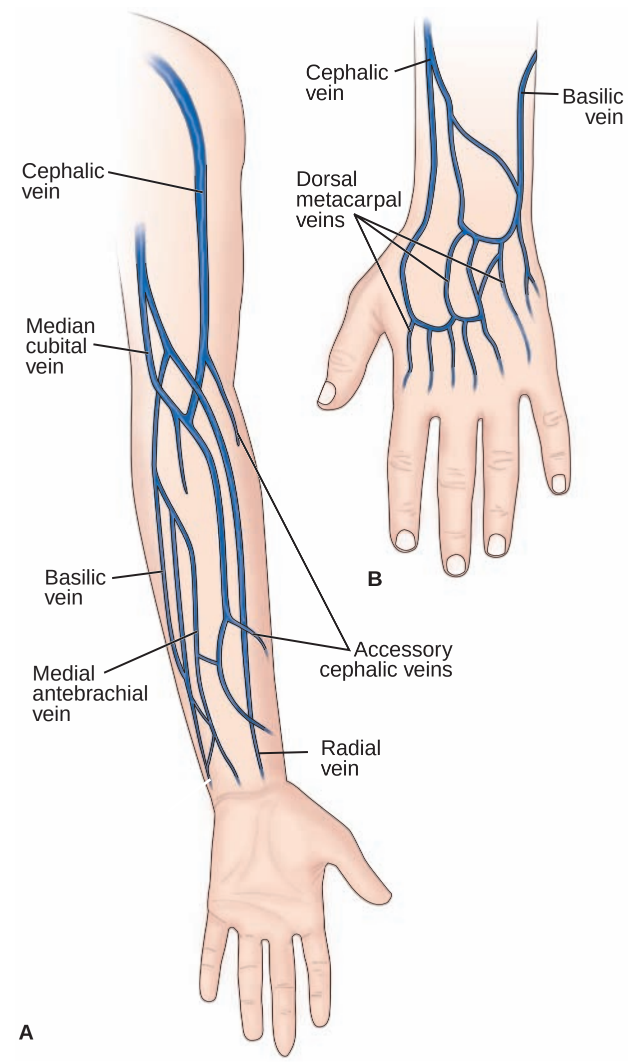


Figure 7-9
A peripheral line is a small catheter that is inserted in a small vein in the arm (**A**) or the back of the hand (**B**).

Guidelines Box 7-1 Guidelines for Performing Venipuncture

WHAT YOU DO	WHY YOU DO IT
Always make sure the specimen container is properly labeled according to your facility's policy.	Proper identification on the specimen container is necessary to ensure that the test results are matched with the correct patient. Otherwise, a person may be diagnosed with and receive treatment for a condition she does not have.
Before going to collect a specimen, always ask yourself: • Do I have the right person? • Do I have the right paperwork? • What method is to be used to collect the specimen? • Do I have the right type of specimen container? • Is the specimen container properly labeled? • What are the correct date and time? • What storage and delivery method must I use?	Having the answers to these questions helps ensure that the specimen will be correctly identified, collected, and transported or stored. This reduces the risk that another specimen will need to be obtained and the test repeated.
If multiple blood specimens are needed from the same patient, make sure you have all of the vacuum tubes you will need.	After you have started to draw the person's blood, you will not be able to leave the room to get more supplies.
Before beginning the procedure, explain to the person that the doctor has asked you to obtain a blood specimen.	You need the person's consent to perform the procedure.
Always use standard precautions when performing venipuncture.	Exposure to the patient's blood could put you at risk for bloodborne diseases, such as hepatitis or HIV/AIDS.
Avoid taking a blood specimen from: • An arm that has an IV line in place • An arm that has a hemodialysis access device, such as a graft or fistula • An arm that is on the same side as a recent mastectomy • The affected arm of a patient who has had a stroke • A site that is swollen or infected • A site with a hematoma • A site with broken skin	Taking a blood specimen from an arm that has an IV line in place can result in inaccurate test results because the blood may be diluted by the IV solution. Taking a blood specimen from an arm with a hemodialysis access device may result in damage to the graft or fistula, which may cause bleeding, infection, or clots. Mastectomy and stroke are conditions that can cause impaired circulation. As a result, the person is at risk for more complications from the venipuncture procedure. Sites with swelling, infection, hematoma, or broken skin should be avoided because using these sites puts the person at higher risk for local or systemic infection.
Avoid choosing a vein that feels hard or cord-like or that does not "spring back" when gently pressed.	The vein likely contains scar tissue, which means it will be hard to access. The needle could bend when you try to insert it.

Guidelines Box 7-1 Guidelines for Performing Venipuncture (*Continued*)

WHAT YOU DO	WHY YOU DO IT
Make sure the tourniquet is not too tight. Never leave a tourniquet in place for more than 2 to 3 minutes.	A tourniquet that is too tight or that is left in place for too long can block arterial blood flow, which in turn can lead to permanent tissue or nerve damage.
Always wash your hands before performing venipuncture and maintain clean technique throughout the procedure.	Pathogens introduced into the bloodstream can cause fatal infections.
If your first attempt to enter the vein fails, obtain new supplies for your second attempt.	Reusing a needle increases the person's risk of infection and is against protocol.
Monitor the patient's safety throughout the procedure.	Having blood drawn makes many people feel faint or nauseous. A person who faints is at risk for injury from falling.
When inserting or removing a vacuum tube from the tube holder, stabilize the tube holder with your dominant hand.	Stabilizing the tube holder helps prevent the needle from moving around inside of the vein. Movement of the needle within the vein is painful for the patient and might cause the needle to slip out of the vein.
Make sure that the specimen is handled correctly after you obtain it. For example, some specimens may need to be delivered to the laboratory while they are still warm or may need to be placed on ice. If a specimen is not being delivered to the laboratory right away, then it needs to be stored properly until the scheduled pick-up time.	Failing to deliver a specimen promptly (or store it properly until pick-up) can change the test results or make it impossible to use the specimen. In this case, another specimen will need to be obtained, which delays diagnosis and treatment, adds to costs, and is inconvenient for the patient.

peripheral line. Because having a peripheral line puts the patient at high risk of complications, peripheral lines are for short-term use only.

Patients with peripheral lines are at risk for **phlebitis** (inflammation of the vein). The skin over the vein is painful, hot, and red. If phlebitis is accompanied by formation of blood clots within the vein (a condition called *thrombophlebitis*), the vein may also feel hard and cord-like. If a clot breaks loose and travels through the bloodstream, the person is at risk for serious conditions, such as a stroke or pulmonary embolism. Phlebitis can also cause a local infection, which can quickly turn into a systemic infection if the pathogens enter the bloodstream.

Another complication seen with the use of peripheral lines is **infiltration** (leaking of the IV fluid into the tissues around the vein). Infiltration can occur if the IV catheter is accidentally dislodged from its proper position in the vein (for example, by pulling or patient movement). If infiltration has occurred, you may notice swelling in the tissue around the insertion site. The skin around the insertion site may also be pale.

TELL THE NURSE !

When caring for a patient with a peripheral line, be sure to report the following observations right away:

- The patient complains of pain or discomfort along the vein.
- The patient has a fever.

- There are red streaks up the patient's arm.
- The patient's arm looks swollen or puffy.
- The dressing over the insertion site is wet, soiled, or loose.
- Swelling is seen at the insertion site.
- The skin at the insertion site is pale or cool to the touch.
- The fluid is not dripping into the drip chamber or the rate of the infusion has slowed.
- Blood is backing up in the tubing.
- The tubing has become disconnected.
- The solution bag is empty.

When a peripheral line is no longer necessary, a doctor will order its removal. Most facilities allow nursing assistants who have received additional training to remove peripheral lines. The basic steps for removing a peripheral line are given in Procedure Box 7-2. If you are not sure whether a patient's line is a peripheral line or a central line, check with the nurse. Nursing assistants are only permitted to remove peripheral lines, never central lines.

CENTRAL LINES

Central means "toward the middle." A **central line** is a large IV catheter that is inserted into a large vein in the neck, chest, or groin. Central lines are called "central" because the catheter ends in one of the two large veins that empty directly into the heart (that is, the superior vena cava or the inferior vena cava) (Fig. 7-10). If the catheter is inserted into the jugular vein (in the neck) or the subclavian vein (in the chest), then the catheter ends in the superior vena cava. If the catheter is inserted into the femoral vein (in the groin), then the catheter ends in the inferior vena cava.

Sometimes, instead of using a vein in the neck, chest, or groin to insert the central line, the doctor will use one of the large veins in the upper arm. A central line that is started in the upper arm is called a **peripherally inserted central catheter (PICC) line**. The PICC line is threaded through the vein in the arm, into the subclavian vein, and then into the superior vena cava. Some central lines, called **implanted venous access devices,** are surgically placed under the skin. The catheter is threaded through the tissue, inserted into the subclavian or jugular vein, and then passed into the superior vena cava. This type of central line is accessed using a special needle inserted through the skin.

A central line is used when the patient requires long-term therapy or when the solution being administered contains large molecules or is potentially irritating to the lining of the veins. For example, a central line is used to administer total parenteral nutrition (TPN) because the TPN solution contains large molecules and is very concentrated. Administering TPN solution into a large vein, such as the vena cava, allows for rapid dilution of the solution by the blood, which helps prevent the lining of the veins from becoming irritated. Other substances that may be administered through a central line include chemotherapy medications and antibiotics.

A central line puts the patient at risk for bloodstream infection. Bloodstream infection can be caused by **bacteremia** (bacteria in the bloodstream) or **fungemia** (fungi in the bloodstream). Bloodstream infection can lead to serious complications, such as a brain abscess or endocarditis (infection of the endocardium, the inner layer of the heart). Many people die every year from health care–associated bloodstream infections. To help lower the patient's risk for bloodstream infection, sterile technique is used to insert the central line, and the insertion site is covered with a sterile dressing.

Another serious, but rare, complication seen with central lines is **air embolism**. Air embolism can occur if a pocket of air enters the system (for example, through disconnected tubing) and travels to the heart. The air pocket prevents the ventricles from filling all the way with blood, which in turn affects the amount of blood that is sent out to the body. Cardiac arrest can occur.

As a nursing assistant, it is not within your scope of practice to insert or remove central lines. However, many of your patients will have central lines. When caring for a patient with a central line, avoid pulling on the central line. Many central lines are sutured to the skin to prevent accidental removal. Pulling on the central line can irritate the skin and increase the patient's risk for infection and air embolism. Also, always make a point to observe the sterile dressing covering the insertion site. The dressing should be clean, dry, and secure.

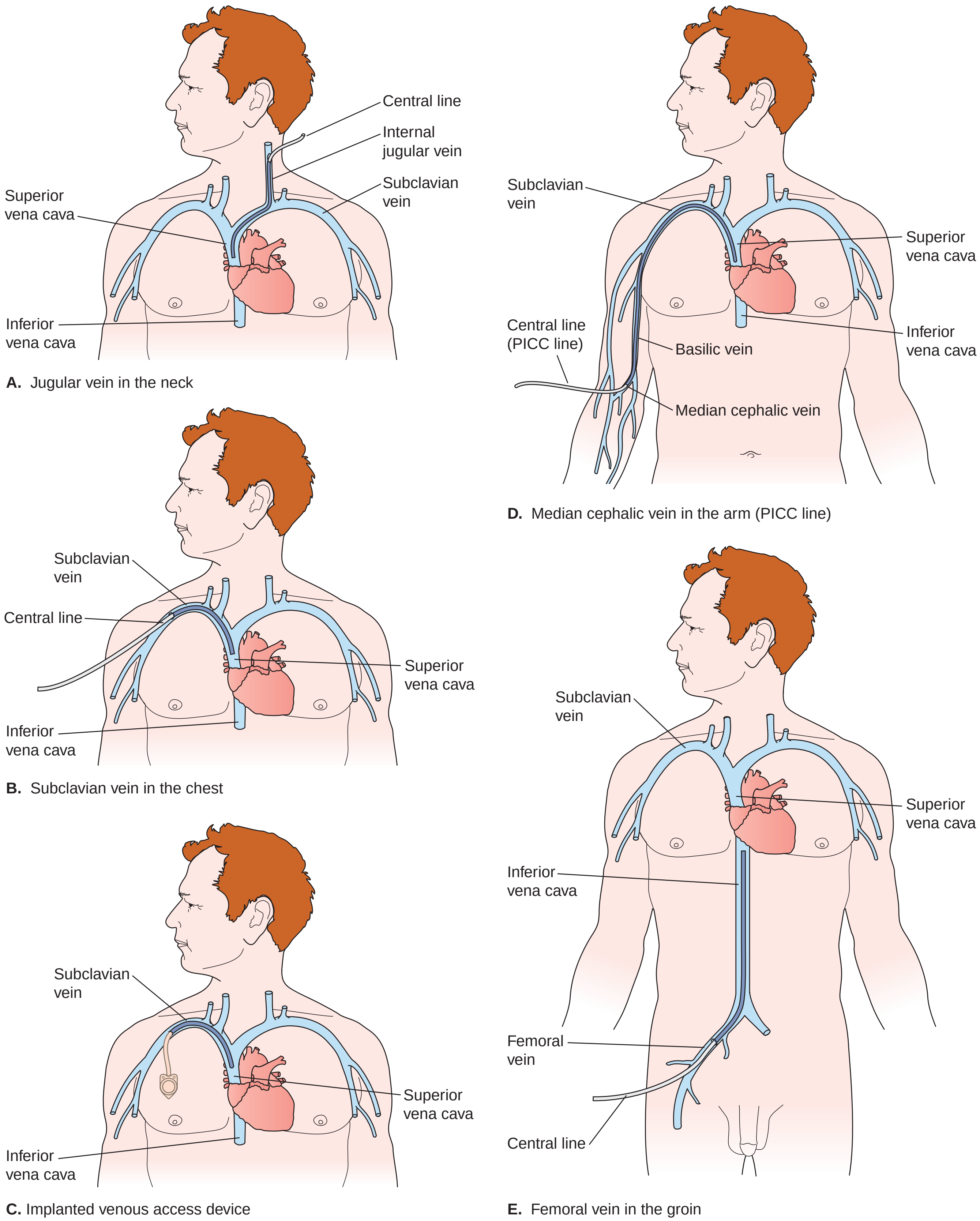


Figure 7-10

All central lines end in the superior vena cava or the inferior vena cava, the two large veins that empty directly into the heart. This is why they are called "central" lines. Veins typically used to insert a central line include the jugular vein (in the neck) (**A**), the subclavian vein (in the chest) (**B**), and the femoral vein (in the groin) (**E**). An implanted venous access device (**C**) is placed under the skin and the catheter is threaded through the tissue and inserted into the subclavian or jugular vein. A peripherally inserted central catheter (PICC) line (**D**) is a central line that is inserted through one of the large veins in the upper arm.

TELL THE NURSE !

When caring for a patient with a central line, tell the nurse if you observe any of the following:

- The patient complains of pain at the insertion site.
- The patient has a fever.
- The patient complains of chest pain or shortness of breath.
- The dressing over the insertion site is wet, soiled, or loose.
- There is drainage, redness, or swelling around the insertion site.
- Blood is backing up in the tubing.
- The tubing has become disconnected.
- The solution bag is empty.

SUMMARY

- Nursing assistants who have received special training may be permitted to perform venipuncture to obtain blood specimens for laboratory analysis.
    - Veins, not arteries, are used for venipuncture. Veins appear bluish and do not pulsate. A suitable vein for venipuncture is one that feels full and "springy," not hard and cord-like, when a tourniquet is applied.
    - A vacuum tube system is most often used to collect blood specimens, but a needle and syringe may also be used. With a vacuum tube system, many blood specimens can be obtained without removing the needle from the person's vein.
    - As with all specimen collection procedures, it is important to use the proper equipment and technique to collect the blood specimen and to handle the blood specimen properly after it has been collected. If the blood specimen is not collected or handled properly, it may be necessary to repeat the test, which is inconvenient for the patient and expensive for the facility.
- Many patients in advanced care settings receive fluids, medications, blood products, or nutrition through a catheter inserted into a vein. This is called intravenous (IV) therapy.
    - IV therapy can be delivered through a peripheral line or a central line.
    - A peripheral line is a short catheter with a small diameter that is inserted into one of the small veins of the hand or arm.
    - A central line is a long catheter with a larger diameter that is inserted into one of the large veins of the neck, chest, or groin and threaded into one of the large veins that empties directly into the heart.
- Nursing assistants are not responsible for inserting catheters used for IV therapy, for administering IV therapy, or for removing central lines. However, nursing assistants who have received advanced training may be allowed to remove peripheral lines. In addition, all nursing assistants who care for patients receiving IV therapy play an important role in monitoring these patients for signs of complications associated with the IV therapy and reporting these observations to the nurse right away.

CHAPTER

7 PROCEDURES

PROCEDURE 7-1

Performing Venipuncture Using a Vacuum Tube System

WHY YOU DO IT Because the contents of a person's blood can provide a doctor with information about the person's health status and blood type, you may be asked to obtain a blood specimen for laboratory testing.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Plastic bag
- Tourniquet
- Antiseptic swabs
- 20-gauge multi-sample needle
- Tube holder
- Vacuum tube(s), according to ordered test(s)
- Specimen labels
- Plastic transport bag (if required at your facility)
- Gauze pads
- Small adhesive bandage

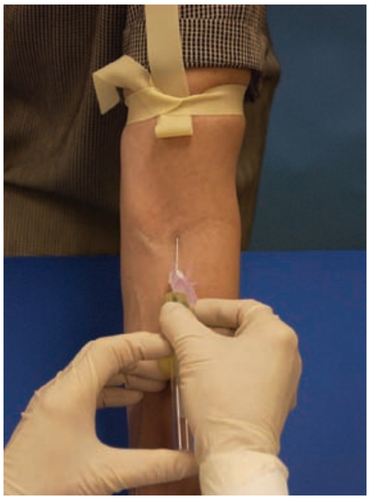
Procedure

2. Place the venipuncture supplies on a clean surface. Place the needle in the tube holder. Make sure the vacuum tubes are within easy reach. Fold down the top edges of the plastic bag to make a cuff. Place the cuffed bag within easy reach.
3. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side. The side rail on the opposite side of the bed should remain up.
4. Assist the person to a seated or supine position. The person's arm should be fully extended, pointed slightly downward, and supported by a firm surface. If necessary, roll up the person's sleeve to expose the antecubital space.
5. Select a vein: Apply the tourniquet 3 to 6 inches above the site where you are planning to insert the needle (see Fig. 7-6). Ask the person to make a fist. Identify a vein that is suitable for venipuncture. Release the tourniquet.
6. Put on the gloves.
7. Clean the site where you are planning to insert the needle.
   a. **Alcohol or Betadine swabs:** Place the swab on the intended insertion site and move it outward in a circular motion. If using Betadine, allow the area to dry for 60 seconds.
   b. **Chlorhexidine:** Place the swab on the intended insertion site and scrub using a back-and-forth motion for at least 30 seconds. Allow the area to dry for 30 seconds.
8. Reapply the tourniquet 3 to 6 inches above the site where you intend to insert the needle.
9. Hold the tube holder in your dominant hand. Remove the needle cover by pulling it straight off.
10. Place the thumb of your non-dominant hand below the site where you intend to insert the needle and pull down so that the skin over the insertion site is stretched tight.
11. If necessary, ask the person to make a fist again. Let the person know that you are about to insert the needle and tell the person to expect to feel a "pinch." With the bevel of the needle facing up and at a 15- to 30-degree angle to the skin, insert the needle into the vein.

(*continued*)

Step 11 Insert the needle into the vein.

12. Place the first vacuum tube into the tube holder. Use your index and middle fingers to stabilize the tube holder as you use your thumb to push the vacuum tube onto the needle.



Step 12 Stabilize the tube holder while inserting the vacuum tube.

13. Let the vacuum tube fill until the vacuum runs out and the blood stops flowing. When the blood stops flowing, remove the vacuum tube from the tube holder, making sure to stabilize the tube holder to minimize movement of the needle. If the vacuum tube contains an additive, gently turn the tube upside down and then right side up a few times to mix the additive and the blood specimen.

14. Repeat steps 12 and 13 until all of the ordered blood specimens have been obtained. Release the tourniquet just before the last vacuum tube finishes filling.

Step 14 Release the tourniquet just before the last tube finishes filling.

15. Gently hold a gauze pad over the needle insertion site. Remove the needle from the vein by pulling it straight out.

Step 15 Place the gauze pad over the insertion site before removing the needle from the vein.

16. Hold the gauze pad in place, applying pressure for 2 to 3 minutes. Place the gauze pad in the cuffed plastic bag.

Step 16 Apply pressure to the insertion site to stop the bleeding.

17. Open the adhesive bandage and apply it to the needle insertion site.
18. Dispose of the tube holder and needle in a facility-approved sharps container.

Step 18 Discard the needle and tube holder as a unit.

19. Complete the specimen labels according to facility policy. Apply the labels to the tubes per facility policy. Place the tubes in a plastic transport bag (if required at your facility).
20. Remove your gloves and dispose of them in a facility-approved waste container.
21. Check to make sure that the bleeding has stopped. Adjust the person's clothing as necessary. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.
22. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.
23. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the area designated by your facility. Take the blood specimens to the designated location.

Finishing Up

24. Complete the "Finishing Up" steps.

What You Document

- Any problems encountered
- How the patient tolerated the procedure
- How many attempts were made, and where
- Any excessive amount of bleeding after the procedure

PROCEDURE 7-2

Removing a Peripheral Line

WHY YOU DO IT The doctor will order the patient's peripheral line to be removed when the patient no longer needs intravenous therapy. Removing the peripheral line using proper technique helps prevent infection, bruising, and excessive blood loss.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Non-sterile gloves
- Plastic bag
- Antiseptic swabs
- Gauze pads
- Small adhesive bandage

Procedure

2. Place the supplies on a clean surface. Fold down the top edges of the plastic bag to make a cuff. Place the cuffed bag within easy reach.

3. Check the clamp to verify that the nurse has stopped the flow of fluids through the peripheral line.

4. Make sure that the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side. The side rail on the opposite side of the bed should remain up.

5. Help the person to a comfortable position that allows access to the insertion site. If necessary, roll up the person's sleeve to expose the insertion site.

6. Put on the gloves.

7. Remove the adhesive dressing covering the insertion site carefully using a peeling action. Place the soiled dressing in the cuffed plastic bag.

8. Gently hold a gauze pad over the insertion site. Remove the catheter from the vein by pulling it straight out.

9. Hold the gauze pad in place, applying pressure for 2 to 3 minutes. Place the gauze pad in the cuffed plastic bag.

10. Observe the end of the catheter to make sure the entire catheter was removed.

- **a.** If the catheter looks damaged, call the nurse to the room immediately.
- **b.** If no problems are noted, dispose of the catheter in a facility-approved sharps container.

11. Clean the insertion site.

- **a. Alcohol or Betadine swabs:** Place the swab on the insertion site and move it outward in a circular motion. If using Betadine, allow the area to dry for 60 seconds.
- **b. Chlorhexidine:** Place the swab on the insertion site and scrub using a back-and-forth motion for at least 30 seconds. Allow the area to dry for 30 seconds.

12. Open the adhesive bandage and apply it to the insertion site.

13. Remove your gloves and dispose of them in a facility-approved waste container.

14. Check to make sure that the bleeding has stopped. Adjust the person's clothing as necessary. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person.

15. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return the side rail to the raised position on the working side of the bed.

16. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the area designated by your facility.

Finishing Up

17. Complete the "Finishing Up" steps.

What You Document

- Any problems encountered
- How the patient tolerated the procedure
- Any damage to the catheter, if any
- Any excessive amount of bleeding after the procedure
- Any redness or drainage

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Which one of the following veins would be the best vein to use for venipuncture?
   a. A vein that is hard and cord-like
   b. A vein that pulsates
   c. A vein that feels firm and full, like a cooked spaghetti noodle
   d. A vein that is flat when the tourniquet is on

2. What advantage does a vacuum tube system have over a needle and syringe for drawing a blood specimen?
   a. It keeps the blood from spilling out of the tube
   b. It keeps the blood sterile
   c. It allows multiple specimens to be drawn without removing the needle from the patient's arm
   d. It uses a smaller needle and is therefore less painful for the patient

3. What actions can you take to make it easier to identify a suitable vein for venipuncture?
   a. Apply a tourniquet above the site where you plan to insert the needle
   b. Apply cool packs to the person's face and neck
   c. Restrict the person's fluid intake for several hours
   d. Ask the nurse to identify the vein to use before beginning the procedure

4. What complications may occur when a central line is used?
   a. Bloodstream infection and air embolism
   b. Seizure and stroke
   c. Fainting and vomiting
   d. Bleeding and pain

5. Which of the following statements about a peripheral line is correct?
   a. The peripheral line empties into the superior or inferior vena cava
   b. The peripheral line must be inserted surgically
   c. The peripheral line is for short-term use
   d. The peripheral line is used for administering substances that might irritate the veins, such as the formula used for total parenteral nutrition

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Central line

_____ **2.** Implanted venous access device

_____ **3.** Peripheral line

_____ **4.** Peripherally inserted central catheter (PICC) line

_____ **5.** Venipuncture

_____ **6.** Phlebotomy

a. The use of a needle to puncture a vein and withdraw blood

b. A special type of central line that is surgically placed under the skin

c. A large intravenous catheter that is inserted in one of the large veins of the neck, chest, or groin and that ends in one of the large veins that empties directly into the heart

d. The act of obtaining blood from a vein for therapeutic or diagnostic purposes

e. A small intravenous catheter that is placed in one of the small veins of the hand or arm

f. A special type of central line that is inserted in one of the large veins of the arm and that ends in one of the large veins that empties directly into the heart

STOP and Think!

1. Mrs. Varma is receiving normal saline and regular doses of intravenous (IV) antibiotics through a peripheral line. When you answer Mrs. Varma's call light, she tells you that she is experiencing pain at the IV site. What do you think is going on, and what should your next steps be? Why do you think it is important to act quickly?
2. It is 7:00 in the morning, and you have been asked to obtain a blood specimen from Mr. Davis. You knock on Mr. Davis' door, and when he says, "Come in," you enter. You introduce yourself and tell Mr. Davis that you have come to get the blood specimen that the doctor requested. When he hears this, Mr. Davis lashes out at you, yelling, "Don't you people know what time it is? I haven't even had breakfast yet, and here you come wanting to stick me with needles. How much of my blood do you need, anyway? There was someone in here yesterday wanting a blood sample, too. What happened, did the lab lose it? And I hope you are better at taking blood than the girl who was in here yesterday. She was terrible, and she stuck me three times, once in the arm I told her not to use." Why do you think Mr. Davis might have lashed out at you like this? How would you respond to him? What will you do if he refuses to have his blood drawn?

CHAPTER

8

Advanced Cardiovascular Monitoring Skills

WHAT WILL YOU LEARN?

The health care team looks at vital signs—such as blood pressure and pulse rate, rhythm, and amplitude—to monitor how well a person's cardiovascular system is functioning. When a patient's condition is relatively stable, checking the blood pressure and pulse manually using basic tools such as a sphygmomanometer and a watch is simple and effective. However, if very frequent or continuous cardiovascular monitoring is necessary (for example, because the patient's condition is unstable or the doctor is trying to diagnose a heart problem), more advanced equipment and techniques for cardiovascular monitoring are used. When you are finished with this chapter, you will be able to:

Advanced cardiovascular monitoring equipment is often used for patients who are critically ill.

1. Explain how measuring a person's blood pressure using a machine is similar to, and different from, measuring a person's blood pressure manually.
2. Describe the parts of an arterial pressure monitoring system.
3. Explain precautions that should be taken and observations that should be reported when caring for a patient with an arterial line.
4. Explain what electrocardiography is and describe the two major uses for electrocardiography.
5. Explain the difference between hardwire cardiac monitoring, telemetry, and continuous ambulatory (Holter) monitoring.
6. Describe the special features of the myocardial cells that allow them to respond to an electrical impulse and contract as a unit.
7. Describe the cardiac cycle.
8. Describe the path an electrical impulse takes through the conduction system of the heart.
9. Identify the different waveforms and intervals found on an electrocardiogram (ECG) and describe what each one represents.
10. Describe two common dysrhythmias that begin in the sinoatrial (SA) node.
11. Describe two common dysrhythmias that begin in the atria.
12. Describe two common dysrhythmias that begin in the atrioventricular (AV) junction.
13. Describe four common dysrhythmias that begin in the ventricles.
14. Describe the dysrhythmias caused by first-degree, second-degree, and third-degree atrioventricular block.
15. Describe the dysrhythmias caused by bundle branch block.
16. Explain the nursing assistant's role in caring for a patient who is undergoing continuous cardiac monitoring.
17. Demonstrate proper technique for setting up continuous cardiac monitoring.
18. Demonstrate proper technique for obtaining a 12-lead ECG.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Arterial line	Electrodes	Atrial systole	Atrioventricular (AV) node
Waveform	Lead	Ventricular diastole	Sinus rhythm
Electrocardiography	Electrocardiograph	Ventricular systole	Defibrillation
Electrocardiogram (ECG, EKG)	Depolarization	Atrial diastole	Artifact
	Repolarization	Sinoatrial (SA) node	

AUTOMATIC BLOOD PRESSURE MONITORING

Many facilities have automatic vital sign monitoring equipment. The same machine can automatically measure and display a patient's blood pressure, temperature, pulse, and blood oxygen level (pulse oximetry). Frequently, only the respiratory rate needs to be obtained manually. Most of these machines store the readings in a memory bank. Some are also able to record the readings in the person's medical record if the machine is linked to the facility's computer system.

Measuring a person's blood pressure using a machine is similar in many ways to measuring a person's blood pressure manually. The main difference is that in automatic blood pressure monitoring, the machine inflates and deflates the cuff, and the machine "listens" for the Korotkoff sounds that indicate the systolic and diastolic pressures. Just as when you are obtaining a blood pressure manually, you must select a cuff that is the appropriate size, place the arrow mark on the cuff over the brachial artery, and ensure that the cuff is even and snug but not too tight. The arrow mark on the cuff is where the device that "listens" for the pressures is located, so it is important to correctly place the arrow over the artery.

The main advantage of automatic blood pressure monitoring is that it permits very frequent monitoring of a patient's blood pressure. This type of monitoring is often necessary during medical procedures or when a patient is critically ill. The cuff is left in place, and the machine is set to obtain a blood pressure reading at regular intervals (for example, every 5 minutes). If the time between blood pressure readings is 30 minutes or more, the cuff should not be left in place between readings. When there is this much time between readings, leaving the cuff in place is uncomfortable for the patient, and it is unlikely that the cuff will stay in the correct position between readings.

When blood pressure is being measured automatically, you must check on the person every few minutes to make sure that the cuff is in the correct position and to observe and document the blood pressure readings. Closely monitoring the blood pressure is of no benefit if no one is paying attention to the readings as they become available. Most automatic monitors have alarms that ring if the patient's blood pressure, pulse, or pulse oximetry readings are outside of a pre-set range. Although these alarms are useful for calling your attention to a potential problem, they are not a substitute for actually going into the patient's room and checking on him frequently. If the patient has a condition that makes frequent monitoring of vital signs necessary, then he most likely needs to be observed frequently for other signs and symptoms that would suggest a change in his medical condition as well.

The machine may provide inaccurate readings if the cuff is not positioned correctly, the person moves around while the blood pressure is being taken, the batteries are low, or there is a problem with the machine. Look at the blood pressure readings the machine is giving you and check the person's blood pressure manually if the machine's readings do not seem to be correct. For example, if a patient's blood pressure has consistently been in the 120/70 mm Hg range and it suddenly jumps into the 150/90 mm Hg range or falls into the 100/50 mm Hg range, then you need to investigate. If you measure the patient's blood pressure manually and obtain the same reading that the machine is giving, then you need to report this change in the patient's blood pressure to the nurse immediately.

ARTERIAL PRESSURE MONITORING

Arterial pressure monitoring is used when a person's cardiovascular function must be continuously and closely monitored. In arterial pressure monitoring, a catheter called an **arterial line** is inserted into the radial artery (in the wrist) or the femoral artery (in the groin). The arterial line is connected to a monitor, which continuously displays the person's blood pressure and pulse. The arterial line can also be used to draw samples of arterial blood for laboratory testing.

An arterial pressure monitoring system is shown in Figure 8-1. The doctor inserts an arterial line into the artery in much the same way a

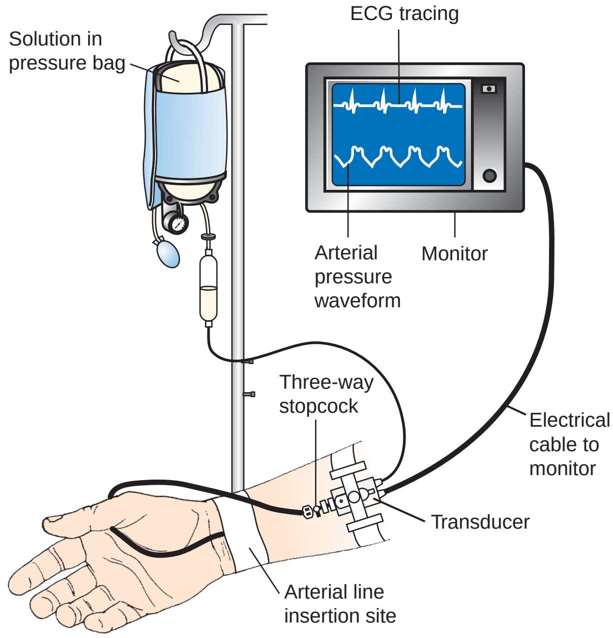


Figure 8-1
An arterial line is a small catheter that is used to monitor the blood pressure. The arterial line is usually inserted into the radial artery in the wrist. Tubing connects the arterial line to a transducer and a bag of solution that is under pressure. The transducer reads the pressure in the artery and translates it into an electrical signal, which is displayed as a waveform on the monitor. The pressurized solution flows through the tubing to prevent blood from backing up into the tubing. The stopcock is used to obtain blood samples and zero the transducer.

peripheral line is inserted into a vein and then sutures or tapes the arterial line into place to keep it from slipping out of the artery. Tubing connects the arterial line to a bag of solution, which is under pressure. The solution, which may contain a small amount of heparin to prevent blood clotting, flows through the tubing into the artery at a constant rate to keep the artery open, to prevent blood clots from forming in the arterial line, and to prevent blood from backing up into the tubing.

Tubing also connects the arterial line to a *transducer* (a device that reads the blood pressure in the artery and translates it into an electric signal). An electrical cable connects the transducer to a monitor. The monitor displays the signal from the transducer as a **waveform** (Fig. 8-2).

To work properly, the transducer must be kept level with the patient's heart. In most systems, the transducer is located on the patient's arm. When this is the case, you may have to use a pillow to keep the patient's arm (and the transducer) level with the heart, especially when the patient is sitting up in bed or a chair. When you are providing routine care for the patient, it may be necessary to move the bed, the patient, or both. If you change the position of the bed or the patient, the transducer will no longer be level with the patient's heart, and you will need to alert the nurse after you have completed the care so that he can level and "zero" (balance) the transducer.

When providing care for a patient with an arterial line, be careful not to bump or pull on the arterial line and tubing. The catheter could damage the artery, or it might come out of the artery entirely. If this happens, another arterial line will need to be inserted. If the tubing becomes disconnected, the patient could lose a substantial amount of blood. In addition, the patient's risk of a serious infection is increased because the disconnected tubing is a portal of entry for microbes into the bloodstream.

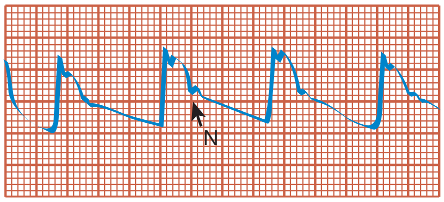


Figure 8-2
An arterial pressure waveform. The high point is the systolic pressure, and the low point is the diastolic pressure. The little notch (*N*), called the *dicrotic notch*, occurs when the aortic valve of the heart snaps shut.

TELL THE NURSE !

When caring for a patient with an arterial line, report the following to the nurse right away:

- The sterile dressing covering the insertion site is loose, wet, or soiled.
- There is redness, swelling, drainage, or bleeding at the insertion site.
- There is blood in the tubing.
- The tubing is disconnected.
- There has been a change in the position of the patient or the bed (so the transducer needs to be leveled and zeroed).
- There is a change in the waveform or pressure reading on the monitor.
- The patient complains of pain, numbness, or tingling in the hand.
- The patient's hand is pale, blue, or cold.

When an arterial line is no longer needed, a doctor will order its removal. Nurses are usually responsible for removing arterial lines, but in some facilities, nursing assistants are trained to do this skill. If removing arterial lines is within your scope of practice, be sure to take standard precautions when performing this procedure. You should inspect the tip of the catheter after you remove it from the artery to make sure the entire catheter came out. If you notice any irregularities or are not sure whether the catheter is intact, call a nurse.

As soon as the line is removed, direct pressure must be applied to the insertion site and maintained until no bleeding is noted. This could take from 5 minutes to 1 hour, depending on the site and the patient's condition. The site must be closely monitored for several hours afterward. When caring for a patient who has recently had an arterial line removed, be sure to take standard precautions and monitor the person closely for bleeding. If you note that the person is bleeding (either under the skin or out of the insertion site), immediately apply direct pressure and call for help.

You will have to attend special training to learn any skills associated with arterial lines that you are expected to perform. As always, make sure that the skills you are expected to perform are listed in your job description and that you have had adequate training before you perform them.

ELECTROCARDIOGRAPHY

Electrocardiography is a method of recording the electrical activity of the heart. The graph (or *tracing*) that results is called an **electrocardiogram (ECG, EKG)**. The ECG shows abnormalities in the conduction system of the heart. An ECG is obtained by placing **electrodes** (small, disposable adhesive pads with a gel center that conducts electricity) at specific points on the body. The imaginary line formed between an electrode and another point (which may be another electrode or a reference point created by "joining" two or more electrodes) is called a **lead**. Each lead takes a "snapshot" of the electrical impulse as it moves through the heart's conduction system. Electrocardiography can be used as a tool to diagnose a heart condition or can be used to continuously monitor a person's heart.

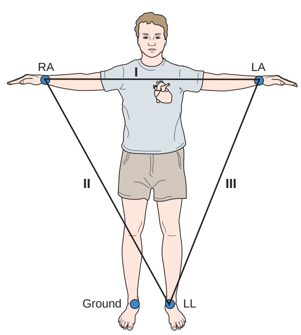
When electrocardiography is used as a diagnostic tool, 10 electrodes are applied to the person's body to create 12 leads, producing what is called a *12-lead ECG* (Box 8-1). Because each lead looks at the electrical impulse from a slightly

BOX 8-1 The 12-Lead ECG

In a 12-lead ECG, four electrodes are placed on the limbs, and six electrodes are placed on the chest to create 12 leads. Two points are needed to create a lead. One point is always the electrode that is "looking" at the heart. The other point could be another electrode or an imaginary point created from a combination of two or more electrodes.

Standard (Bipolar) Limb Leads

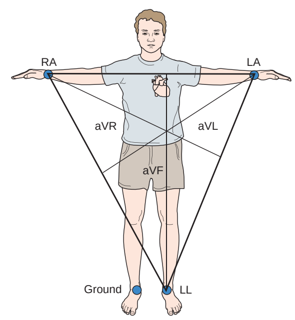
The standard limb leads trace the electrical activity between the electrodes on the limbs.



- **Lead I** traces the electrical activity from the right arm (RA) to the left arm (LA).
- **Lead II** traces the electrical activity from the right arm (RA) to the left leg (LL).
- **Lead III** traces the electrical activity from the left arm (LA) to the left leg (LL).

Augmented (Unipolar) Limb Leads

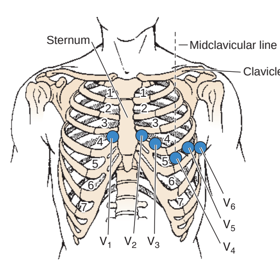
Augmented means "extra." The augmented limb leads trace the electrical activity between a limb electrode and a point midway between the electrodes on the other two limbs.



- **Lead aVR** traces the electrical activity from the RA to the point midway between the LA and the LL.
- **Lead aVL** traces the electrical activity from the LA to the point midway between the RA and the LL.
- **Lead aVF** traces the electrical activity from the LL to the point midway between the RA and the LA.

Chest (Precordial) Leads

Pre- means "in front of," and *cor* means "heart." The chest leads trace the electrical activity between the chest electrodes and a point in the center of the body created by joining all of the limb electrodes.



(continued)

BOX 8-1 The 12-Lead ECG (Continued)

- **Lead V_1** traces the electrical activity at the fourth intercostal space on the right side of the sternum. (*Inter-* means "between," and *costal* means "ribs," so the fourth intercostal space is the space between the fourth and fifth ribs.)
- **Lead V_2** traces the electrical activity at the fourth intercostal space on the left side of the sternum.
- **Lead V_3** traces the electrical activity midway between leads V_2 and V_4.
- **Lead V_4** traces the electrical activity at the fifth intercostal space on the midclavicular line. (*Mid-* means "half," and *clavicular* means "having to do with the clavicle, or collarbone," so the midclavicular line is an imaginary line drawn straight down from the middle of the collarbone.)
- **Lead V_5** traces the electrical activity at the fifth intercostal space on the anterior axillary line. (*Anterior* means "in front of," and *axillary* means "armpit," so the anterior axillary line is an imaginary line in front of the armpit.)
- **Lead V_6** traces the electrical activity at the fifth intercostal space on the mid-axillary line. (*Mid-* means "half," and *axillary* means "armpit," so the mid-axillary line is an imaginary line drawn straight down from the center of the armpit.)

different angle, looking at the 12-lead ECG gives the health care team a very complete picture of how the heart is functioning. The 12-lead ECG is typically printed out on paper on a machine called an **electrocardiograph** (Fig. 8-3). Doctors and other health care professionals who have been trained to interpret ECGs can use the information provided by the 12-lead ECG to determine where exactly in the heart's conduction system the problem is occurring.

Figure 8-3
A 12-lead ECG uses six electrodes attached to the chest and four electrodes attached to the limbs. The electrocardiograph (the machine used to print out the ECG) is on the cart in the background.

In continuous cardiac monitoring, three to five electrodes are applied to the person's chest (Box 8-2). The type of continuous cardiac monitoring used depends on the situation. Three very common ways of continuously monitoring a person's heart rhythm are hardwire cardiac monitoring, telemetry, and continuous ambulatory (Holter) monitoring.

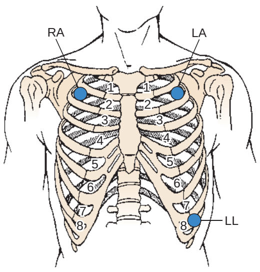
- In *hardwire cardiac monitoring*, the electrodes are attached to wires, which are attached to a monitor at the bedside. The monitor displays the patient's ECG. The patient's ECG may also be displayed on monitors at a central monitoring station. Alarms are set to sound if the patient's heart rate or rhythm changes. Hardwire cardiac monitoring is used most often in critical care units, step-down units, and post-anesthesia care units (PACUs). This type of cardiac monitoring limits the patient's mobility because the patient is physically attached to the monitor at the bedside.
- In *telemetry*, the electrodes are attached to wires, and the wires are attached to a small, portable, battery-operated device that the person wears (Fig. 8-4). The device transmits the person's ECG to a central monitoring station, where it is displayed on a monitor.

BOX 8-2 Continuous Cardiac Monitoring

In continuous cardiac monitoring, three or five electrodes are placed on the chest per the doctor's orders. The two types of most commonly used heads are Leads II and V_1.

Three-Electrode System

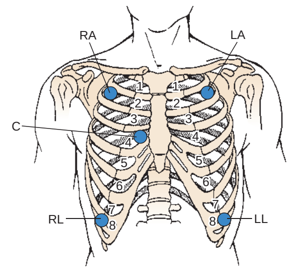
A three-electrode system allows the health care team to monitor the patient in any of the three standard limb leads (leads I, II, or III). The placement of the electrodes is as follows:



- **RA**: at the second intercostal space on the right midclavicular line
- **LA**: at the second intercostal space on the left midclavicular line
- **LL**: at the eighth intercostal space on the left midclavicular line

Five-Electrode System

A five-electrode system allows the health care team to switch between leads II and V_1 without moving the lead wires. The placement of the electrodes is as follows:



- **RA**: at the second intercostal space on the right midclavicular line
- **LA**: at the second intercostal space on the left midclavicular line
- **RL**: at the eighth intercostal space on the right midclavicular line
- **LL**: at the eighth intercostal space on the left midclavicular line
- **C**: any V lead position (usually V_1, at the fourth intercostal space on the right side of the sternum)

Figure 8-4
In telemetry, the person wears a small battery-operated device that transmits the person's ECG wirelessly to a central monitoring station, where it can be viewed on a screen. The person can wear the device around the neck (as shown here), or it can be attached to the person's clothing.

Telemetry allows the person to be ambulatory while still being continuously monitored.

- In *continuous ambulatory (Holter) monitoring*, the small portable device that the person wears records the person's ECG for a period of up to 24 hours instead of transmitting the ECG to a central monitoring station. Continuous ambulatory monitoring is often used in the outpatient setting to detect abnormal heart rhythms that occur during a person's normal daily activities. While the person is wearing the monitor, she writes down her activities (as well as any symptoms, such as chest pain, shortness of breath, or dizziness that occurred while doing those activities) and the times so that the health care team can compare this information with the ECG during the same time period.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Think for a minute about how it would feel to undergo continuous cardiac monitoring. The reason you are having your heart rate and rhythm continuously monitored is because the health care team is worried about how well your heart is functioning. Would this make you feel a little bit anxious? Do you think being able to actually see your heart rate and rhythm on the screen would make you feel better or worse? What if the machine started to beep suddenly? Patients and family members will often look to you for reassurance. They may ask lots of questions, such as, "How does the heart tracing look?" or "Did you notice those funny-looking beats?" Avoid responding to questions like this with statements such as, "Don't worry about it; we've got everything under control." This kind of a response does not address the person's concerns, so it is not very reassuring. Instead, take the time to listen carefully to the person's comments and questions. Tell the person that you will continue to come in to check on her frequently, and let her know that you will ask the nurse to come in and talk to her about the monitoring as well. When you take the time to understand your patient's concerns and respond in a truly reassuring way, you are taking a humanistic approach to health care.

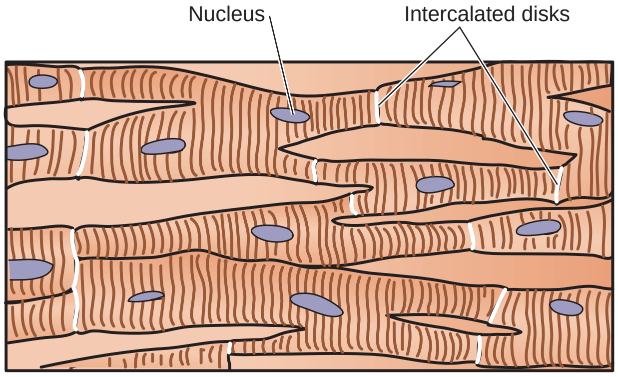


Figure 8-5
Cardiac muscle cells (myocardial cells) form a branching network. In addition, special areas on the cell membrane, called intercalated disks, join each myocardial cell tightly to the one next to it. The intercalated disks and branching network allow an electrical impulse to travel quickly from cell to cell, allowing the myocardial cells to contract as a unit.

HOW THE HEART WORKS

To understand how electrocardiography works, you need to understand a little bit about how the heart works. As you remember from your basic training, the muscle cells that make up the myocardium (the middle layer of the heart) are very specialized (Fig. 8-5). The myocardial cells have intercalated disks, which are special areas along the cell membrane that attach each myocardial cell firmly to the one next to it. (*Intercalated* means "inserted between" in Latin.) In addition, the myocardial cells "branch" and rejoin, forming a complex network. The intercalated disks and the branching network allow the electrical impulse that causes the heart muscle to contract to move quickly from one myocardial cell to the next, allowing the myocardial cells to contract as a unit. This unified contraction allows the heart to work efficiently as a pump, moving blood continuously through the body.

Before receiving the electrical impulse, the myocardial cells are in a "resting state." This means that they are ready to receive the impulse. The minerals normally present in our body (such as sodium, potassium, and calcium) can be positively (+) or negatively (−) charged. When the myocardial cells are in the resting state, sodium, which is positively charged, is outside the cells. The other minerals, which are negatively charged, are inside the cells. When the electrical impulse is received, sodium moves rapidly into the myocardial cells, carrying its positive charge with it. This is known as **depolarization**. Depolarization causes the myocardial cells to contract. After depolarization and contraction have occurred, the cell must return to its resting state. To do this, the positive charge must again return to the outside of the cell. This is known as **repolarization**. Repolarization must take place before the cell can respond to another electrical impulse.

The heart muscle contracts in two phases. The two atria (the upper chambers of the heart) pump together to push the blood that has entered them down into the two ventricles (the lower chambers of the heart). This phase, when the atria are pumping, is known as **atrial systole**. While the atria are pumping, the ventricles are relaxed so they can fill completely with blood. The relaxation phase of the ventricles is known as **ventricular diastole**. As soon as the ventricles are full, both ventricles

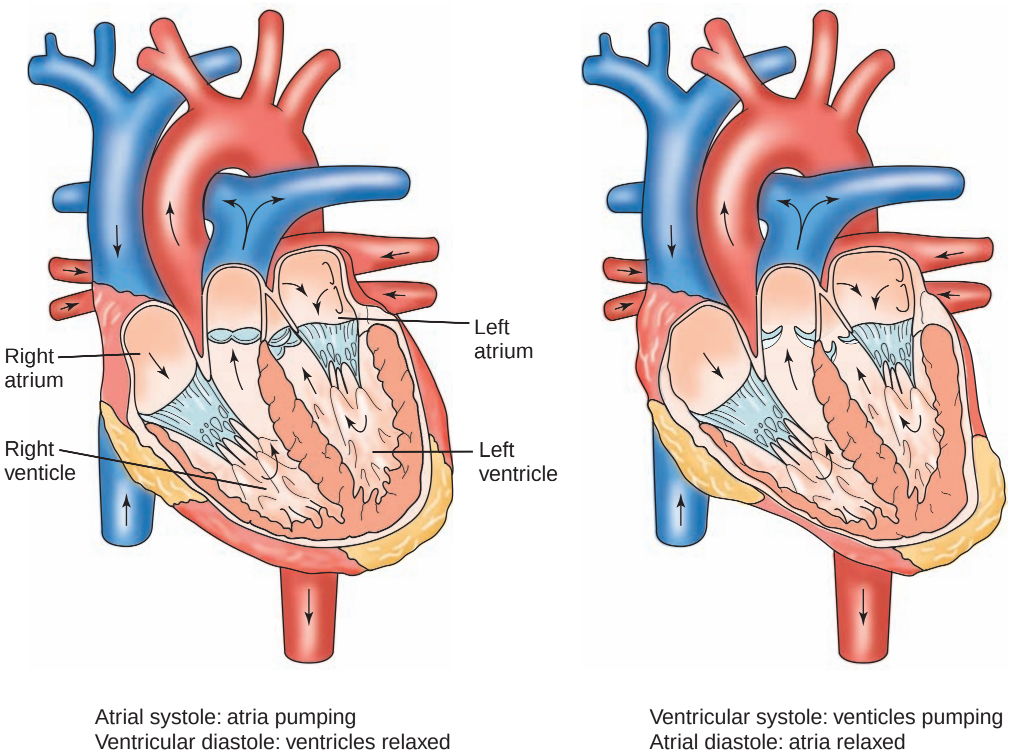


Figure 8-6
The cardiac cycle. The atria contract (atrial systole), sending blood into the relaxed ventricles (ventricular diastole). Then the atria relax (atrial diastole) while the ventricles contract (ventricular systole), sending the blood out of the heart.

pump together to send the blood out of the heart. This phase, when the ventricles are pumping, is known as **ventricular systole**. While the ventricles are pumping, the atria are relaxed so they can fill completely with blood. The relaxation phase of the atria is known as **atrial diastole**. This coordinated effort is called the *cardiac cycle* (Fig. 8-6).

Each cardiac cycle, which represents one heart beat, begins with an electrical impulse. The electrical impulse begins in the **sinoatrial (SA) node,** a specialized group of cells located where the superior vena cava enters the right atrium (Fig. 8-7). In a healthy heart, the SA node fires an electrical impulse 60 to 100 times per minute. Because the SA node fires the impulse and sets the pace for contraction, the SA node is called the heart's primary pacemaker.

From the SA node, the electrical impulse travels down specialized fibers called the *internodal pathways* in the atria (see Fig. 8-7). As it passes through the internodal pathways, the electrical impulse causes the myocardial cells of the atria to depolarize and contract as a unit. One internodal pathway leads to another specialized group of cells, similar to the SA node, located in the right atrial wall near the tricuspid valve. This is the **atrioventricular (AV) node**.

The AV node causes the impulse to pause slightly before allowing it to continue through the conduction system. This pause is important because it allows time for the atria to complete their contraction so the ventricles fill completely with blood. The heart is able to perform more efficiently when the ventricles are filled because less force is required to send the maximum amount of blood out into the body. After a slight pause, the AV node allows the electrical impulse to travel through to a group of specialized fibers, called the *bundle of His.* The bundle of His divides into the *right bundle branch*, which carries the impulse to the right ventricle, and the *left bundle branch*, which carries the impulse to the left ventricle. The right and left bundle branches travel downward through the septum (wall) that separates the right and left ventricles.

Near the end of the bundle branches, small fibers, called the *Purkinje fibers*, allow the electrical

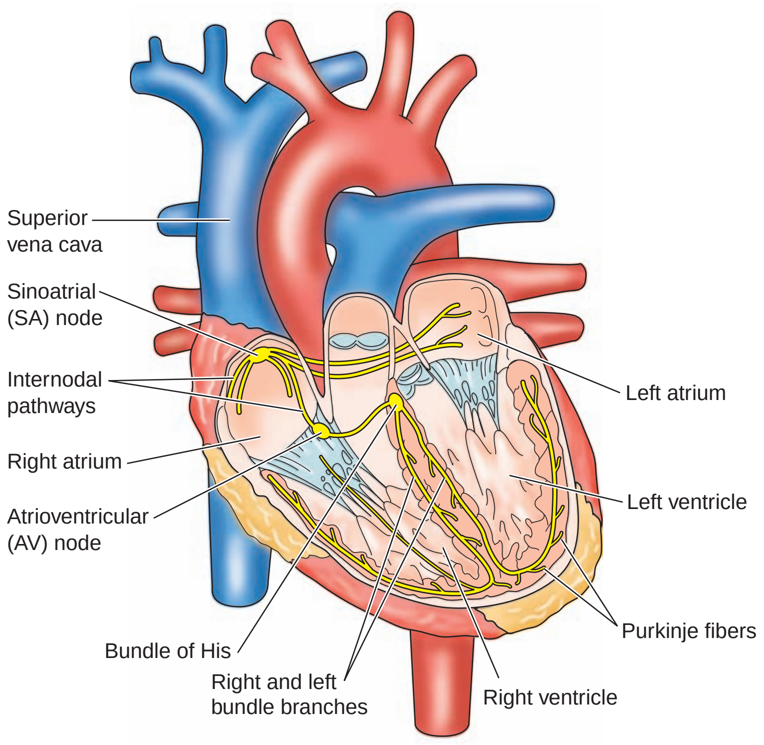


Figure 8-7
The conduction system of the heart (shown in *yellow*) carries the electrical impulses that stimulate the heart to beat. The specialized fibers of the conduction system form the sinoatrial (SA) node, internodal pathways, atrioventricular (AV) node, bundle of His, left and right bundle branches, and Purkinje fibers.

impulse to enter the myocardial cells of the ventricles, causing them to depolarize and contract. Contraction of the myocardial cells of the ventricles causes the ventricles to pump together to send the blood out of the heart. This completes one cardiac cycle. The SA node fires another electrical impulse, and the cardiac cycle begins again.

If there is no electrical impulse, there is no cardiac cycle and no heart beat. Fortunately, other parts of the heart's conduction system can fire an electrical impulse if the SA node fails. If the AV node does not receive an impulse from the SA node, the AV node will take over as the heart's pacemaker. The AV node can fire 40 to 60 electrical impulses per minute, which is enough to keep the tissues supplied with blood while the person is at rest. The Purkinje fibers in the ventricles can also fire electrical impulses but at a very slow rate (20 to 40 times per minute). This is enough to keep the brain and other major organs supplied with blood for a short time, but the person will quickly need medical attention.

THE ELECTROCARDIOGRAM

When an ECG is printed on paper, the hard copy is called a *rhythm strip*. Special ECG graph paper is used to record the rhythm strip. The ECG graph paper is ruled to form boxes. Each small box on the ECG graph paper equals 0.04 second, and each large box equals 0.2 second (Fig. 8-8). Additional marks at the top of the ECG graph paper divide the ECG rhythm strip into 3-second intervals.

When looking at an ECG rhythm strip, we look at the horizontal axis to measure the time (see Fig. 8-8). The time is stated in seconds. We look at the vertical axis to measure the amplitude (power) of the electrical impulse (see Fig. 8-8). The power of

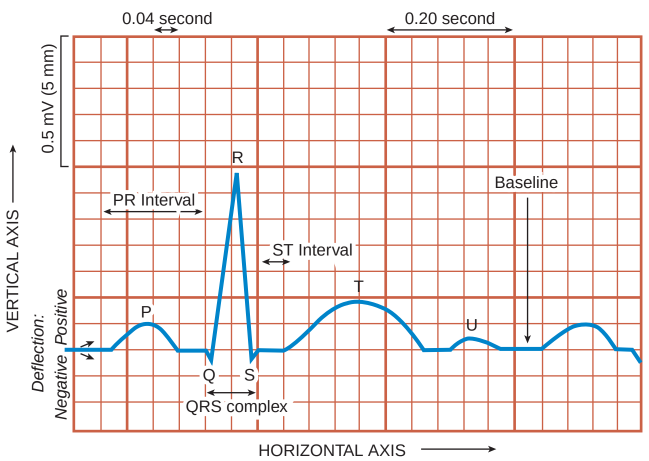


Figure 8-8
The cardiac cycle, as it looks on an electrocardiograph rhythm strip.

the electrical impulse is stated in millivolts (mV) or millimeters (mm). The electrical impulse creates waveforms on the ECG rhythm strip (see Fig. 8-8). When the waveform is above the baseline, it is called a *positive deflection*. When the waveform is below the baseline, it is called a *negative deflection*.

Waveforms

The ECG waveforms represent the electrical events of the cardiac cycle. There are three major waveforms:

- **P wave.** The first waveform of the cardiac cycle is the *P wave* (see Fig. 8-8). The P wave (a small, semicircular bump) represents atrial depolarization, which causes atrial contraction (atrial systole). After the P wave, the waveform returns to the baseline of the ECG tracing. During this time, the AV node has received the electrical impulse and is holding it for a moment before sending it to the bundle of His. After this pause, the impulse moves rapidly through the bundle of His, the left and right bundle branches, and the Purkinje fibers to depolarize the ventricles.
- **QRS complex.** The next waveform of the cardiac cycle is the *QRS complex*. The QRS complex represents ventricular depolarization, which causes ventricular contraction (ventricular systole). The QRS complex usually consists of a negative deflection (the Q wave), followed by a positive deflection (the R wave), followed by another negative deflection (the S wave) (see Fig. 8-8). After the QRS complex, the waveform again returns to the baseline.
- **T wave.** The last major waveform is the *T wave*. The T wave is larger than the P wave and is rounded or slightly peaked (see Fig. 8-8). The T wave represents ventricular repolarization, when the ventricles return to their resting state before the next contraction. Occasionally, an additional small wave, the *U wave,* occurs after the T wave.

After the U wave (or the T wave if no U wave is present), the waveform returns to the baseline, and then another P wave appears, indicating the beginning of the next cardiac cycle.

The appearance of the cardiac cycle on the ECG varies slightly according to which lead is being viewed. For example, lead II shows the cardiac cycle waveforms in an upright position, and lead V_1 shows them in a downward position (Fig. 8-9).

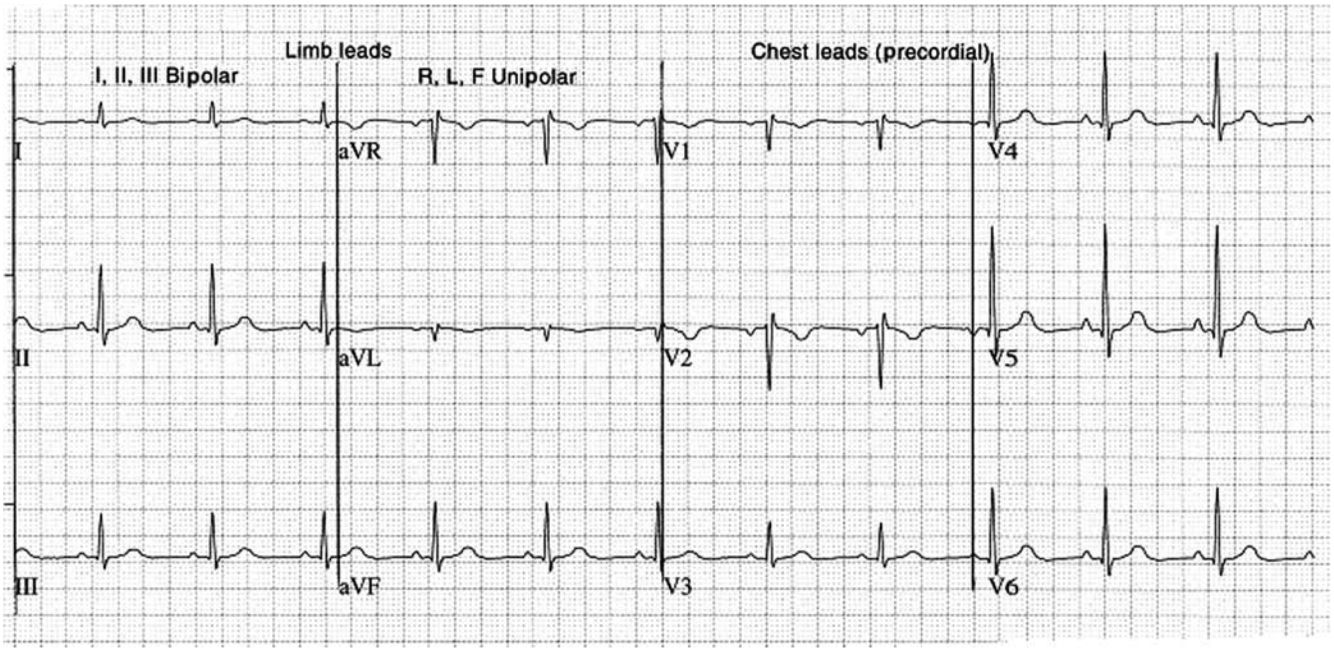


Figure 8-9
A normal cardiac cycle in the 12 views of the 12-lead electrocardiograph. The waveforms look a little bit different in each lead. (*From Diepenbrock, N. (2004).* Quick Reference to Critical Care, 2nd *ed. Philadelphia: Lippincott Williams & Wilkins.*)

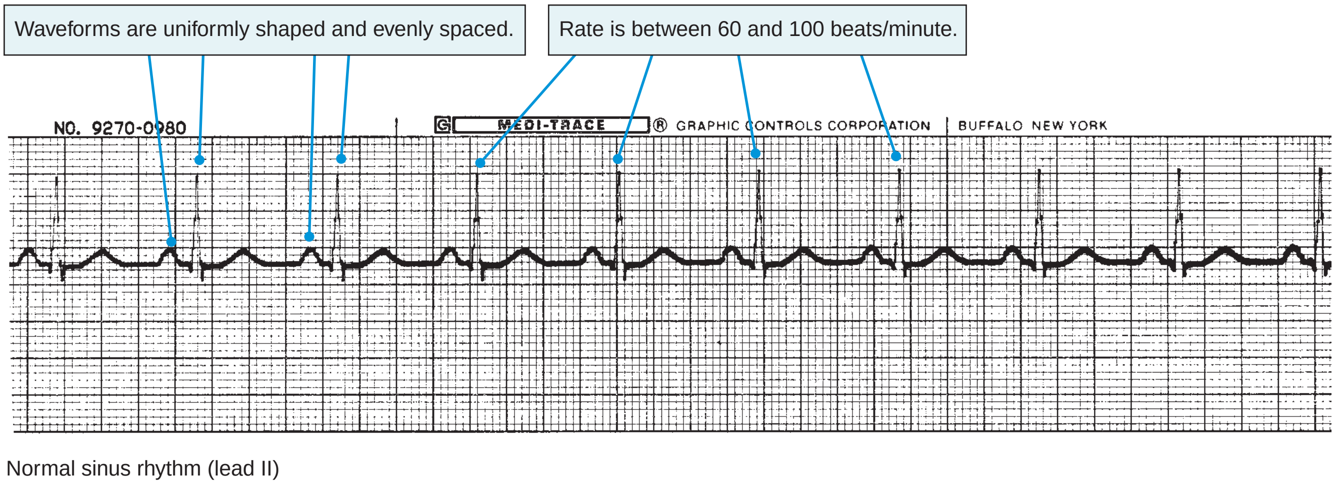


Figure 8-10
Normal sinus rhythm. The waveforms for each cardiac cycle are uniformly shaped and evenly spaced. The heart rate is between 60 and 100 beats per minute. This is what a healthy heart looks like on an ECG.

Intervals

In addition to the three main waveforms on the ECG, there are two intervals:

- **PR interval.** The *PR interval* extends from the beginning of the P wave to the beginning of the QRS complex (see Fig. 8-8). The PR interval represents the period of time between the beginning of atrial depolarization and the beginning of ventricular depolarization. Normally, the PR interval lasts from 0.12 to 0.2 second.
- **ST interval.** The *ST interval* (sometimes called the *ST segment*) extends from the end of the QRS complex to the beginning of the T wave (see Fig. 8-8). The ST interval represents the period of time between the end of ventricular depolarization and the beginning of ventricular repolarization. Changes in a person's ST interval can indicate that the myocardial cells are not receiving enough oxygen or that the myocardial cells have been injured (for example, during or after a myocardial infarction).

COMMON DYSRHYTHMIAS

A dysrhythmia is an irregular heart rate, rhythm, or both. To recognize any type of dysrhythmia on an ECG, you must first be able to recognize what is considered normal. In a person with a healthy heart, the SA node generates electrical impulses at regularly timed intervals, and the electrical impulses travel normally through the conduction system, producing what is known as **sinus rhythm** on the ECG (Fig. 8-10). The ECG shows waveforms for each cardiac cycle that are evenly spaced and uniformly shaped, indicating a regular heart rate and rhythm. The heart rate is between 60 and 100 beats per minute in adults (see Box 8-3 for a quick way to estimate the heart rate by looking at the ECG rhythm strip).

Remember that for the heart to be an effective pump, it must contract in two coordinated phases (atrial systole/ventricular diastole followed by ventricular systole/atrial diastole). Rhythms that are irregular or rates that are too fast can affect the ventricles' ability to fill with an adequate amount of blood or pump strongly enough to send the blood out of the heart.

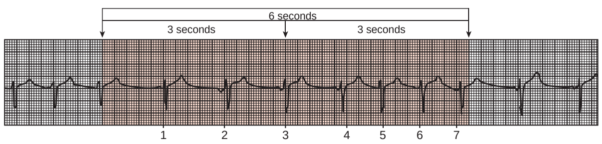
Dysrhythmias are often grouped according to where in the conduction system the abnormality occurs: the SA node, the atria, the AV junction (the area around the AV node and the bundle of His), or the ventricles. Some of the more commonly seen dysrhythmias are discussed here.

Sinoatrial Node (Sinus) Dysrhythmias

SA node (sinus) dysrhythmias occur when the SA node, the primary pacemaker of the heart, fires electrical impulses at a slower or faster rate than normal.

BOX 8-3 Estimating the Heart Rate Using the Rhythm Strip

To quickly estimate the heart rate, look at the marks at the top of the ECG graph paper that divide the rhythm strip into 3-second intervals. Two of these intervals together will be 6 seconds. Count the number of QRS complexes contained in two intervals and multiply by 10. This gives you the number of beats (which occur simultaneously with the QRS complex) per minute. This method works for both regular and irregular heartbeats.



In this example, there are approximately seven QRS complexes in the 6-second interval. Therefore, the heart rate is about 70 beats per minute (7 × 10 = 70).

Sinus bradycardia

In sinus bradycardia, the SA node fires electrical impulses at a rate that is slower than normal (that is, less than 60 impulses per minute in an adult). (Remember that *brady-* means "slow.") The rhythm is normal, with normal-appearing waveforms, as in normal sinus rhythm, but the rate is much slower (Fig. 8-11). In some people (such as a young, healthy person who is very physically fit), sinus bradycardia is a normal finding.

Sinus tachycardia

In sinus tachycardia, the SA node fires electrical impulses at a rate that is faster than normal (that is, greater than 100 impulses per minute in an adult). (Remember that *tachy-* means "fast.") Again, the rhythm is normal, but the rate is much faster (see Fig. 8-11). Sinus tachycardia can be a normal finding in a person who is anxious, in pain, or febrile or who is engaging in strenuous physical activity.

Atrial Dysrhythmias

Atrial dysrhythmias occur when impulses begin in the atria instead of in the SA node. The atrial impulses are fired at a very high rate. The atria fire more impulses than the AV node can conduct through to the ventricles. As a result, the atria contract many more times than the ventricles do.

Atrial flutter

Atrial flutter as it appears on an ECG is shown in Figure 8-12. In atrial flutter, atrial contraction (represented by the P waves on the ECG) is regular but faster than normal (250 to 400 times per minute). The P waves have a characteristic "saw-toothed" shape and as a result are often called *F waves*. Ventricular contraction (represented by the QRS complexes on the ECG) is regular and usually occurs at a normal rate of 75 to 100 times per minute. Occasionally, the ventricular rate becomes irregular. The ratio of P waves to QRS complexes is usually consistent—for example, two P waves before each QRS complex (2:1), three P waves before each QRS complex (3:1), or four P waves before each QRS complex (4:1).

Atrial fibrillation

To *fibrillate* means to move back and forth rapidly in an uncoordinated way. Atrial fibrillation is caused by rapid, uncoordinated twitching of the myocardium of the atria. Atrial fibrillation may start and end very suddenly. In a person with atrial fibrillation, the P waves are irregular and small, and they occur at a rapid rate all along the ECG (see Fig. 8-12). The ventricular rhythm is usually very irregular, and the rate of ventricular contraction is high (usually between 120 and 200 times per minute). When the ventricular rate is so rapid, the ventricles are not able to fill adequately with blood between beats. As a result, the maximum amount of blood is not sent out to the body with each beat. The person may feel lightheaded and complain of chest palpitations (awareness that the heart is beating).

Atrioventricular Junction Dysrhythmias

Dysrhythmias can begin in the area around the AV node and the bundle of His. This area is called the *atrioventricular (AV) junction.*

Junctional rhythm

A junctional rhythm occurs if the SA node fails to fire and send an electrical impulse through to the AV node or if the SA node fires the impulse too slowly. In this case, the AV node becomes the pacemaker for the heart. On the ECG, the ventricular rhythm is normal, but the rate is slower

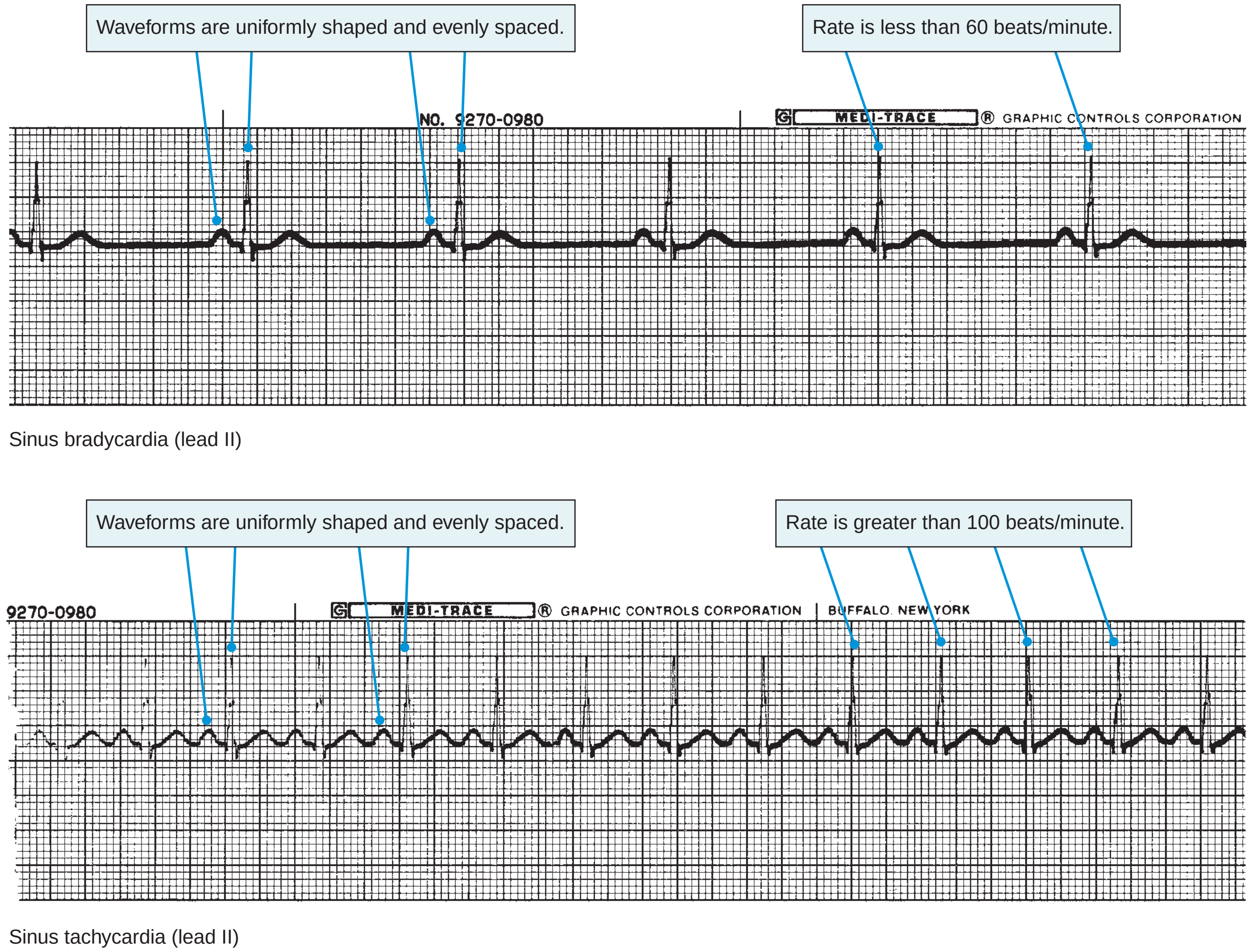


Figure 8-11
Sinoatrial node (sinus) dysrhythmias. In sinus bradycardia (*top*), the rhythm is normal, but the rate is slow. In sinus tachycardia (*bottom*), the rhythm is normal, but the rate is fast.

than normal (between 40 and 60 beats per minute) (Fig. 8-13). The P waves may be totally absent, or they may be inverted. The P waves may even appear after the QRS complex. If the P wave is in front of the QRS complex, the PR interval is less than 0.12 second.

Atrioventricular nodal re-entry tachycardia

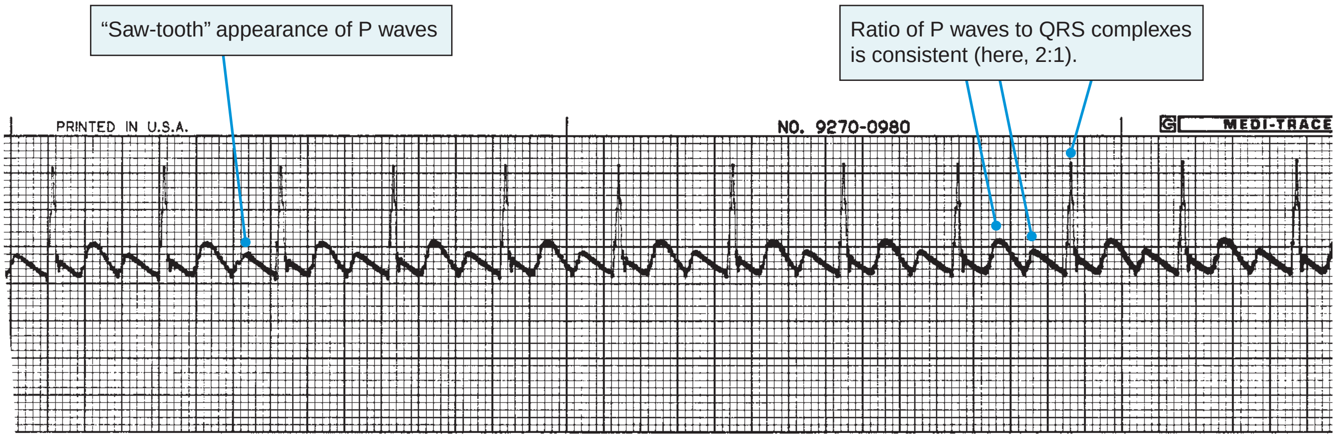
Occasionally, an impulse that is conducted to the AV node gets "rerouted" along another conduction pathway back to the AV node over and over again at a rapid rate. Each time, the AV node conducts the impulse down through the bundle of His to the ventricles, causing them to contract at a rapid rate. On the ECG, the ventricular rhythm is regular, but the rate is fast (between 75 and 250 beats per minute) (see Fig. 8-13).

Ventricular Dysrhythmias

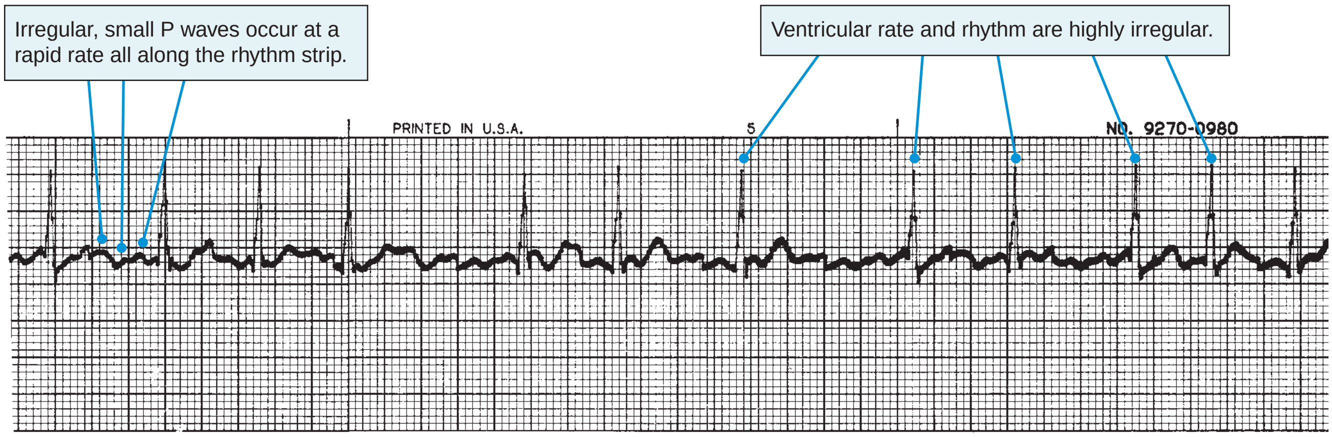
Ventricular dysrhythmias begin in the ventricles below the bundle of His. Ventricular dysrhythmias have the potential to be very serious. If the ventricles are not contracting in an organized way or if they are contracting too fast, they may not be able to circulate enough blood throughout the body to meet the body's needs.

Premature ventricular contraction

A premature ventricular contraction (PVC) occurs when an impulse begins in a ventricle and is conducted through the ventricles before the next normal sinus impulse. When an impulse begins in a ventricle, the QRS complex appears much wider than normal on the ECG (Fig. 8-14). PVCs



Atrial flutter (lead II)



Atrial fibrillation (lead II)

Figure 8-12
Atrial dysrhythmias occur when electrical impulses arise in the atria instead of in the sinoatrial (SA) node. In atrial flutter (*top*), the rhythm is regular, but there are two, three, or four P waves for each QRS complex. In atrial fibrillation (*bottom*), the rhythm is irregular, and there are many P waves for each QRS complex.

can have the same shape and appearance on an ECG, or they can be *multifocal* (that is, each one can have a different shape and appearance). PVCs can occur by themselves, in groups, or in a regular pattern. For example:

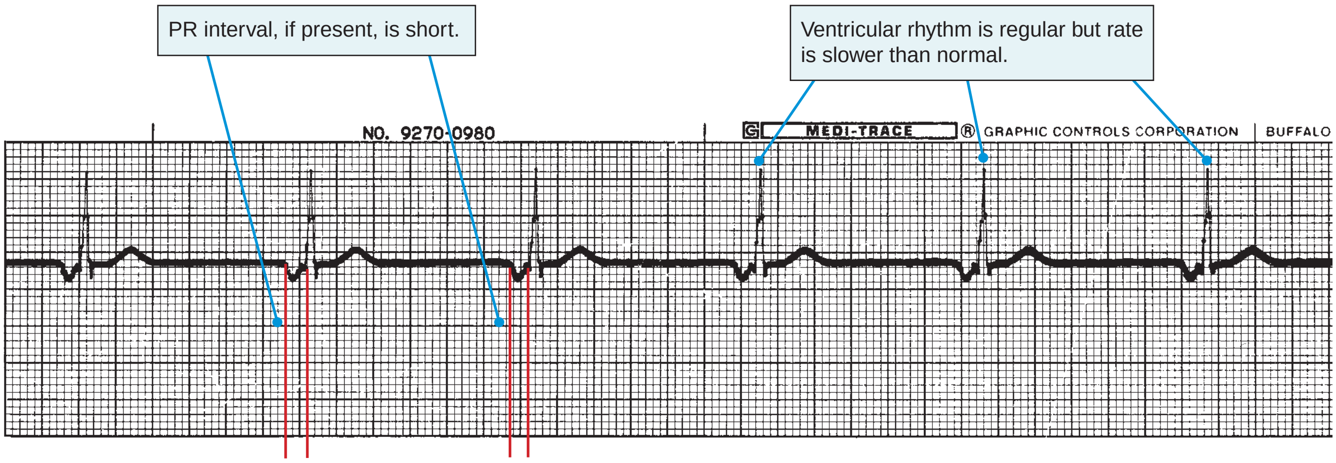
- In *bigeminy*, every other complex is a PVC.
- In *trigeminy*, every third complex is a PVC (that is, there are two normal beats in between each PVC).
- In *quadrigeminy*, every fourth complex is a PVC (that is, there are three normal beats in between each PVC).

Complications arise when the PVC occurs too soon after a normal QRS complex. In this case, the ventricles are not able to fill adequately with blood before they contract again. A good way to check to see if the PVCs are circulating blood is to feel the person's pulse while watching the ECG monitor. If you can feel a strong pulse with each normal QRS and with each PVC, then the PVCs are sending blood out with each beat. If you cannot feel a pulse for the PVCs, then they are not sending blood out to the body (in other words, they are *non-perfusing*).

Occasional PVCs are not a significant finding in a healthy person; however, in a person who has recently had an acute myocardial infarction, the appearance of PVCs should be reported promptly. The PVCs might indicate that the myocardial cells are not receiving enough oxygen.

Ventricular tachycardia

Ventricular tachycardia (VT, V tach) is three or more PVCs occurring in a row at a rate greater



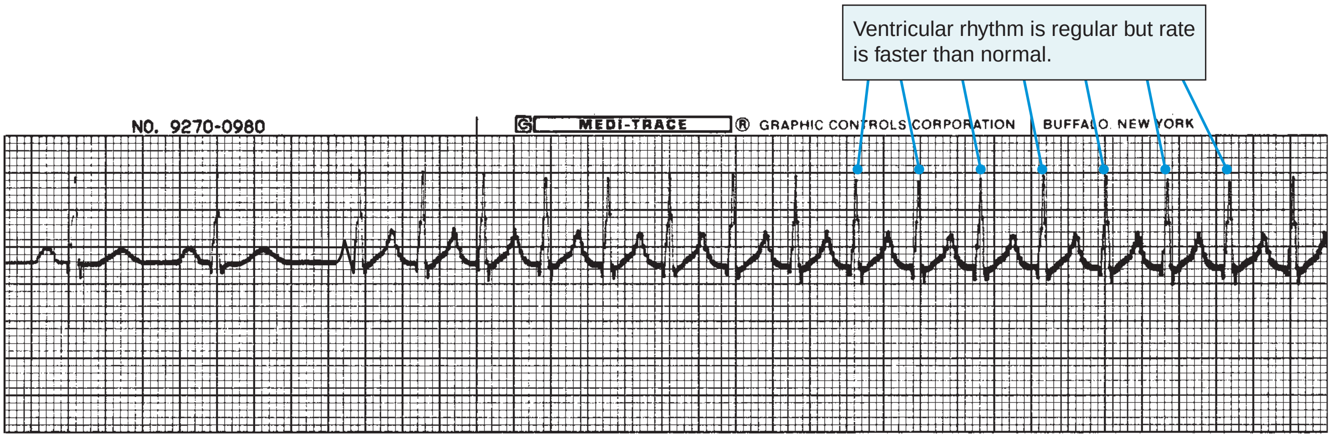


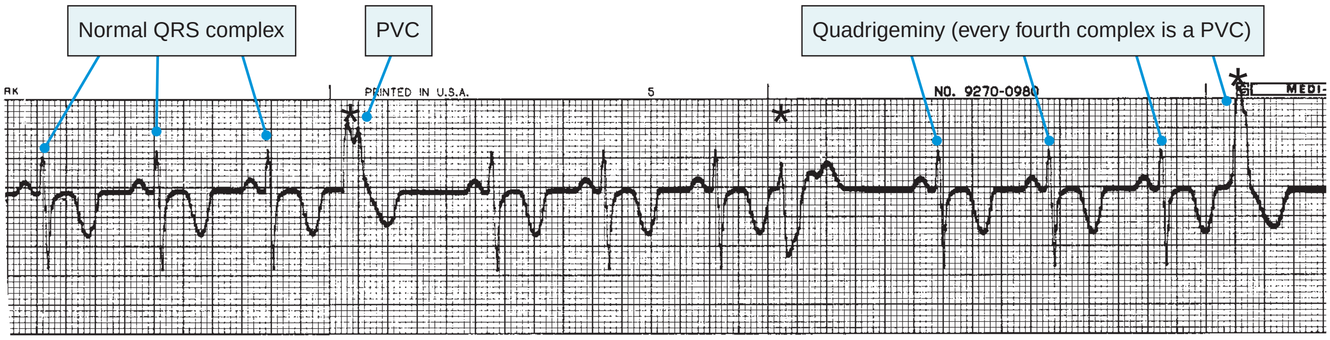
Figure 8-13
Atrioventricular (AV, or junctional) dysrhythmias. In a junctional rhythm (*top*), the electrical impulse is initiated by the AV node. As a result, the ventricular rhythm is regular, but the rate is slow. In AV nodal re-entry tachycardia (*bottom*), impulses are routed through the AV node multiple times, causing the ventricles to contract at a rapid rate.

than 100 beats per minute (see Fig. 8-14). Ventricular tachycardia is an emergency situation because the person usually does not have a pulse and is usually (although not always) unresponsive. An unresponsive or unstable person needs immediate treatment with medications and **defibrillation** (the administration of an electric shock to the heart to stop fast, abnormal heart beats and restore the heart's normal rhythm).

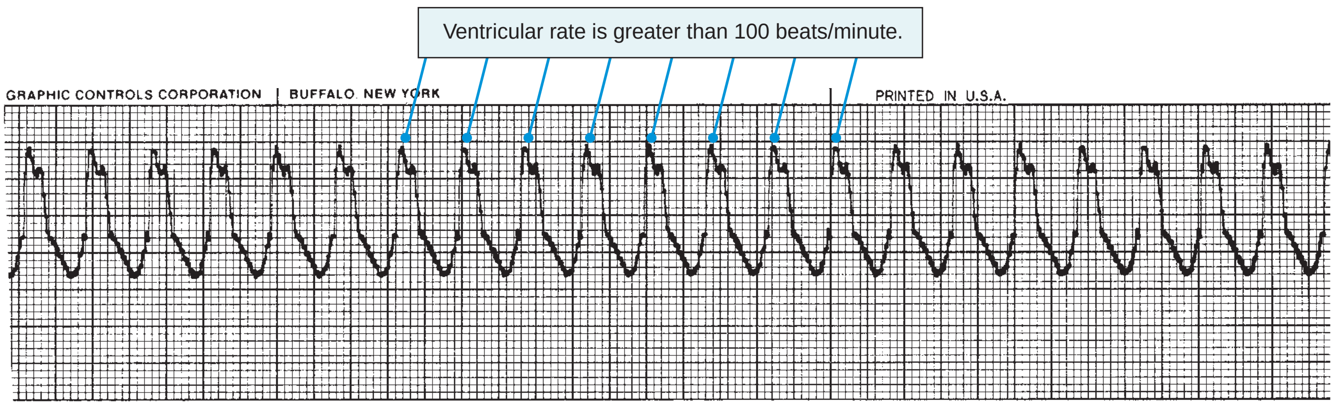
Ventricular fibrillation

If it is not treated quickly, ventricular tachycardia can turn into ventricular fibrillation. Ventricular fibrillation is caused by rapid, uncoordinated

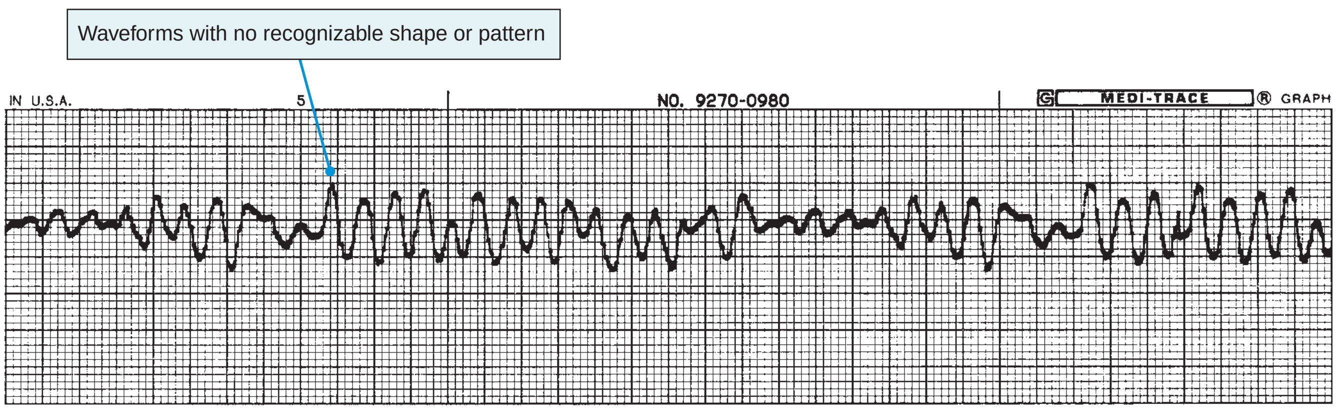
Figure 8-14
Ventricular dysrhythmias. Premature ventricular contractions (PVCs; *first rhythm strip*) are caused by impulses that begin in the ventricles and cause the ventricles to contract before the next normal impulse arrives from the sinus node. In ventricular tachycardia (*second rhythm strip*), the ventricular rhythm is usually regular but the rate is very fast. In ventricular fibrillation (*third rhythm strip*), the ventricular rhythm and rate are very irregular. The normal waveforms of the cardiac cycle cannot be detected. In idioventricular rhythm (*fourth rhythm strip*), the impulse originates in the ventricles, and no P waves (representing atrial contraction) can be seen. The ventricular rhythm is regular but very slow.



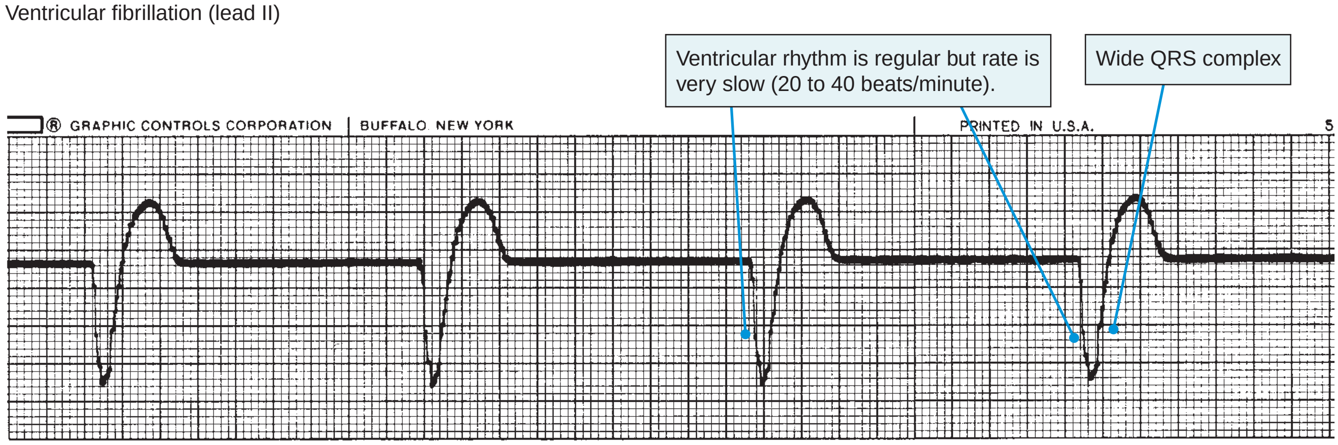
Premature ventricular contraction (lead V_1)



Ventricular tachycardia (lead V_1)



Ventricular fibrillation (lead II)



Idioventricular rhythm (lead V_1)

twitching of the myocardium of the ventricles. On the ECG, the normal waveforms of the cardiac cycle cannot be recognized (see Fig. 8-13). Ventricular fibrillation is an emergency because the ventricles are not able to send blood to the body. The person is always without a pulse and unresponsive. The person requires immediate treatment with cardiopulmonary resuscitation (CPR), defibrillation, and medications to restore the heart's rhythm.

Idioventricular rhythm

An idioventricular rhythm originates in the Purkinje fibers. The rate is very slow but regular (between 20 to 40 beats per minute), and the QRS complexes appear very wide (see Fig. 8-14). Because the heart rate is so slow, the person usually loses consciousness and his blood pressure drops.

Atrioventricular Blocks

A problem with the AV node can prevent the impulse generated by the SA node from traveling down to the ventricles. The impulse may be delayed or blocked entirely.

First-degree atrioventricular block

First-degree AV block occurs when the electrical impulses are sent through the AV node at a slower rate than normal. On the ECG, the waveforms are usually uniformly shaped and evenly spaced, and a P wave occurs before each QRS complex. However, the PR interval (which represents the period of time between the beginning of atrial depolarization and the beginning of ventricular depolarization) is longer than normal (that is, greater than 0.2 second). The length of the PR interval is the same for each beat (Fig. 8-15).

Second-degree atrioventricular block

Second-degree AV block occurs when only some of the electrical impulses are conducted through the AV node.

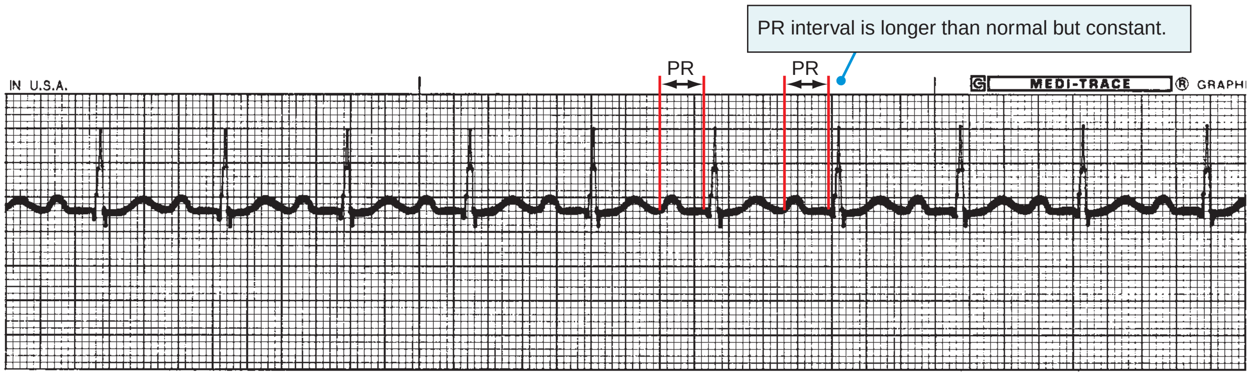
- In *second-degree AV block, type I*, the time between the beginning of atrial depolarization and the beginning of ventricular depolarization becomes longer with each impulse until one impulse is totally blocked. On the ECG, the PR interval becomes longer with each impulse until a P wave appears that is not followed by a QRS complex. Then the pattern begins again (see Fig. 8-15). This rhythm is also known as a *Wenckebach rhythm*.
- In *second-degree AV block, type II*, the time between the beginning of atrial depolarization and the beginning of ventricular depolarization is constant, but not all of the impulses are sent through the AV node to the ventricles. As a result, the ECG will show normal and constant PR intervals until an impulse is blocked, and then a P wave will appear without a QRS complex occurring after it (see Fig. 8-15). A missed beat may occur singly, or there may be two in a row before the AV node starts sending impulses through again. This rhythm is also known as a *Mobitz type I rhythm*.

Third-degree atrioventricular block

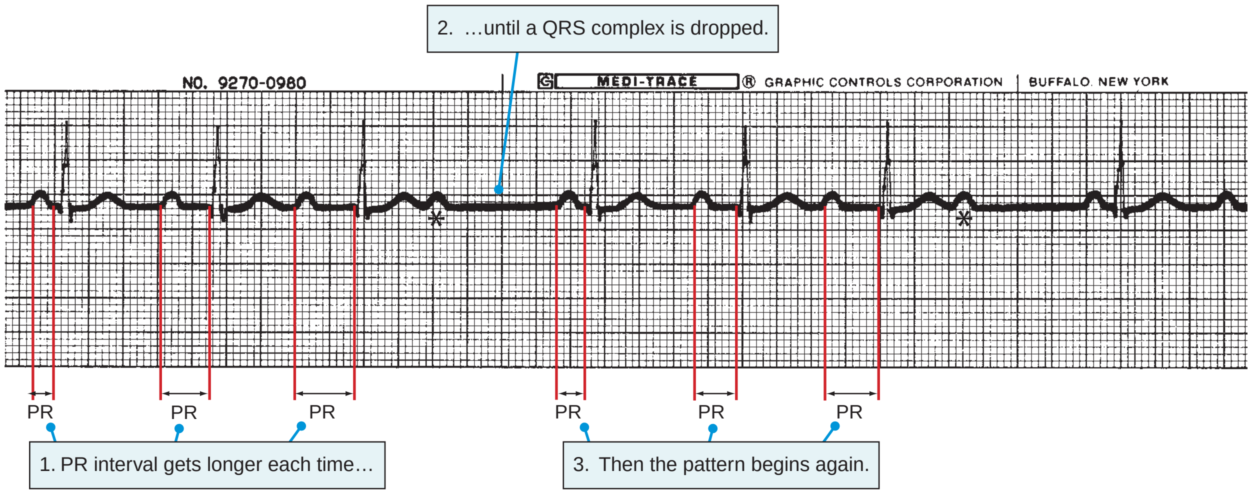
Third-degree AV block (also known as a *Mobitz type II rhythm*) occurs when no electrical impulses are sent through the AV node. Atrial contraction is stimulated by the impulse from the SA node. Ventricular contraction is stimulated at a very slow rate by an impulse that originates in the Purkinje fibers. Third-degree AV block can be a medical emergency. If medication fails to increase the person's heart rate, the person may need surgery to implant a pacemaker.

On the ECG, there is no relationship between the P waves and the QRS complexes because the atria and the ventricles are contracting independently of each other. The PR intervals vary in

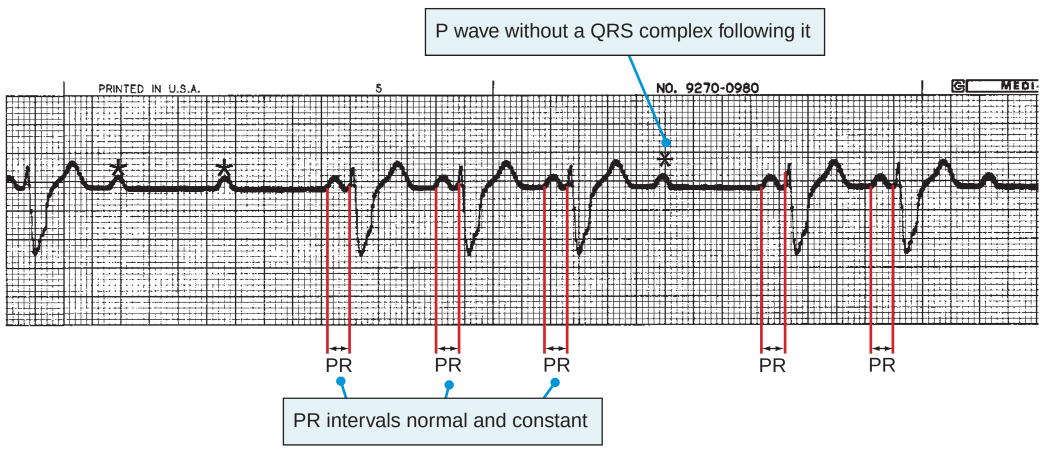
Figure 8-15
Atrioventricular (AV) block. In first-degree AV block (*first rhythm strip*), all impulses are conducted through the AV node, just at a slower rate than normal. In second-degree AV block, type I (*second rhythm strip*), the conduction time for each impulse becomes increasingly longer until one impulse is blocked completely. Then the pattern begins again. In second-degree AV block, type II (*third rhythm strip*), the conduction time for each impulse is the same, but not all impulses are conducted through the AV node. In third-degree AV block (*fourth rhythm strip*), no impulse from the sinoatrial (SA) node is conducted through the AV node. Because the atria and ventricles contract independently of each other, there is no relationship between the P waves and the QRS complexes.



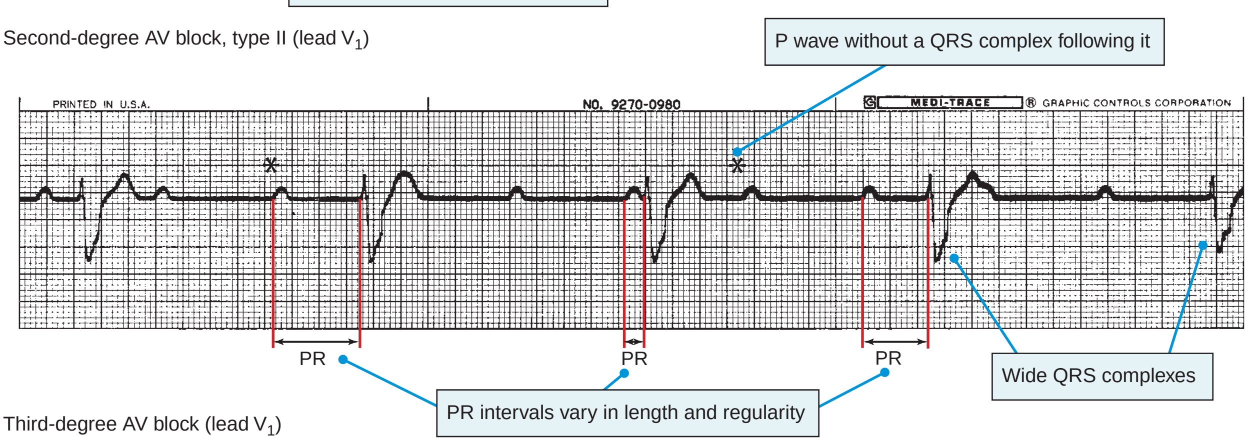
First-degree AV block (lead II)



Second-degree AV block, type I (lead II)



Second-degree AV block, type II (lead V_1)

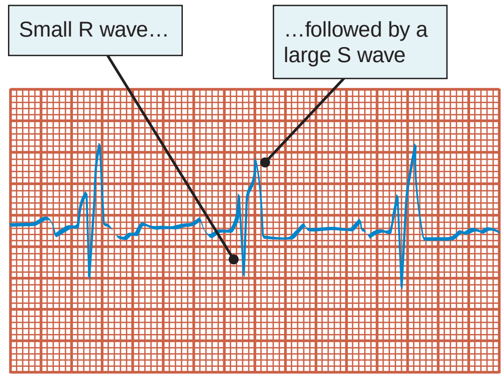


Third-degree AV block (lead V_1)

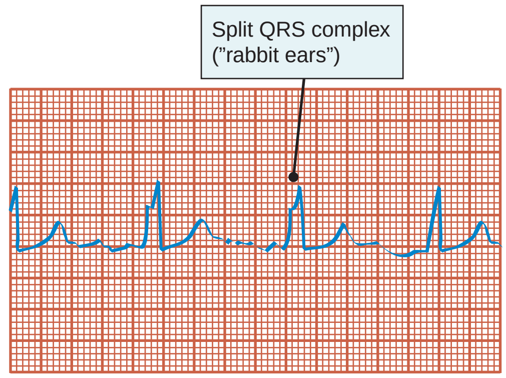
length and regularity. The QRS complexes are wide and abnormal in appearance (see Fig. 8-15).

Bundle Branch Block

A bundle branch block occurs when either the left bundle branch or the right bundle branch is unable to conduct the electrical impulse down to the Purkinje fibers after it passes through the bundle of His. Only the myocardial cells in the ventricle that receives the impulse are able to depolarize. But because the impulse spreads throughout the myocardial cells (by way of the intercalated disks), the impulse does travel from the unaffected ventricle to the ventricle with the blocked bundle branch. However, it takes a longer time for the impulse to reach the myocardial cells of the ventricle with the blocked bundle branch. As a result, the ECG shows a wider-than-normal QRS complex. Depending on which ventricle the block is affecting, the R wave may be small, followed by a large S wave, or the QRS complex will appear split, resulting in an appearance that is often called "rabbit ears" (Fig. 8-16).



Right bundle branch block (lead V_1)



Left bundle branch block (lead V_6)

Figure 8-16
Bundle branch block. Bundle branch block occurs when the impulse is prevented from passing down either the left bundle branch or the right bundle branch. Instead of contracting at the same time, first the ventricle with the unaffected bundle branch contracts and then the ventricle with the bundle branch block contracts. On the ECG, this is seen as a wide QRS complex with a "split" appearance.

THE NURSING ASSISTANT'S ROLE

As a nursing assistant working in an advanced care setting, you may be responsible for caring for patients who are undergoing continuous cardiac monitoring or who require 12-lead ECGs. If this is the case, you may receive additional training so you can recognize and report abnormalities in the person's ECG. You may also be taught how to apply the electrodes that are used for continuous cardiac monitoring or to obtain a 12-lead ECG.

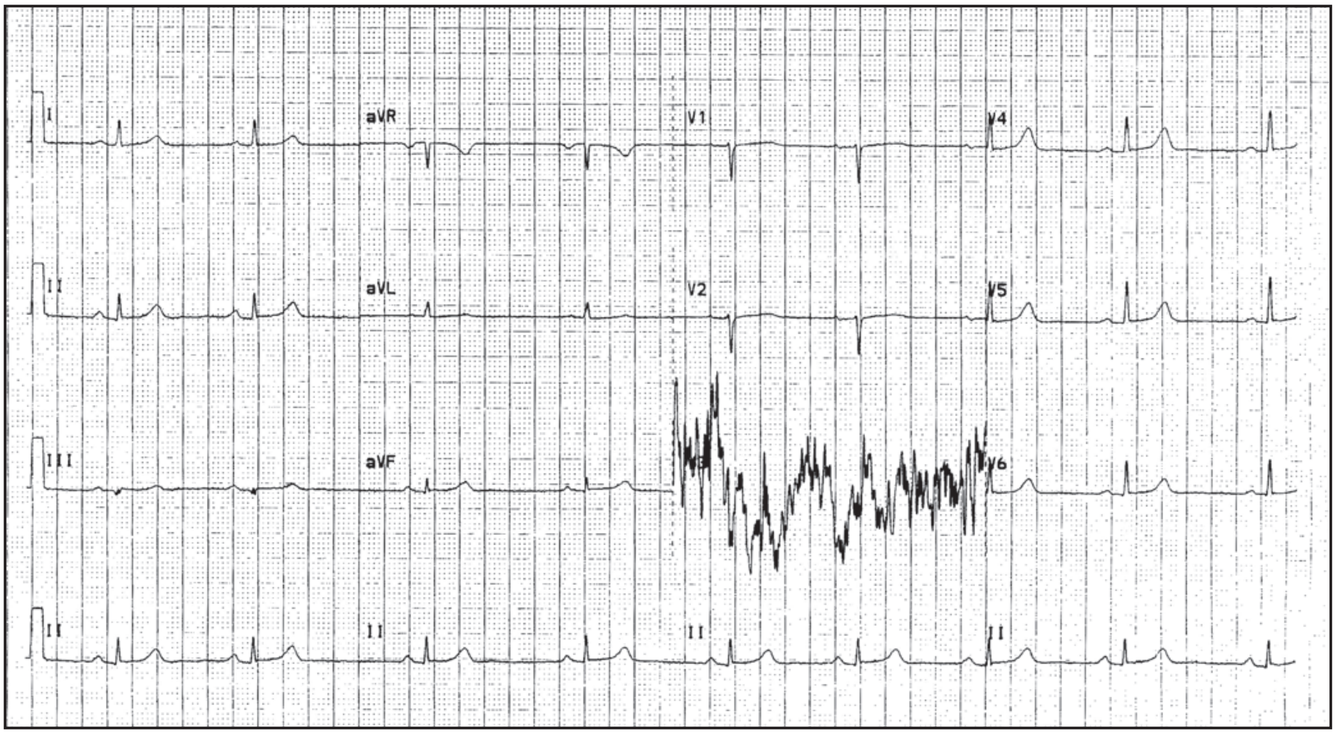
Recognizing and Reporting Abnormalities on the Person's Electrocardiograph

Although you have just learned a little bit about dysrhythmias and what causes them, you are not responsible for diagnosing a person's dysrhythmia. You should, however, be able to recognize an abnormal heart rhythm or rate on the ECG monitor. Remember, as with vital signs, "normal" varies according to the individual. You must be especially observant for new changes in the appearance of a person's ECG and for signs and symptoms of heart trouble.

TELL THE NURSE

When caring for a person who is undergoing continuous cardiac monitoring, be sure to report the following observations to a nurse immediately. These observations may indicate a significant change in the person's medical condition or possibly even a life-threatening emergency.

- The PR interval is longer than it was earlier.
- The ST interval changes.
- The QRS complex has changed in shape or widened.
- The tracing does not return to the baseline in between the QRS complex and the T wave.
- The T wave has increased in size or changed the direction of deflection.
- The ECG shows a new dysrhythmia.



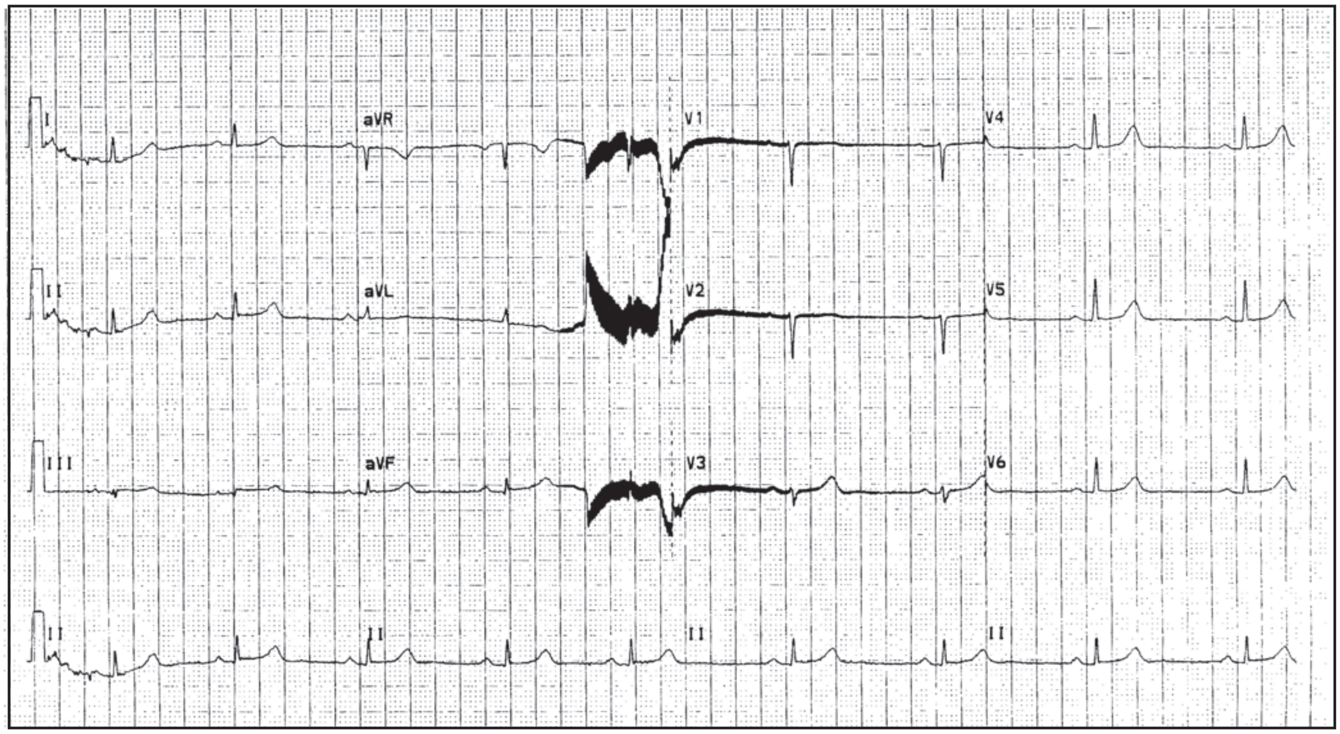


Figure 8-17
Artifact is an abnormal tracing on the electrocardiograph. Common causes include electrical interference from other electrical equipment in the area, problems with the electrodes or lead wires, and movement of the patient.

- The person complains of chest pain or discomfort.
- The person complains of shortness of breath.
- The person complains of dizziness.
- The person is unconscious.

On an ECG, you may see abnormal tracings that are not representative of the heart's electrical activity at all. The waveforms on the ECG may look fuzzy or jagged. They may even look like a serious dysrhythmia, such as ventricular tachycardia or ventricular fibrillation. These abnormal tracings are called **artifact** (Fig. 8-17). Have you ever been listening to the radio and heard static? Static occurs when radio waves compete for the same channel. The undesired waves compete with the desired waves, producing noise. The same thing can happen with an ECG, causing artifact. Artifact can be caused by:

- Electrical interference from other electrical equipment (such as an electric razor) or monitoring devices in the area
- Loose electrodes, especially if the person is diaphoretic (sweating) or has recently been repositioned
- Electrodes that have dried out
- Electrodes that have been placed over an excessively hairy area
- A defective monitor or lead wires
- Patient movement (for example, from shivering or brushing the teeth)

If you notice an ECG pattern that could be artifact, be sure to call a nurse or check on the person yourself. If the abnormal pattern is not artifact, then the change on the ECG could be a sign of a serious change in the person's medical condition. If the abnormal pattern is artifact, then the cause of the artifact must be addressed so that accurate monitoring can continue.

Applying Electrodes

You may receive additional training to learn how to apply the electrodes used for continuous cardiac monitoring or to obtain a 12-lead ECG. A nurse will teach you how to feel for the intercostal spaces and count them for proper electrode placement. Taking the time to make sure that the electrodes are placed properly is very important. Improper electrode placement can lead to errors or delays in diagnosing, treating, or monitoring the person's medical condition.

Before applying electrodes, the skin must be clean, dry, and free of excess hair. If the electrodes are to be left in place for a period of time (as with continuous cardiac monitoring), then the electrodes should be changed every 24 to 48 hours according to facility policy. Loose electrodes need to be changed immediately. When changing the electrodes, be sure to examine the skin carefully for signs of irritation caused by the adhesive. If the person is sensitive to the adhesive, hypoallergenic electrodes should be used.

Procedure 8-1 describes how to set up continuous cardiac monitoring. Procedure 8-2 describes how to obtain a 12-lead ECG.

SUMMARY

- In automatic blood pressure monitoring, an automated blood pressure cuff inflates and deflates at regular intervals to measure the person's blood pressure. Automatic blood pressure monitoring permits very frequent monitoring of a person's blood pressure, such as might be necessary during medical procedures or when a person is critically ill.
- In arterial pressure monitoring, a special catheter is inserted into an artery in the wrist or groin to continuously monitor the person's blood pressure, pulse, and blood oxygen level. The arterial line can also be used to draw samples of arterial blood for laboratory testing.
- Electrocardiography translates the journey of an electrical impulse through the heart's conduction system into a series of waveforms and intervals called an electrocardiogram (ECG, EKG) that can be analyzed to detect abnormalities in the heart.
  - Electrocardiography can be used to diagnose a heart condition or to continuously monitor a person's cardiac function.
    - A 12-lead ECG is used to diagnose a heart condition. A 12-lead ECG uses 10 electrodes.
    - Hardwire cardiac monitoring, telemetry, and continuous ambulatory (Holter) monitoring are used to continuously monitor the person's heart rate and rhythm. Continuous cardiac monitoring uses between three and five electrodes.
  - As an electrical impulse travels through the conduction system of the heart, it causes the atria to contract, followed by the ventricles. This organized contraction

of the heart in two phases is known as the cardiac cycle and is necessary for the heart to pump efficiently. The events of the cardiac cycle are represented on the ECG by a series of waves and intervals.
  - The P wave represents the firing of the sinoatrial (SA) node and contraction of the atria.
  - The QRS complex represents contraction of the ventricles.
  - The T wave represents ventricular repolarization, which is when the ventricles return to their resting state before the next contraction.
  - The PR interval represents the period of time between the beginning of atrial contraction and the beginning of ventricular contraction. In other words, it represents the amount of time the impulse needs to travel through the atria (from the SA node to the bundle of His).
  - The ST interval lasts from the end of the QRS complex to the beginning of the T wave. It represents the amount of time between the end of ventricular contraction and the beginning of ventricular repolarization.
- If the electrical impulse does not travel through the heart's conduction system in an orderly manner, dysrhythmias can occur.
  - SA node dysrhythmias (such as sinus bradycardia and sinus tachycardia) occur when the SA node fires impulses at a rate that is faster or slower than normal.
  - Atrial dysrhythmias (such as atrial flutter and atrial fibrillation) occur when electrical impulses begin in the atria instead of in the SA node. The atria contract many more times than the ventricles do.
  - Atrioventricular (AV) junction dysrhythmias (such as junctional rhythm and AV nodal re-entry tachycardia) begin in the area around the AV node and the bundle of His. The ventricular rate is affected.
  - Ventricular dysrhythmias (such as premature ventricular contraction, ventricular tachycardia, ventricular fibrillation, and idioventricular rhythm) begin in the ventricles. Ventricular tachycardia and ventricular fibrillation are especially dangerous dysrhythmias.
  - AV blocks occur when a problem with the AV node prevents the impulse from traveling down to the ventricles.
  - Bundle branch blocks occur when a problem with one of the bundle branches prevents the impulse from traveling to both ventricles at the same time. First one ventricle contracts, and then the other contracts.
- As a nursing assistant, you may be responsible for recognizing and reporting abnormalities on a person's ECG, setting up continuous cardiac monitoring, or obtaining a 12-lead ECG.
  - New changes in the appearance of a person's ECG may be a sign of a serious change in the person's condition and should be reported immediately.
  - When setting up continuous cardiac monitoring or obtaining a 12-lead ECG, it is important to make sure that the electrodes are placed correctly. Incorrect electrode placement may lead to errors or delays in diagnosing, treating, or monitoring the person's medical condition.

CHAPTER

8 PROCEDURES

PROCEDURE 8-1

Setting Up Continuous Cardiac Monitoring

WHY YOU DO IT Setting up continuous cardiac monitoring using proper technique helps to ensure that the electrocardiograph (ECG) that results is clear (free from artifact) and accurate.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Alcohol pads
- Gauze pads
- Disposable clippers
- Electrodes (three or five, depending on the type of monitoring system used)
- Lead wires
- Monitor or telemetry cable
- Monitor (for hardwire system) or transmitter box, battery, and carrying pouch (for telemetry system)
- Bath towel

Procedure

2. Prepare the equipment.

  a. Hardwire: Place the monitor close to the person's bed, plug in the power cord, and turn on the monitor. Insert the cable into the appropriate socket in the monitor and connect the lead wires to the cable if necessary. (In some systems, the lead wires and cable are kept connected to the monitors.)

  b. Telemetry: Insert a new or freshly charged battery into the transmitter box. Check to make sure the battery works by turning on the device.

3. Make sure the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up.

4. Fanfold the top linens to below the person's waist. Adjust the person's clothing as necessary to expose the chest. (If the person is a woman, use the bath towel to cover the breasts for modesty.)

5. Determine the correct position for each electrode according to the system in use (see Box 8-2). Make sure that the skin in the areas where the electrodes will be applied is free from irritation, bruising, and breaks. If the person's chest is excessively hairy, use the clippers to remove the hair in the areas where the electrodes will be placed.

6. Clean each area where an electrode will be placed with an alcohol pad to remove skin oils that may interfere with electrode function or adhesion. Dry each area with a gauze pad.

7. Peel off the backing of the electrode and check to make sure the gel is moist. If the gel is dry, the electrode should be discarded.

8. Apply the electrode, pressing it down firmly to ensure a good seal. Repeat steps 7 and 8 until all of the electrodes have been applied.

9. Snap the lead wires to the appropriate electrodes.

  a. Three-electrode system: RA = white, LA = black, LL = red

  b. Five-electrode system: RA = white, RL = green, LA = black, LL = red, C = brown

(*continued*)

Three-electrode system

Five-electrode system

Step 9 Snap the appropriate lead wire to each electrode.

10. Check to make sure the lead wires are attached securely to the electrodes. Observe the ECG waveforms on the monitor. Adjust the monitor or the position of the electrodes as needed to obtain a clear tracing.

11. Set the alarm rate limits according to your facility's policy or as ordered by the doctor. Turn on the alarm.

12. Adjust the person's clothing as necessary to cover the chest. If using a telemetry monitoring system, place the transmitter box in the carrying pouch. Secure the pouch to the person (either by placing the pouch around the person's neck or securing it to the person's clothing).

13. Straighten the bottom linens and draw the top linens over the person. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return them to the raised position.

14. Record a rhythm strip and label it with the person's name and room number, the date, and the time according to your facility's policy. Place the rhythm strip in the person's chart.

Finishing Up CLSOWR

15. Complete the "Finishing Up" steps.

What You Document

- Irritation, bruising, or breaks in the skin
- The patient's heart rate and ECG rhythm
- The patient's vital signs
- Any complaints of chest pain or discomfort

PROCEDURE 8-2

Obtaining a 12-Lead Electrocardiograph

WHY YOU DO IT Obtaining a 12-lead electrocardiograph (ECG) using proper technique helps to ensure that the ECG that results is clear (free from artifact) and accurate.

Getting Ready

1. Complete the "Getting Ready" steps.

Supplies

- Alcohol pads
- Gauze pads
- Disposable clippers
- Electrodes (10)
- Lead wires
- Monitor or telemetry cable
- Electrocardiograph
- Bath blanket
- Bath towel

Procedure

2. Place the electrocardiograph close to the person's bed, plug in the power cord, and turn the electrocardiograph on. If necessary, enter the required patient information into the machine. Check to make sure that there is enough paper and replace the roll of paper if necessary.
3. Make sure the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up. Lower the head of the bed so that the bed is flat (as tolerated).
4. Position the person in the supine position in the center of the bed with the arms out to the sides. Make sure that the person's feet are not touching the footboard of the bed.
5. Spread the bath blanket over the top linens (and the person). If the person is able, have him hold the bath blanket. If not, tuck the corners under the person's shoulders. Fanfold the top linens to the foot of the bed. Adjust the person's clothing as necessary to expose the chest, arms, and legs.
6. Fold the bath blanket down to expose the chest and arms and up from the bottom to expose the person's lower legs. (If the person is a woman, use the bath towel to cover the breasts for modesty.)
7. Apply the limb electrodes and leads.
   a. Determine the correct position for each electrode. When selecting sites for the limb electrodes, choose sites that are fleshy rather than muscular or bony. Make sure that the skin in the areas where the electrodes will be applied is free from irritation, bruising, and breaks. If the person's limbs are excessively hairy, use the clippers to remove the hair in the areas where the electrodes will be placed.
   b. Clean each area where an electrode will be placed with an alcohol pad to remove skin oils that may interfere with electrode function or adhesion. Dry each area with a gauze pad.
   c. Peel off the backing of the electrode and check to make sure the gel is moist. If the gel is dry, the electrode should be discarded.
   d. Apply the electrode, pressing it down firmly to ensure a good seal. Repeat steps 7c and 7d until all of the limb electrodes have been applied.
   e. Snap the lead wires to the appropriate electrodes: RA = white, RL = green, LA = black, LL = red.
8. Apply the chest electrodes and leads. If the person is a woman, move the bath towel to expose the breasts as necessary. You will need to lift the breasts and place the electrodes below the breast tissue on the chest wall.
   a. Determine the correct position for each electrode (see Box 8-1). Make sure that the skin in the areas where the electrodes will be applied is free from irritation, bruising, and breaks. If the person's chest is excessively hairy, use the clippers to remove the hair in the areas where the electrodes will be placed.

(*continued*)

- **b.** Clean each area where an electrode will be placed with an alcohol pad to remove skin oils that may interfere with electrode function or adhesion. Dry each area with a gauze pad.
- **c.** Peel off the backing of the electrode and check to make sure the gel is moist. If the gel is dry, the electrode should be discarded.
- **d.** Apply the electrode, pressing it down firmly to ensure a good seal. Repeat steps 8c and 8d until all of the chest electrodes have been applied.
- **e.** Snap the lead wires to the appropriate electrodes (V_1 through V_6 = brown).

9. Ask the person to relax and breathe normally. Remind the person to lie still and not talk during the ECG recording. Let the person know that the ECG recording will only take a few minutes.

Step 9 Remind the person to lie still during the recording.

10. Press the button that starts the recording.

11. Check the ECG tracings on the recording paper to make sure that all of the leads recorded clearly. If the ECG tracings are not clear, it may be because an electrode or lead wire became loose during the recording. If the first recording is not clear, check all of the electrodes and lead wires and re-run the ECG recording.

12. Remove the electrodes and clean the person's skin if necessary. Adjust the person's clothing as necessary to cover the chest, arms, and legs.

13. Straighten the bottom linens and draw the top linens over the person. Remove the bath blanket from underneath the top linens. Make sure that the bed is lowered to its lowest position and that the wheels are locked. If the side rails are in use, return them to the raised position. Raise the head of the bed, as the person requests.

14. Label the ECG with the person's name and room number, the date, and the time according to your facility's policy, if the machine did not do it automatically. Place the ECG in the person's chart or other designated place per your facility's policy.

15. Gather the soiled linens and place them in the linen hamper or linen bag. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the storage area.

Finishing Up

16. Complete the "Finishing Up" steps.

What You Document

- Irritation, bruising, or breaks in the skin
- The patient's vital signs
- Any complaints of chest pain or discomfort

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. You are caring for Mrs. Smith, who is having her blood pressure monitored automatically. The machine is set to measure her blood pressure every 10 minutes. When you go in to Mrs. Smith's room to check on her, you notice that the most recent blood pressure measurement is much lower than the one 10 minutes before. What should you do?
   a. Report the low blood pressure measurement to the nurse immediately
   b. Measure Mrs. Smith's blood pressure manually and report to the nurse if the manual blood pressure measurement is also low
   c. Nothing; Mrs. Smith looks fine, and no alarm sounded
   d. Call the doctor immediately

2. You are caring for Mrs. Lyman, who just had an arterial line removed. What should you do?
   a. Take standard precautions when providing care and monitor Mrs. Lyman for bleeding from the insertion site
   b. Apply pressure to the site for 30 seconds
   c. Apply an adhesive bandage to stop the bleeding
   d. Expect to find large amounts of blood on the sterile dressing

3. Which type of continuous cardiac monitoring system allows the person to be more mobile?
   a. Hardwire cardiac monitoring
   b. 12-lead ECG
   c. Telemetry
   d. Invasive cardiac monitoring

4. What are the specialized fibers called that transmit the electrical impulse down the septum to the ventricles?
   a. Internodal pathways
   b. Bundle branches
   c. Purkinje fibers
   d. Interseptal bundles

5. To estimate a person's heart rate by looking at an ECG rhythm strip, you can count the number of QRS complexes contained in two 3-second intervals and multiply by:
   a. 2
   b. 5
   c. 10
   d. 20

6. Where do atrioventricular (AV) junction dysrhythmias begin?
   a. In the sinoatrial (SA) node
   b. In the bundle branches
   c. In the pacemaker
   d. In the area around the atrioventricular (AV) node and the bundle of His

7. Premature ventricular contractions (PVCs) that have different shapes on the ECG rhythm strip are called:
   a. Bigeminy
   b. Multifocal
   c. Unifocal
   d. Aberrant

8. An electrical impulse that originates in the ventricles will cause the ventricles to contract at a rate of:
   a. 60 to 100 beats per minute
   b. 40 to 60 beats per minute
   c. 20 to 40 beats per minute
   d. 100 to 160 beats per minute

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Ventricular systole

_____ **2.** Sinoatrial (SA) node

_____ **3.** P wave

_____ **4.** QRS complex

_____ **5.** Ventricular diastole

_____ **6.** T wave

_____ **7.** Atrioventricular (AV) node

a. Waveform caused by atrial depolarization (contraction)
b. Contraction phase of the ventricles
c. Specialized group of cells that hold the impulse for a moment before transmitting it to the bundle of His
d. Waveform caused by ventricular repolarization
e. Waveform caused by ventricular depolarization (contraction)
f. Relaxation phase of the ventricles
g. The heart's primary pacemaker

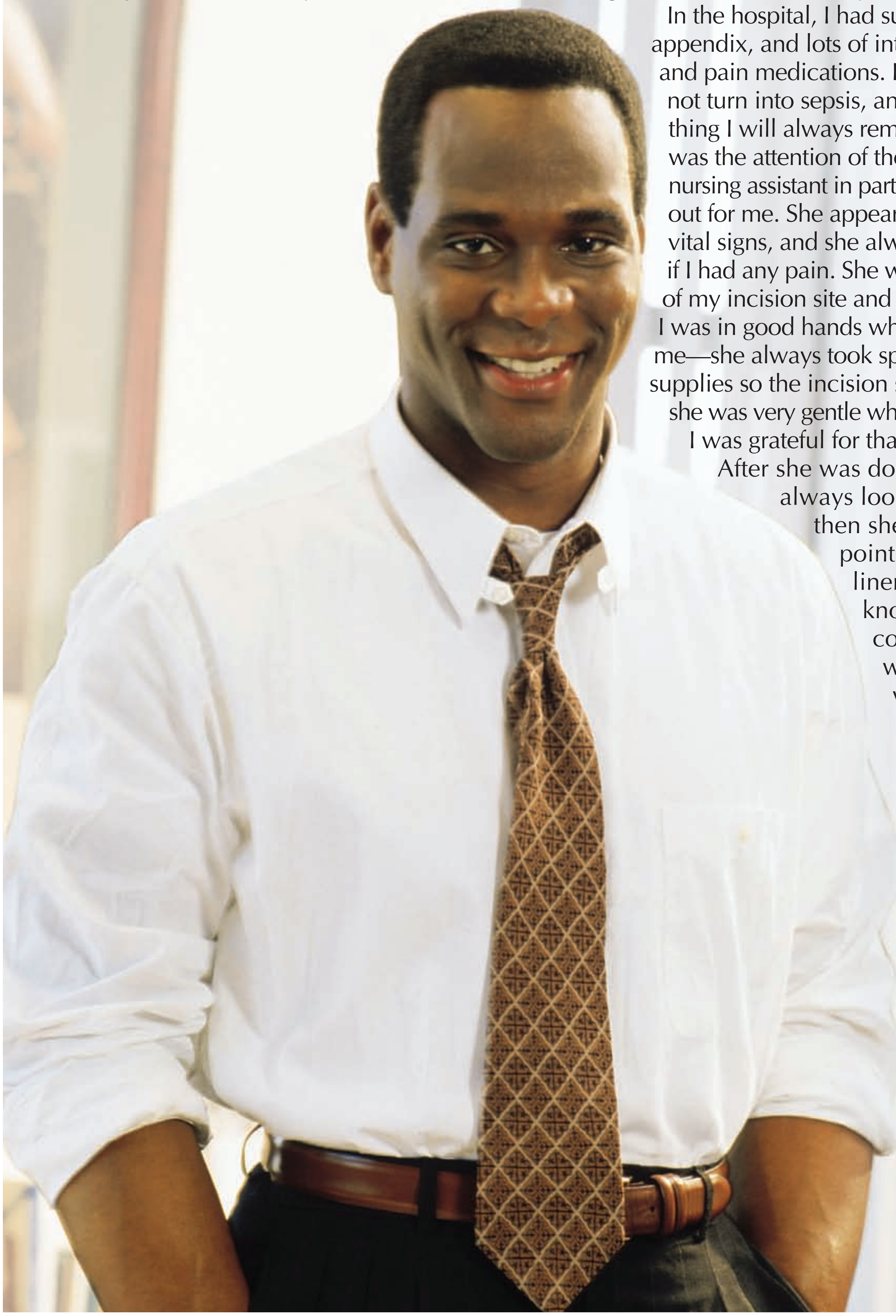
STOP and Think!

1. Mrs. Spencer is an elderly patient who has been admitted to your unit after having abdominal surgery. She has been placed on telemetry to monitor her heart. Since her surgery, Mrs. Spencer has become a bit confused and has pulled off her telemetry leads three times already today. As you pass the station where the telemetry monitoring screens are, you notice that Mrs. Spencer's rhythm is again looking irregular. You are really busy, and she has already pulled her leads off so many times today. What should you do?

2. Mrs. Jacobs is an elderly patient who has just been admitted to your unit with pneumonia. Her doctor has written an order for telemetry monitoring. What will some of your responsibilities be regarding Mrs. Jacobs' telemetry?

Nursing Assistants Make a Difference!

My name is Chris, and I'm a salesman for Tasty Treats, one of America's largest manufacturers of frozen food products. About 6 months ago, I came pretty close to dying when my appendix burst on an airplane. I hadn't been feeling well for quite some time, but I just ignored my symptoms. I figured I had the flu or something, and I needed to keep my appointment with a very important client of ours. Well, wouldn't you know it, my appendix burst at 36,000 feet. The plane had to make an emergency landing but by then, peritonitis, a really serious infection of the lining of the abdominal cavity, had set in.



In the hospital, I had surgery to remove the ruptured appendix, and lots of intravenous fluids, antibiotics, and pain medications. I was lucky; the peritonitis did not turn into sepsis, and I began to feel better. One thing I will always remember about my hospital stay was the attention of the nursing staff. There was one nursing assistant in particular, Kari, who really watched out for me. She appeared like clockwork to take my vital signs, and she always made it a point to ask me if I had any pain. She was also the one who took care of my incision site and changed my dressing. I knew I was in good hands when Kari was taking care of me—she always took special care in setting up her supplies so the incision site wouldn't get infected, and she was very gentle when she was cleaning my incision. I was grateful for that because I was still pretty sore! After she was done changing my dressing, it always looked so neat and clean, and then she would make it a special point to straighten my gown and linens and fluff the pillow. I know it sounds silly, especially coming from a grown man, but when she did that, I really felt well taken care of. I mean, after all, when this happened, I was 1500 miles away from home. It's not like my friends or family could come to visit, and I was really pretty sick. It was nice to know that someone cared.

Now I'm back at work and as busy as ever. I always treat my clients like they are the Very Important People that they are. I have to say, during my stay at Three Rivers Hospital, I felt like a VIP myself, thanks to Kari. I'll never forget the care she gave me after my close call.

U N I T

3 Special Care Concerns

To make providing care more efficient, many health care facilities group patients according to their special health care needs. As a nursing assistant working in an advanced care setting, you may find yourself working on a unit or in a facility that is dedicated to caring for patients with a specific type of health care need. In this unit, you will learn about some of these specialized areas of health care and about the nursing assistant's role in providing that care.

Photo: Today, nursing assistants are working in many specialized areas of health care. Here, a nursing assistant assists with the application of a pediatric patient's cast.

CHAPTER

9

Care of the Rehabilitation Patient

WHAT WILL YOU LEARN?

The word "rehabilitation" comes from the Latin word *habilitas*, "to make able." As you know from your basic training, rehabilitation is the process of helping a person return to her highest level of functioning after an illness or injury. A hospitalized patient who has had a serious illness or injury begins rehabilitation very soon after her medical condition is stabilized. Rehabilitation may continue for weeks, months, or even longer in a sub-acute care facility, long-term care facility, rehabilitation center, or the person's home. As a nursing assistant working in an advanced care setting, you may help your patients with rehabilitation while they are still in the hospital, or you may find employment at a

A physical therapy assistant watches a patient perform exercises during a therapy session. (AP Photo/Matt Rourke.)

rehabilitation center. Some nursing assistants receive additional training to become rehabilitation aides. When you are finished with this chapter, you will be able to:

1. Explain the major goals of rehabilitation and describe settings where rehabilitation can take place.
2. List and describe the three phases of the rehabilitation process.
3. Describe areas that might be addressed as part of a rehabilitation program.
4. Describe the responsibilities of key members of the rehabilitation team.
5. List and describe factors that can affect the outcome of the rehabilitation effort.
6. Discuss the nursing assistant's role in caring for a person with a spinal cord injury during the acute, sub-acute, and chronic phases of rehabilitation.
7. Discuss the nursing assistant's role in caring for a person with traumatic brain injury (TBI) during the acute, sub-acute, and chronic phases of rehabilitation.
8. Discuss the nursing assistant's role in caring for a person who has had a stroke during the acute, sub-acute, and chronic phases of rehabilitation.
9. Discuss the nursing assistant's role in caring for a person with a cardiovascular disorder during the acute, sub-acute, and chronic phases of rehabilitation.
10. Discuss the nursing assistant's role in caring for a person with a musculoskeletal disorder during the acute, sub-acute, and chronic phases of rehabilitation.
11. Discuss the nursing assistant's role in caring for a person with a burn injury during the acute, sub-acute, and chronic phases of rehabilitation.
12. Discuss why an elderly person might require rehabilitation.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

- Traumatic brain injury (TBI, head injury)
- Intracranial pressure (ICP)
- Dysphagia
- Rancho Los Amigos Scale
- Glasgow Coma Scale (GCS)
- Cerebrovascular accident (CVA)
- Angiography
- Angiogram
- Balloon angioplasty
- Stent
- Deep venous thrombosis (DVT)
- Frail

REHABILITATION: AN OVERVIEW

Rehabilitation is about restoring and maintaining physical, emotional, and social function. The ability to function is essential for maintaining or regaining independence and for ensuring the best quality of life. Any condition that results in a loss of function (disability) can make rehabilitation necessary. A disability may be the result of a sudden event, such as an accident, myocardial infarction (heart attack), or stroke. Or a disability may be the result of a chronic condition that progressively worsens.

SETTINGS FOR REHABILITATION

Rehabilitation services can be provided in a facility devoted exclusively to providing rehabilitation services or in specialized units within a hospital, sub-acute care facility, or long-term care facility. Some people receive rehabilitation services in their homes. Specialized rehabilitation centers provide rehabilitation services for people with specific rehabilitation needs. For example, one rehabilitation center may care only for patients with brain and spinal cord injuries, and another may specialize in stroke rehabilitation. Burn injuries, acute mental illness, and drug or alcohol addiction are examples of other types of conditions a person may receive rehabilitation for in a specialized rehabilitation center.

The rehabilitation process can take varying amounts of time and often occurs in more than one setting. Patients who are expected to recover fairly quickly (for example, those who have had joint replacement surgery) may begin rehabilitation in the form of physical therapy while they are still in the hospital and may then continue rehabilitation on an outpatient basis. Some patients are transferred to a sub-acute care unit or long-term care facility for additional rehabilitation before going home.

Patients with illnesses or injuries that are more severe (for example, brain or spinal cord injuries, stroke, myocardial infarction, burns) most likely will need long-term rehabilitation. Rehabilitation is started in the hospital soon after the person's medical condition has stabilized. The person may then be transferred to a specialized rehabilitation center, a sub-acute care facility, or a long-term care facility for additional rehabilitation.

PHASES OF REHABILITATION

Rehabilitation takes place in three phases.

Acute Phase

For the first 24 hours after surgery, an injury, or a serious illness, the person is acutely ill and needs constant observation and care. The health care team's main focus during this phase is to keep the person alive, for example, by assisting with ventilation and helping the heart to function properly.

Sub-acute Phase

After 24 hours have passed, the person usually enters the sub-acute phase of rehabilitation. This phase usually lasts about 1 week. In this phase, the health care team focuses on stabilizing the person's medical condition and preventing complications associated with immobility (for example, contractures, pressure sores, pneumonia, blood clots, and bowel and bladder problems) so the person's best rehabilitation potential is maintained. Proper nutrition, positioning, skin care, range-of-motion exercises, and urinary and bowel care (that is, measures taken to keep the urinary system and bowels functioning properly) are important. You may need to assist the person with eating, hygiene, and grooming tasks. Make sure to explain all procedures to the person and try to understand periods of anger, grief, and frustration. Many patients who have experienced an acute injury or illness are not used to being dependent on someone else for help with their activities of daily living (ADLs).

Some patients are able to begin taking fluids and food orally, start passive range-of- motion exercises, and progress to active range-of-motion exercises and ambulation during the sub-acute phase. Other patients may still need ventilator support, intravenous fluids, and enteral feedings during the sub-acute phase. Many patients who will be transferring to a specialized rehabilitation center transfer during the sub-acute phase.

Chronic Phase

During the chronic phase of rehabilitation, the work of intense rehabilitation begins. The person may still require medical support as he continues to recover from the injury or illness. In addition, the person will begin a rehabilitation program designed to meet his special needs. Areas addressed as part of a rehabilitation program might include:

- Restoring or maintaining the person's ability to perform ADLs
- Restoring or maintaining the person's ability to move independently
- Restoring or maintaining the person's ability to communicate
- Restoring or maintaining the person's cognitive skills (such as problem solving, decision making, organizing, or concentrating)
- Restoring or maintaining the person's mental health
- Restoring or maintaining the skills the person needs to return to work and achieve financial independence
- Educating the person and family members about the disorder or disability and about ways to prevent future complications

THE REHABILITATION TEAM

The rehabilitation program is designed and carried out by a team of health care workers called the rehabilitation team. Just as with any health care team, the patient is always the focus of the rehabilitation team's efforts, and the goal of the rehabilitation team is to provide holistic care (care of the whole person, physically and emotionally). Many jobs within the health care field have rehabilitation as their specific focus (Table 9-1). In addition to health care workers who specialize in various aspects of rehabilitation, the rehabilitation team usually includes other health care team members, such as dieticians, social workers, and psychologists. The members of the rehabilitation team vary according to the patient's specific needs.

Table 9-1 Health Care Workers Who Specialize in Rehabilitation

JOB TITLE	RESPONSIBILITIES
Rehabilitation physician (physiatrist)	• Works with the patient's doctor to manage and direct the patient's rehabilitation program
Rehabilitation nurse	• Develops a nursing care plan to maximize the patient's functioning and quality of life • Provides patient and family education • Helps the patient practice skills learned in therapy • Takes measures to prevent complications and monitors for complications
Occupational therapist	• Helps the patient regain or maintain the ability to perform activities of daily living (ADLs) • Teaches the patient how to use assistive devices to carry out ADLs (for example, for eating, grooming, or walking) • Helps to evaluate and treat swallowing disorders
Physical therapist	• Helps the patient regain or maintain strength, endurance, coordination, posture, and flexibility
Speech therapist	• Helps the patient regain or maintain the ability to communicate with others and swallow
Rehabilitation aide	• Assists the occupational therapist, physical therapist, and speech therapist with carrying out the rehabilitation program
Orthotist	• Fits the patient with supportive devices (such as braces or supports) to correct deformity, aid movement, and relieve discomfort
Prosthetist	• Fits the patient with prosthetic devices (such as an artificial arm or leg)
Neuropsychologist	• Helps the patient regain or maintain cognitive skills

FACTORS AFFECTING THE REHABILITATION EFFORT

Several factors can affect the outcome of the rehabilitation effort:

- **The person's attitude and coping skills.** For a person facing disability, the future can seem very difficult and frightening. The rehabilitation effort requires a huge amount of effort and is often painful, and progress might be slow. The way a person responds to the challenges brought on by a disability is very personal and may be influenced by the person's upbringing, culture, values, beliefs, outlook on life, and past experiences with life's challenges. A person with a positive attitude and good coping skills is more likely than a person with a negative attitude and poor coping skills to have a positive outcome.
- **The response of family members and caregivers to the person's disability.** Family members and caregivers who insist on doing everything for a person with a disability can actually do more harm than good. The person begins to believe that she cannot be independent and must rely on others to care for her. However, when family members and caregivers treat the disabled person as a responsible, capable person, they build up the person's self-esteem, promote independence, and assist greatly in the rehabilitation process.
- **The person's overall health status.** In a person with a chronic illness or more than one illness, the rehabilitation process may take longer, and the person is at higher risk for developing complications. For example, chronic conditions that can result in poor blood flow to the tissues (such as diabetes) can increase a person's chances of developing pressure ulcers. Osteoporosis and arthritis may increase a person's risk of falling and fracturing bones. Complications such as these can delay the rehabilitation effort and might make full recovery of function impossible.
- **The person's age.** Normal age-related changes can make the rehabilitation process more difficult for an older person compared with a younger person. In addition, an older person is more likely to have one or more chronic conditions that may affect the success of the rehabilitation effort.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Think about how it would feel to survive a severe injury or a serious medical crisis, only to wake up and find your world changed in some significant way. Yesterday you could cook a gourmet meal, give a lecture to a room full of people, run a mile in under 10 minutes, or recite a poem from memory. Today, you cannot feed yourself without assistance, ask for a drink of water, walk to the bathroom, or remember your address. How would a loss like this make you feel? Would you be frustrated or embarrassed about not being able to do something that once came easily to you? Would you feel sorry for yourself? Would you be angry that this happened to you? Would you be frightened about your future?

A person who has experienced a serious injury or illness may have to face one or more losses. The loss of function, income, a cherished career or hobby, independence, or a body part can make rehabilitation seem futile. Disability resulting from injury or illness might also change the way the person thinks about himself. For example, the person may feel that his role in the family or in society will change because of the disability. The person will need to grieve for these losses in much the same way a person who is diagnosed with a terminal illness passes through the stages of grief.

Rehabilitation can be a long, frustrating experience. The rehabilitation effort requires the person to work very hard, and the outcome of all of that hard work is uncertain. The person is likely to have good days and bad days. Be patient and empathetic with the person. Focus on the person's abilities rather than his disabilities. Make an effort to learn what motivates the person—what are his goals and dreams? Offer realistic encouragement and reassurance and celebrate every success, no matter how small. Give the person the time he needs to complete tasks independently and only offer assistance if the person seems to be overly frustrated. This helps build the person's self-esteem. Monitor the person's emotional status and report your observations to the nurse. A person who is depressed, suicidal, discouraged, or angry will need help working through these feelings so she can once again focus on her recovery. A holistic approach—considering the person's emotional needs, as well as her physical ones—is essential for the rehabilitation effort to be successful.

REHABILITATION: SPECIFIC SITUATIONS

There are so many different situations that can make rehabilitation necessary that it would be impossible to cover them all in this chapter. Some of the special care concerns for more common rehabilitation situations are described here.

SPINAL CORD INJURY

Injuries to the spinal cord are usually caused by trauma, but they can also be caused by birth defects, vascular disorders, infections, and tumors of the spine. Trauma can cause the bones that surround the spinal cord (the vertebrae) to break, and the sharp fragments of the bone can cut the soft tissue of the spinal cord, causing damage. Damage can also result from the swelling that occurs inside the spinal canal after an injury. Because the vertebrae do not "give," the spinal cord is squeezed, cutting off blood flow and resulting in tissue death from lack of oxygen. Remember that the spinal cord is the line of communication between the brain and the rest of the body. If this line is broken at any point, then nerve impulses cannot travel beyond the break in the line.

The disability that results from a spinal cord injury depends on the severity of the injury. Severe damage to the spinal cord can result in a total loss of movement, sensation, or both below the level of the injury. More minor damage may only result in a partial loss of movement, sensation, or both. A person with a less severe injury to the spinal cord has a greater chance of recovering function in the affected parts of the body than does a person with a more severe injury. If lost function returns, this usually occurs within 6 months of the injury.

The disability that results from a spinal cord injury also depends on the level of the spine where the injury occurred. Anatomists divide the spine into four regions: the cervical, thoracic, lumbar, and sacral regions (Fig. 9-1). The most common sites for spinal cord injury are the lower cervical area (C5, C6, and C7) and the area where the thoracic spine meets the lumbar spine (T12, L1). A person who has a spinal cord injury at level T1 and above will have tetraplegia (quadriplegia), which is paralysis of all four limbs. (Both *tetra-* and

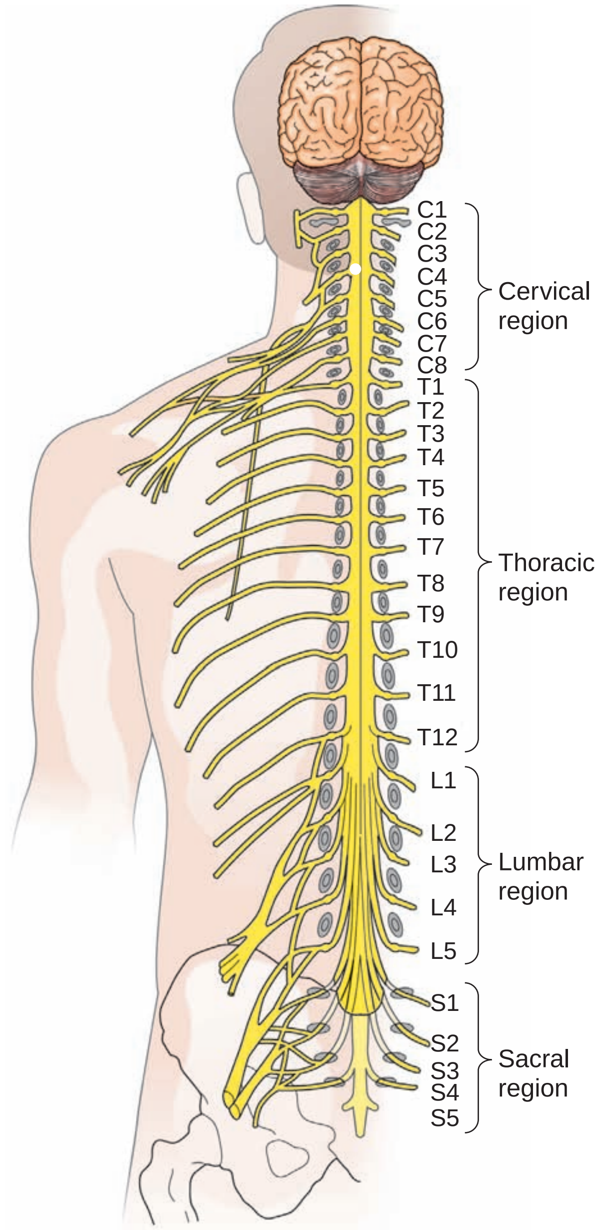


Figure 9-1
The regions of the spine. Spinal cord injuries that occur at level T1 or higher result in tetraplegia (quadriplegia). Spinal cord injuries that occur below level T1 result in paraplegia. Most spinal cord injuries occur in the C5–C7 area and in the T12–L1 area.

quad- mean "four.") The person may have very limited use of the neck and possibly the arms. In many cases, the muscles that assist with respiration are paralyzed, so the person needs a ventilator to breathe. A person who has tetraplegia needs much assistance with his ADLs. People with injuries below the level of T1 have paraplegia (paralysis of two limbs). With rehabilitation, a person with paraplegia may become independent in all areas of daily life.

Acute and Sub-acute Phases of Rehabilitation

The health care team's first priority when providing care for a person with a spinal cord injury is to make sure that the site of the injury is immobilized. If the vertebrae are fractured, additional movement of the fracture site can cause more damage to the spinal cord. The person may need emergency surgery to stabilize the fracture with pins, rods, or other devices. If the person has a cervical injury and is not stable enough for surgery, he will be placed in a rigid cervical collar initially and then in a cervical traction device (Fig. 9-2).

Measures are taken to prevent complications of immobility. If the person has a lower spinal cord injury, he may be placed on a special bed so alignment of the spine can be maintained when turning and repositioning.

The person may be on a ventilator. Because some spinal cord injuries affect the central nervous system's ability to control blood pressure and other vital functions, the person's vital signs are monitored constantly.

Chronic Phase of Rehabilitation

After the person's medical condition is stabilized, the rehabilitation program focuses on helping the person adjust physically and emotionally to the disability caused by the spinal cord injury. The person will be taught how to manage ADLs independently and how to prevent complications associated with spinal cord injury (such as those caused by immobility). The person may need to learn skills related to managing bowel and bladder function, such as self-catheterization with a straight catheter. The person will receive vocational therapy, if necessary, so that he can re-enter the workforce. The person may learn how to drive using special adaptive equipment.

TRAUMATIC BRAIN INJURY

Traumatic brain injury (TBI, head injury) is an injury that affects normal brain function. Common causes of TBI include a blow to the head, a penetrating wound (for example, from a bullet), and hypoxia (lack of oxygen, such as occurs with near drowning). TBI can be mild (for example, resulting

A. Cervical tongs

B. Halo vest

Figure 9-2
Cervical traction. **(A)** Cervical tongs. Pins are driven into the skull, and then weight is suspended from the pins. **(B)** Halo vest. A metal ring that is attached to the person's skull stabilizes the cervical spine. The halo vest allows the person to be mobile, which helps prevent complications of prolonged immobility.

in loss of consciousness for a short period of time) or severe (for example, resulting in permanent disability or even death).

TBI can take many different forms:

- A *concussion* is a temporary change in mental status caused by head trauma. The person may or may not lose consciousness. A concussion is a mild type of TBI.
- A *skull fracture* occurs when the bones of the skull break. Damage to the brain tissue can occur if pieces of the skull press into the soft brain tissue.
- A *cerebral contusion* is a bruise on the brain that occurs when the brain tissue hits the skull.
- A *hematoma* is a pool of blood (Fig. 9-3). An *epidural hematoma* occurs when blood collects between the skull and the dura mater (the layer of connective tissue that is attached to the skull). *Epi-* means "above," and *dural* means the dura mater. A *subdural hematoma* occurs when blood collects between the dura mater and the arachnoid mater (the layer of connective tissue underneath the dura mater). *Sub-* means "below," and *dural* means the dura mater.

Many of these injuries result in bleeding and swelling of the brain tissue, which causes an increase in the **intracranial pressure (ICP)**. The ICP is the pressure in the space between the skull and the brain. (*Intra-* means "within," and *cranial* means "the skull.") An increase in the ICP can crush the brain tissue, reduce blood flow to the brain tissue, or cause structures in the brain to shift position. If the ICP remains too high for too long, severe disability or death may result.

The type of disability a person experiences as a result of a TBI depends on the severity of the injury and on what part of the brain was injured. Physical disabilities, such as loss of coordination and balance, loss of the ability to form words (expressive aphasia), difficulty swallowing (**dysphagia**), or hemiplegia (paralysis on one side of the body), may occur. The person may also have cognitive disabilities, such as memory loss or loss of the ability to recognize words (receptive aphasia). Psychological or behavioral disabilities may affect the person's personality and moods. Disability as the result of TBI can be temporary, with the person regaining all lost function, or it may be permanent. Permanent disabilities vary in their nature and severity (Fig. 9-4).

The **Rancho Los Amigos Scale,** which was developed by the Rancho Los Amigos National Rehabilitation Center in California, describes the stages of recovery that a patient with a TBI may

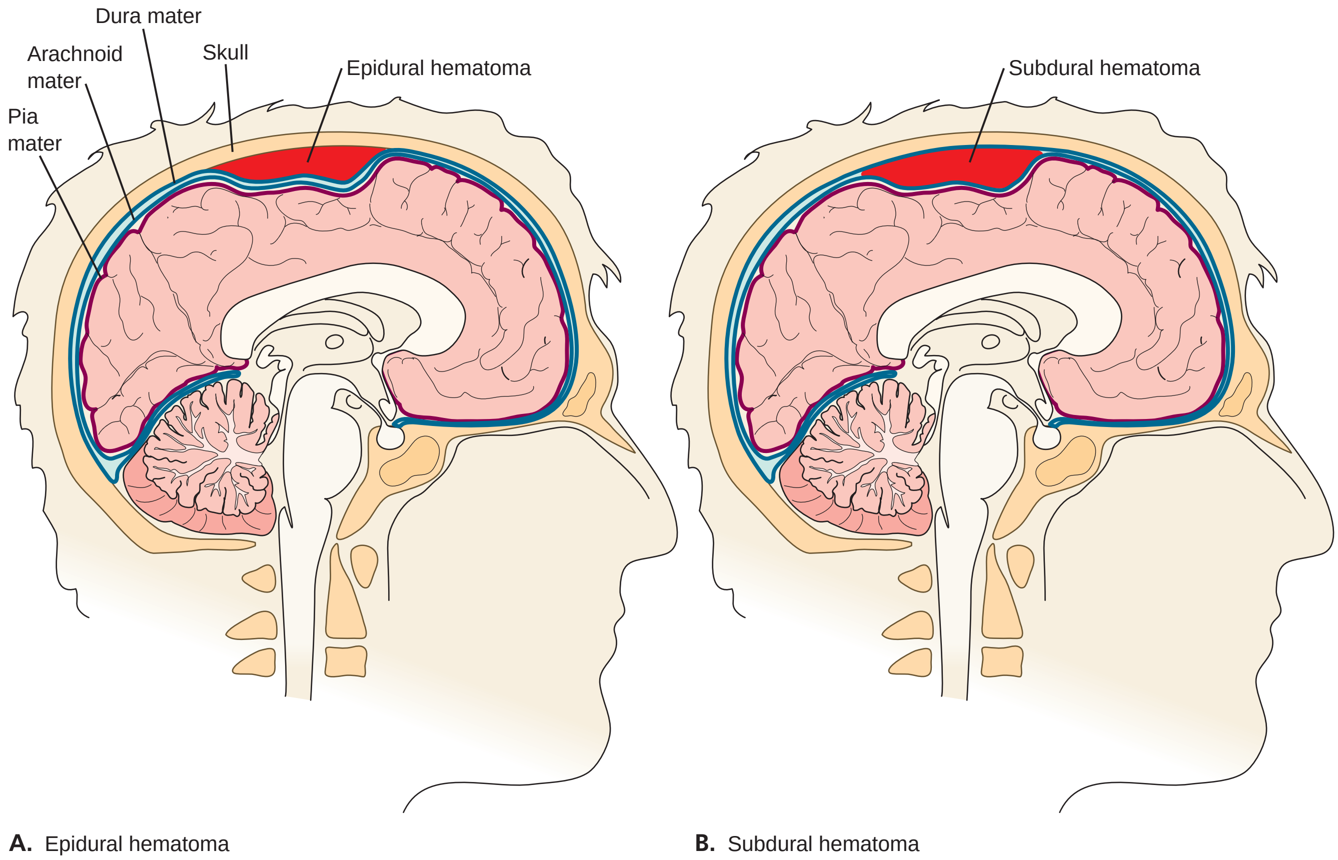


Figure 9-3
(A) An epidural hematoma occurs when blood collects between the dura mater and the skull. **(B)** A subdural hematoma occurs when blood collects between the dura mater and the arachnoid mater.

Figure 9-4
Permanent disabilities associated with traumatic brain injury (TBI) can vary in their severity. **(A)** This man has short-term memory loss as the result of a TBI that occurred 30 years ago. He writes things he needs to remember in a journal. **(B)** After a TBI as the result of a car accident, this man is unable to provide for his own care and needs constant supervision to stay safe. Here, his father helps to reposition him. (*Part A from AP Photo/East Valley Tribune, Tim Hacker; part B from AP Photo/The Daily Times, Brett Butterstein.*)

BOX 9-1 The Rancho Los Amigos Scale

Level I: No response. The person does not respond to sounds, sights, touch, or movement.

Level II: Generalized response. The person begins to respond to sounds, sight, touch, or movement, but the response may be slow, inconsistent, or delayed. Responses might include chewing, sweating, breathing faster, moaning, moving, or an increase in blood pressure.

Level III: Localized response. The person reacts more specifically to what he hears, sees, or feels (for example, by turning toward a sound or withdrawing from pain). The person may be able to respond to simple directions (for example, "Look at me") and may be able to respond to simple yes-or-no questions by nodding or shaking the head. The person may begin to recognize family and friends. The person may be awake on and off throughout the day.

Level IV: Confused and agitated. The person is confused and frightened because he cannot understand what is happening to him. He may strike caregivers, scream, or use abusive language. The person is not able to pay attention or concentrate for more than a few seconds, and he may have trouble following directions. With help, he may be able to perform some ADLs, such as feeding or dressing himself.

Level V: Confused and inappropriate. The person might not know what day it is, where she is, or why she is in the hospital. Her memory is poor, and she may not be able to start or complete ADLs without step-by-step instructions. The person is easily distracted.

Level VI: Confused and appropriate. The person is still confused but can now pay attention for about 30 minutes and can follow simple directions consistently. The person requires less help with ADLs.

Level VII: Automatic and appropriate. The person is able to follow a schedule and do routine ADLs without help if he is physically able. The person may still have difficulty making judgments and solving problems.

Level VIII: Purposeful and appropriate. The person is largely able to function without help.

go through (Box 9-1). Some people with a TBI go through all eight stages. Others only progress to a certain level. Each person will progress at her own rate. The rehabilitation team uses the Rancho Los Amigos Scale to identify the person's level of recovery so rehabilitation efforts can be targeted to the person's current abilities. In addition, the scale can be used to help caregivers and family members understand how the person is progressing.

Acute and Sub-acute Phases of Rehabilitation

Initially, the health care team focuses on providing respiratory support and preventing an increase in ICP. Surgery may be necessary to remove pieces of broken bone or foreign objects or to remove blood that has collected from an epidural or subdural hematoma.

The person may have an altered level of consciousness (LOC) (Fig. 9-5). You may be asked to assist the nurse in monitoring the person's LOC at frequent intervals during the acute and sub-acute phases of recovery. The **Glasgow Coma Scale (GCS)** is a tool that health care workers commonly use to evaluate a person's LOC (Box 9-2). To use the GCS, you assign the person a score in each of three different categories (best eye-opening response, best motor response, and best verbal response) and then total the scores. A person with a normal LOC would score a total of 15 points on the GCS. A person with a score of less than 7 points is considered comatose. A nurse will show you exactly how to evaluate a person using the GCS and how to record your findings.

Figure 9-5
The nurse squeezes the hand of a comatose patient to check for a response. (*AP Photo/Kitsap SUN, James Branaman.*)

TELL THE NURSE !

The status of a person with a TBI can change very quickly. The person can be alert, oriented, and talking to you one minute and be in a coma the next. If you observe a change in the person's condition, you should report this change to the nurse immediately, no matter how minor the change seems to be. Observations that should be reported to the nurse right away include:

- There has been a change in the person's LOC.
- The person complains of headache or increased head pain.
- The person complains of dizziness.
- The person is restless or agitated.
- There are changes in the person's respirations.
- The person's pupils are unequal in size.
- The person complains of sudden weakness or loss of feeling in any body part.
- The person's speech is slurred.
- There is drainage from the person's ears or nose.

BOX 9-2 Glasgow Coma Scale

Best Eye-Opening Response	Score
Spontaneous	4
To the sound of your voice	3
To pain	2
No response	1

Best Motor Response	Score
Obeys command	6
Responds to pain by reaching toward it (localizes stimuli)	5
Withdraws from pain (withdrawal from stimulus)	4
Shows decorticate posturing (flexes arms across chest) in response to pain	3
Shows decerebrate posturing (extends arms to sides) in response to pain	2
No response	1

Best Verbal Response	Score
Oriented	5
Confused conversation	4
Inappropriate words	3
Garbled sounds	2
No response	1

A total score of 3 to 8 suggests severe impairment, 9 to 12 suggests moderate impairment, and 13 to 15 suggests mild impairment.

Chronic Phase of Rehabilitation

People with head injuries often need long-term rehabilitation to regain their former abilities or to maximize their function after the injury. The focus is often on helping the person and family adjust to cognitive losses (such as memory problems, problems with judgment and decision-making skills, and personality changes), as well as helping the person re-learn skills needed for self-care and safety. The person may have problems speaking or understanding words that will need to be addressed as part of the rehabilitation program. The person may need vocational rehabilitation to re-learn job skills or to train for another type of job.

STROKE (CEREBROVASCULAR ACCIDENT)

A stroke, or **cerebrovascular accident (CVA),** occurs when part of the brain is deprived of blood flow, causing the tissue to die. A stroke can be either ischemic or hemorrhagic:

- An *ischemic stroke* occurs when an artery in the brain becomes partially or completely blocked, preventing blood flow to the brain tissue supplied by the artery. As a result, the tissue dies from lack of oxygen. Usually, the block is caused by a blood clot. Administration of a clot-dissolving medication can restore the blood supply to the affected area of the brain and prevent or lessen the extent of permanent tissue damage, but the person must receive the medication within a few hours of the first signs or symptoms of the stroke.
- A *hemorrhagic stroke* occurs when an artery in the brain bursts. The bleeding into the surrounding tissue puts pressure on the delicate tissue, damaging it.

As with TBI, the disability that results from a stroke depends on the severity of the injury and the part of the brain that is injured. Common disabilities resulting from a stroke include hemiplegia, aphasia, and dysphagia.

Acute and Sub-acute Phases of Rehabilitation

Immediately after a stroke, the person may be unconscious. The person's LOC may range from a confused state to a deep coma. You may be asked to help monitor the person's LOC with the GCS or the Rancho Los Amigos Scale.

Respiratory support, oxygen, medications to support the heart rate and blood pressure, and continuous monitoring of vital signs may be necessary. If the person is receiving clot-dissolving medications, he will be more likely to bruise and bleed easily (for example, from a venipuncture site or an ulcer). You will need to observe the person for signs of internal bleeding, such as tar-like black stool (a sign of bleeding in the upper digestive tract) or red blood in the stool. The person's airway may need to be suctioned frequently if he is not swallowing properly, and you will have to observe him for aspiration of food, fluids, and oral secretions. Signs of aspiration, such as coughing or choking, noisy breathing, or cyanosis of the lips, should be reported to a nurse immediately.

TELL THE NURSE !

It is common for a person who is recovering from a stroke to experience a second, more severe stroke. Be very observant for any signs that the person's condition is changing. Be sure to report the following observations to the nurse immediately:

- There is a change in the person's LOC.
- There is a change in the person's vital signs, especially the blood pressure or pulse.
- The person shows signs or symptoms of a stroke that were not present before (for example, drooling; drooping of the eyelid; slurred speech; or paralysis, tingling, or numbness of an arm, a leg, or one side of the face).
- The person complains of the sudden onset of a severe headache.

Chronic Phase of Rehabilitation

After the person's medical condition stabilizes, the person may be transferred to a rehabilitation facility that specializes in the care of patients who have had a stroke, or rehabilitation may continue in a long-term care facility or in the person's home. Many of the areas covered in a rehabilitation program for a person who has had a stroke are similar to those covered in a rehabilitation program for a person who has had a TBI (for example, self-care skills, mobility skills, cognitive skills, speaking, and swallowing).

CARDIOVASCULAR DISORDERS

Although many different cardiovascular disorders can make cardiac rehabilitation necessary, coronary artery disease and myocardial infarction are the most common reasons people enter a cardiac rehabilitation program. Coronary artery disease occurs when the coronary arteries narrow as a result of atherosclerosis, reducing blood flow to the heart muscle. As a result, the person might experience angina (chest pain) or myocardial infarction. Myocardial infarction occurs when one or more of the coronary arteries becomes completely blocked, preventing blood from reaching the parts of the heart that are fed by the affected arteries. Those parts of the heart muscle die from a lack of oxygen. The larger the area of heart muscle affected, the less effectively the heart can pump.

Acute and Sub-acute Phases of Rehabilitation

Many people seek health care after experiencing chest pain. Chest pain can be a result of coronary artery disease or myocardial infarction.

Coronary artery disease

Angiography is a type of radiographic study that uses dye to look at blood-filled structures, such as blood vessels or the chambers of the heart. (*Angio-* means "vessel.") Angiography may be used to determine if one or more coronary arteries are blocked. When angiography is used to look at the coronary arteries, you might also hear it called "cardiac catheterization." This is because angiography is done by placing a catheter into the person's femoral artery (in the groin) and threading the catheter up through the descending aorta and into the left coronary artery. A special dye is injected through the catheter, and then an x-ray is taken. The dye makes the vessels visible on the x-ray, which is called an **angiogram** (Fig. 9-6).

If the chest pain is only an early warning of blockage in a coronary artery, myocardial infarction may be avoided if normal blood flow is restored. If the artery is very blocked, surgery to bypass the blocked arteries may be performed. For less severe blockages, **balloon angioplasty** may be performed (Fig. 9-7A). In balloon angioplasty, a catheter with a small balloon on the tip is inserted into the narrow part of the artery. The balloon is inflated, pressing the plaque against the arterial wall. Then the balloon is deflated, and the catheter is removed. Sometimes balloon angioplasty is done along with placement of a small coiled wire called a **stent** (Fig. 9-7B). The stent supports the artery walls, helping to keep the artery open. Balloon angioplasty, stent placement, or both are often performed at the same time that the angiogram is done.

After cardiac catheterization, a blood clot forms at the site where the catheter was inserted into the femoral artery. The patient must remain still and quiet for several hours after these procedures so the clot stays in place. Many patients are required to stay in bed with the head of the bed raised slightly. Having to lie still for such a long time can be uncomfortable for the patient. Use comfort measures such as plumping the pillows, smoothing the sheets, and offering distraction in the form of soft music or television as needed. Also, be sure to report observations of pain or discomfort to the nurse.

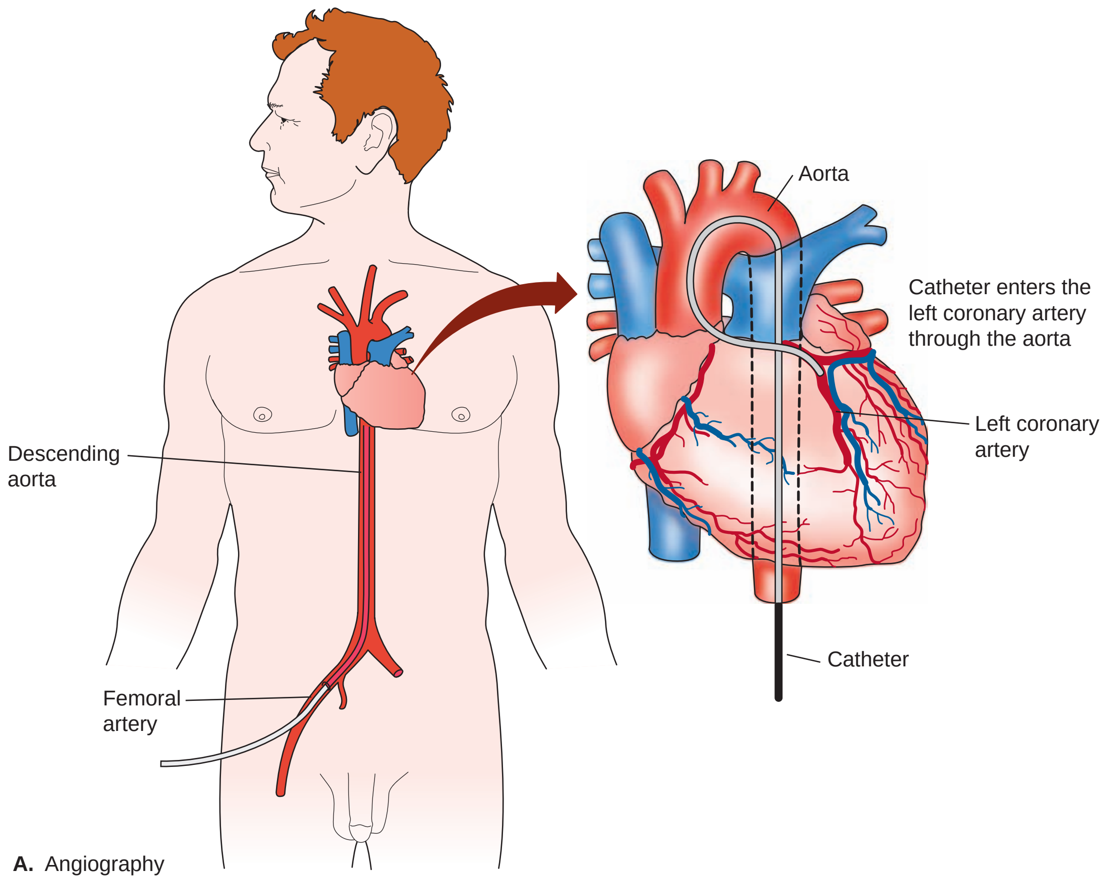
Make sure that you are familiar with any restrictions your patient may have. You will need to assist the person with using a urinal or bedpan. Make sure the person does not strain when being placed on the bedpan or while voiding or defecating. The person may also need assistance with eating if the head of the bed is not elevated enough to make this process easy. You will need to monitor the person's vital signs frequently, according to the person's care plan.

If the blood clot does not stay in place, the person is in danger of severe hemorrhage. If you note bleeding when you check the person's dressing, call a nurse immediately. You may be asked to put on gloves and apply direct pressure over the puncture site for an extended period of time, up to 20 minutes. A sandbag or other pressure device may be placed over the site on top of the dressing to maintain pressure for an additional period of time, just to be certain that the clot will stay in place and the patient will not begin to bleed again. Make sure you reassure the person. The extra pressure on the puncture site can be very uncomfortable, and the person may be concerned about starting to bleed again.

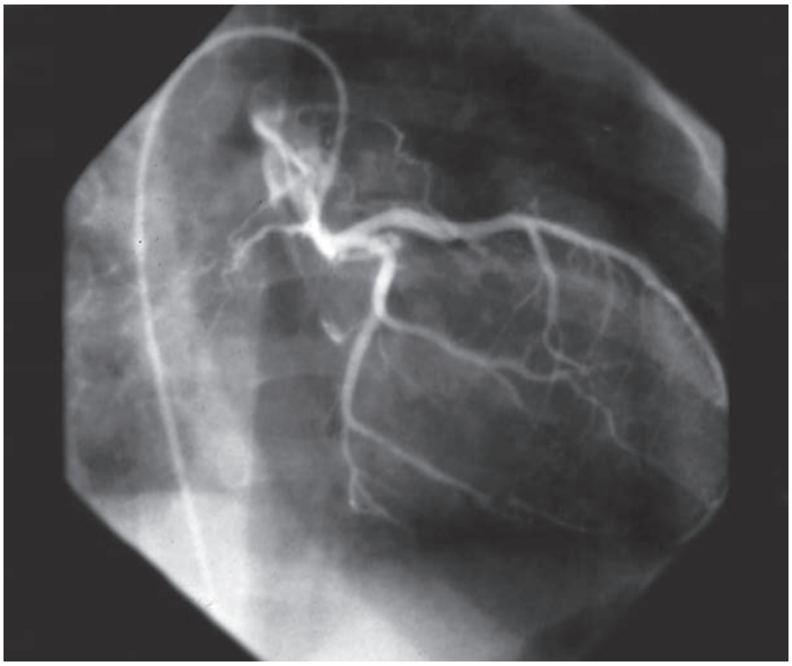
If the clot that forms is too large, it can break loose and become lodged in one of the smaller arteries of the lower leg, blocking blood flow. You will need to observe the patient's leg below the level of the puncture site to make sure there is good blood flow to the area. The leg should be warm, and you should be able to feel the pulse on top of the foot and on the inside of the ankle. If you note that the leg is cold, blue, or gray; the pulses are very weak or cannot be felt; or the person complains of pain, numbness, or tingling, notify a nurse immediately. These could be signs that the clot has broken loose and is lodged in one of the smaller arteries of the lower leg. Depending on the severity of the obstruction, the person may need emergency surgery to remove the clot and restore circulation.

Myocardial infarction

If coronary artery disease is not detected and treated, the person is at risk for myocardial infarction. A person having a myocardial infarction is experiencing a medical emergency. Early



A. Angiography



B. Angiogram

Figure 9-6

In angiography, a catheter is inserted in the femoral artery and then passed through the descending aorta and into the left coronary artery of the heart. Dye is injected through the catheter to make the blood vessels of the heart visible on x-ray. The x-ray, called an angiogram, allows the doctor to identify arteries that are blocked. (*Angiogram from Dean D PhD and Herbener TE MD.* Cross-Sectional Human Anatomy. *Baltimore: Lippincott Williams & Wilkins, 2000.*)

recognition of the symptoms of myocardial infarction and early treatment can greatly increase a person's chances of surviving. The onset of a myocardial infarction may be very sudden and very painful, or the onset may be more gradual.

The person may or may not experience cardiac arrest. If cardiac arrest occurs, defibrillation, emergency medications, cardiopulmonary resuscitation (CPR), and rescue breathing must be used to restore the heart's normal rhythm. After the person has been stabilized, he may receive many different medications intravenously to dissolve clots, relieve chest pain, and regulate the heart beat. Because the pain medications can affect respiration, frequent monitoring of the person's blood oxygen level using pulse oximetry is necessary. Often, the person will undergo balloon angioplasty, stent placement, or both within 24 hours. Some patients require surgery.

During recovery from a myocardial infarction, the person will feel weak. Complete bed rest is ordered to help the heart rest and recover from injury. The person will need assistance with all of her ADLs until she is able to regain strength. The person usually requires continuous cardiac monitoring using electrocardiography.

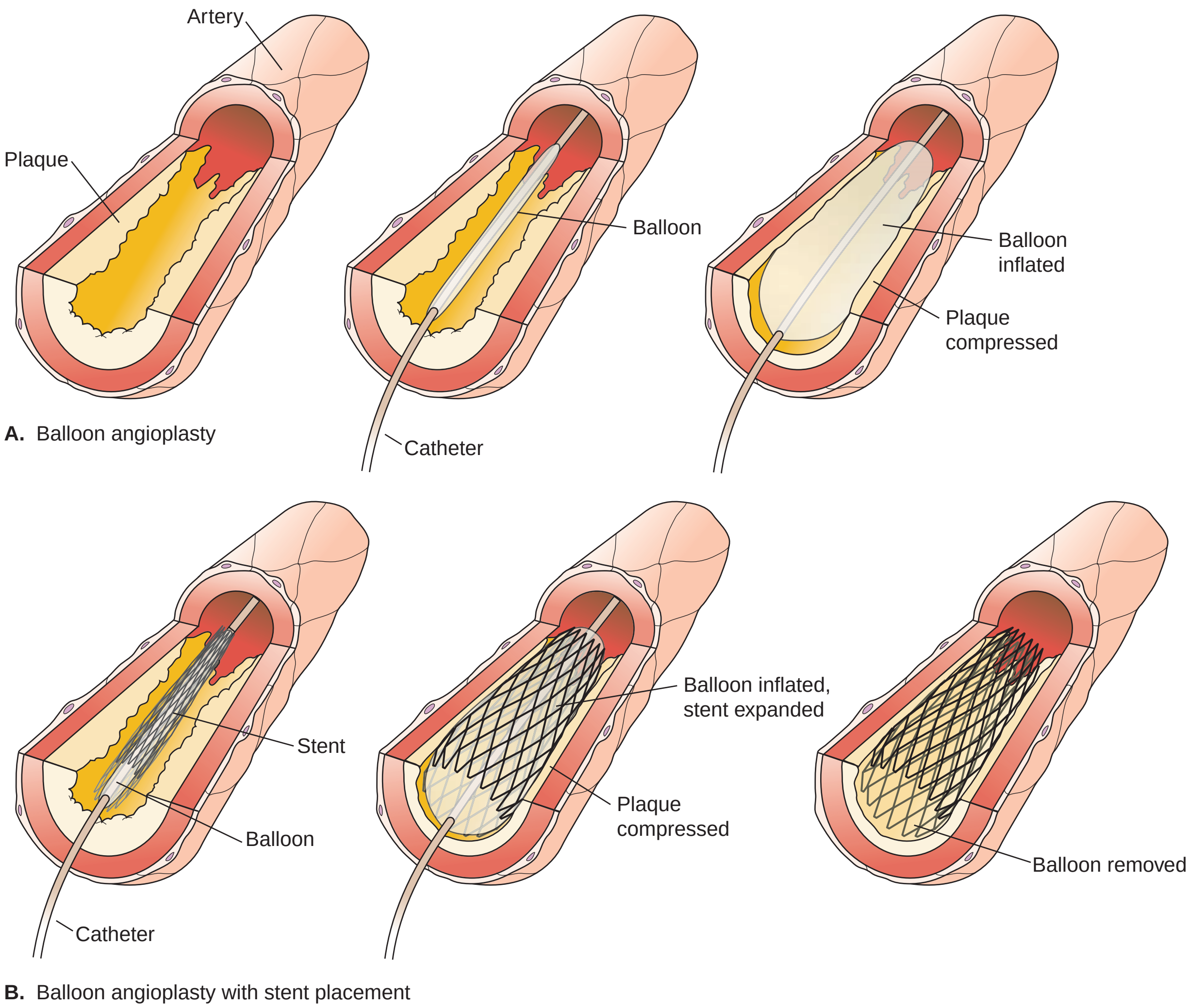


Figure 9-7
(A) In balloon angioplasty, a catheter with a balloon on the tip is passed into the narrowed part of the artery. The balloon is expanded, pushing the plaque to the sides of the arterial wall and widening the artery. **(B)** Sometimes balloon angioplasty is done along with stent placement. The stent, a small wire cage, provides additional support to keep the artery open.

TELL THE NURSE !

When caring for a person who is recovering from a myocardial infarction, be alert to signs and symptoms of another myocardial infarction. Report the following observations to a nurse immediately:

- The person complains of chest pain, "crushing," or "squeezing."
- The person complains of pain that travels down either arm or up the neck into the jaw.
- The person is very sweaty, the skin is cool and clammy, or the person's face appears pale or gray.
- The person is having difficulty breathing.
- The person has nausea, vomiting, or hiccups.
- The person faints or complains of feeling very weak or tired.
- The person is disorientated, confused, or restless.
- There are changes in the person's vital signs (either an increase or a decrease).
- There are changes in the appearance of the person's electrocardiogram on the monitor.

Chronic Phase of Rehabilitation

Cardiac rehabilitation is continued either on an outpatient basis or in a sub-acute care or long-term care setting. The goals of cardiac rehabilitation are to help the person regain strength and adopt habits that will help the cardiovascular system become healthier. As part of a cardiac rehabilitation program, the person begins a closely supervised exercise program designed to strengthen the heart muscle and make it a more effective pump. As the person grows stronger, the rehabilitation team works with the person to develop an exercise plan that will become part of the person's daily routine. The rehabilitation team also works with the person to make other lifestyle changes that are important for cardiovascular health. For example, the person might need help to stop smoking or might need to be educated about how to select and prepare "heart-healthy" foods. The person will learn about medications that must be taken regularly and about the importance of keeping chronic disorders that can affect cardiovascular health, such as diabetes, under control.

MUSCULOSKELETAL DISORDERS

Musculoskeletal rehabilitation may be required for many different musculoskeletal disorders and injuries. Two of the most common reasons a person may require musculoskeletal rehabilitation are a hip fracture and amputation.

Hip Fracture

You learned about the different types of fractures and common ways that they are treated in your basic training. Recovering from any type of fracture requires a certain amount of rehabilitation. However, hip fractures may be the most challenging from a rehabilitation standpoint.

A hip fracture is a fracture that occurs at the top of the femur (thigh bone) (Fig. 9-8). The two factors that put a person at high risk for a hip fracture are a tendency to fall and fragile bones (as a result of the normal aging process or a disease process, such as osteoporosis). For these reasons, hip fractures are common in elderly people, especially elderly women.

Many hip fractures, especially in people older than 75 years, result in the person's death. A person with a hip fracture is at risk for developing complications of immobility, such as pneumonia and blood clots. Many people with hip fractures also have one or more chronic medical conditions. The combination of these factors can make recovery from a hip fracture difficult.

Acute and sub-acute phases of rehabilitation

During the acute phase of rehabilitation, the health care team focuses on stabilizing the person. Bleeding into the tissues around the fracture site can be severe and can cause the person to go into shock. Many elderly patients have additional medical conditions that may cause complications. Pain and the medications that are given to help control the pain can cause delirium. As a result, the person may become agitated and combative. You will need to monitor the person's vital signs closely and report any changes in the person's behavior to a nurse immediately.

After the person's medical condition is stabilized, the person may have surgery to repair the fracture. Some patients may be scheduled for surgery within a few hours of the fracture. Others take longer to stabilize. When caring for a person with a hip fracture that has not yet been repaired,

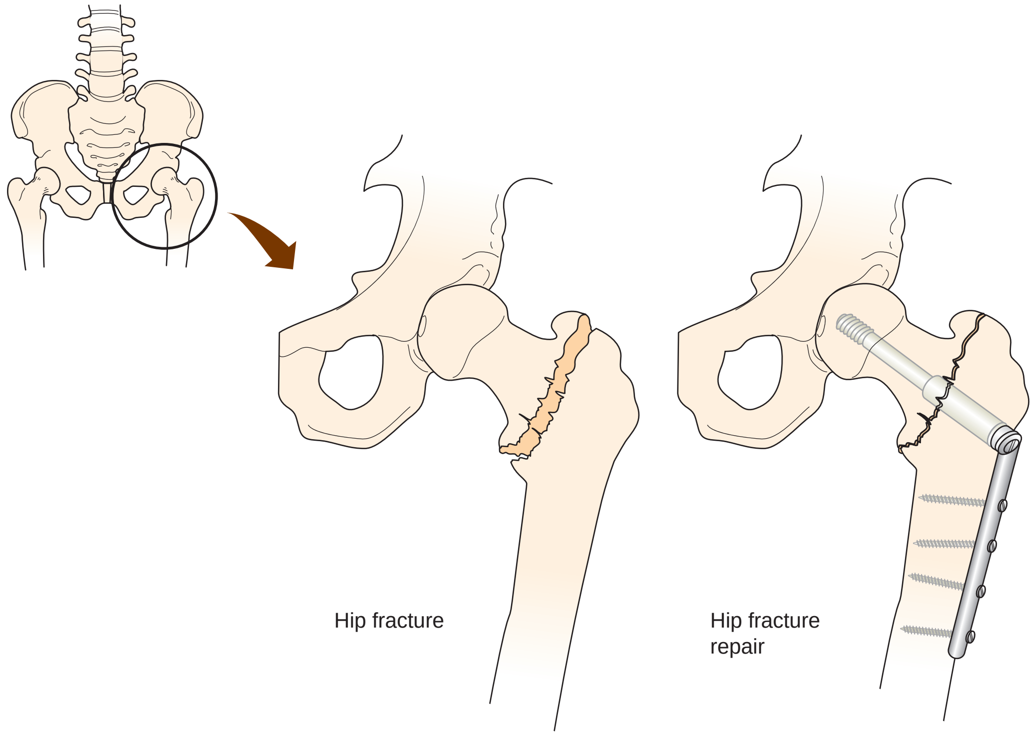


Figure 9-8
A hip fracture is a fracture that occurs at the top of the femur (the thigh bone). The fracture is often repaired using plates, pins, and screws.

take care to prevent movement of the fractured hip. Actions that would not ordinarily cause a person harm, such as accidentally bumping the person's bed, can cause a person with an unrepaired hip fracture a great deal of pain.

Most hip fractures are surgically reduced and stabilized with the use of plates, screws, or pins (see Fig. 9-8). Some patients may also require joint replacement with an artificial (prosthetic) joint. After surgery, the patient will need routine post-operative care and monitoring (see Chapter 10). Complications you will need to monitor for include the following.

- **Hemorrhage.** Many patients will have a Hemovac drain after surgery. You will need to monitor wound drainage closely.
- **Poor circulation, sensation, or both in the legs.** Blood that collects in the tissues around the fracture and tissue swelling can compress nerves, blood vessels, or both. You will have to monitor the person's lower legs and feet for signs of poor circulation or sensation.
- **Blood clots (thrombi).** The most common complication after a hip fracture is **deep venous thrombosis (DVT)**. In DVT, a blood clot (thrombus) forms in one of the large veins of the lower leg. Clot formation in the lower leg puts the person at risk for serious complications, such as stroke (if the clot breaks off and travels to an artery in the brain) or pulmonary embolism (if the clot breaks off and travels to the pulmonary artery, the vessel that supplies the lungs with blood on its way to pick up oxygen). The doctor may order the use of a sequential compression device (SCD) (a device that is applied to the calves to help prevent pooling of blood in the lower legs), anti-embolism (TED) stockings, or both to prevent DVT. Foot flexion exercises every 1 to 2 hours can also help prevent DVT. Signs of DVT that should be reported to a nurse immediately include calf tenderness (in one leg), warmth, redness, and swelling.

Pain control is also important during the subacute phases of rehabilitation. You can assist with pain control by making sure the person is positioned comfortably and by observing the person closely for signs or symptoms of pain. Report any complaints or observations of pain to a nurse promptly so medication can be administered as needed. Pain, pain medication, and unfamiliar surroundings can cause the person to become confused. This is especially common in elderly patients. Check on your patient frequently, make sure that the side rails are up (to help prevent falls), and ensure that the call light control is always within reach.

Many patients are assisted out of bed to a chair and begin to walk with assistance on the first day after surgery. Many patients are allowed to bear their full weight on the leg. Others may only be allowed to bear partial weight. The amount of weight the person is allowed to bear on the affected leg depends on the type of surgical repair performed, the doctor's preference, and the patient's overall condition. A physical therapist will teach the person how to use any assistive devices that are necessary (for example, a walker or a cane). Make sure that you follow the doctor's orders and the physical therapist's instructions as you assist the patient with transfers and ambulation.

After the person regains strength and is steady on her feet, she can be discharged from the hospital. Some patients are able to go home and receive assistance from family members or home health care workers as they continue to recover. Others may need to spend a few weeks in a subacute nursing unit or a long-term care facility so they can receive more rehabilitation before returning home.

Chronic phase of rehabilitation

Chronic rehabilitation after a hip fracture focuses on continuing to help the person to build muscle strength and preventing future falls. Strong arm muscles make it easier to use assistive devices, such as walkers. Strong leg muscles help prepare the person for walking without the use of an assistive device and promote stability and balance. Balance exercises and gait training help the person re-learn how to walk safely and reduce the risk of falling again.

Amputation

Amputation is the removal of a body part, usually all or part of an arm or leg. Amputation may be necessary as a result of trauma or disease (for example, bone cancer or diabetes). Diabetes-related foot problems are very common and account for many amputations in the United States.

Acute and sub-acute phases of rehabilitation

After an amputation, the person is at risk for hemorrhage if a suture on a major blood vessel becomes loose. Make sure you observe the wound dressing and drainage devices for signs of increased bleeding. Patients who have had an amputation as the result of a traumatic injury are also at increased risk for infection. Signs of infection that should be reported to the nurse immediately include increased temperature; increased pain at the wound site; and foul-smelling, purulent wound drainage.

For a prosthetic device (prosthesis) to be fitted, the stump (the end of the amputated limb that is left after surgery) must be cared for properly. Positioning is used to keep the muscles and tendons from shortening, and nearby joints are put through range-of-motion exercises to help maintain normal joint function and mobility. Wrapping the end of the stump with elastic bandages helps to shrink and shape the stump properly.

Chronic phase of rehabilitation

The chronic phase of rehabilitation after an amputation focuses on ensuring that the stump continues to heal properly, helping the person adjust physically and emotionally to the loss of the body part, and (if necessary) teaching the person how to avoid another amputation in the future. The person may also need vocational rehabilitation to train for a different career.

The rehabilitation team continues to take measures to ensure that the stump heals properly and the muscles and joints remain strong and flexible. The stump is wrapped with compression bandages (such as Ace bandages), or the person is fitted with a compression garment, sometimes called a "stump shrinker." The rehabilitation team works with the person to begin an exercise program that will strengthen the muscles and maintain the flexibility of the joints above the site of the amputation.

The use of assistive devices, a prosthetic device, or both allows many people who have had an amputation to regain mobility and function. If the person will be using a prosthetic device, he will be fitted for it after the stump has healed. The rehabilitation team teaches the person how to put on the prosthetic device, care for it, and use it (Fig. 9-9). The person will also learn how to

Figure 9-9
During the chronic phase of rehabilitation, a person who has had an amputation may learn how to use a prosthetic device.

transfer without wearing the prosthetic device, if necessary. Exercises to strengthen the muscles and build stamina help to reduce pain and weakness. When caring for a person who is receiving rehabilitation after an amputation, allow the person plenty of time to accomplish tasks such as transfers and self-care. You will also need to make sure that the person has rest periods so he does not become overly fatigued.

The person may need emotional support to help cope with the change in body image, especially if the amputation was the result of a traumatic injury. The person may be angry or bitter. Allow the person to express his frustration without taking it personally. Make sure you report changes in the person's behavior to the nurse, especially if the person seems depressed or withdrawn.

A person who has had an amputation because of a complication from a chronic disease (such as diabetes) will be taught how to prevent the same complication from happening again. This helps to decrease the likelihood that the person will require another amputation in the future.

BURNS

Patients with severe burn injuries require lengthy and intense rehabilitation. The severity of the burn injury is determined by the burn's depth (Fig. 9-10) and the amount of surface area involved (Fig. 9-11). For example, you may see a patient's injuries described as "deep partial-thickness (second-degree) burns over 40% of the body." Other factors that contribute to the severity of a burn injury include the patient's age, the location of the burn, the presence of other medical conditions, and the presence of other injuries (such as smoke inhalation injuries).

Acute and Sub-acute Phases of Rehabilitation

Immediately after being burned, the person may be in extremely critical condition. If the person inhaled hot air and smoke, the lining of the airway may swell, making it difficult to breathe. As a result, many patients with burns require intubation and ventilatory support during the acute phase of rehabilitation.

Fluid balance is another issue early in the rehabilitation phase for patients with burn injuries. Fluid may be lost through the burnt tissue. The kidneys may not function as well as they should because of the shock associated with the injury. For these reasons, the person's fluid intake and output must be monitored frequently and accurately. Many patients with burn injuries will have indwelling urinary catheters to allow more accurate monitoring of urine output.

The nurse or doctor will cleanse the burned areas and apply dressings. Patients with burn injuries are at high risk for infection because the skin is destroyed by the burn injury. Many types of burns weep (leak tissue fluid), creating a moist environment that promotes the growth of bacteria. The patient may be placed in reverse (protective) isolation to help prevent infection. Bed linens and other equipment used for the patient's care may need to be sterilized. Caregivers need to wear masks, head coverings, sterile gowns, and sterile gloves. The patient may only be permitted to receive short visits from a few people (for example, immediate family members). The visitors should also wear protective clothing to limit the patient's exposure to microbes.

Range-of-motion exercises are begun as soon as possible during the acute phase of rehabilitation

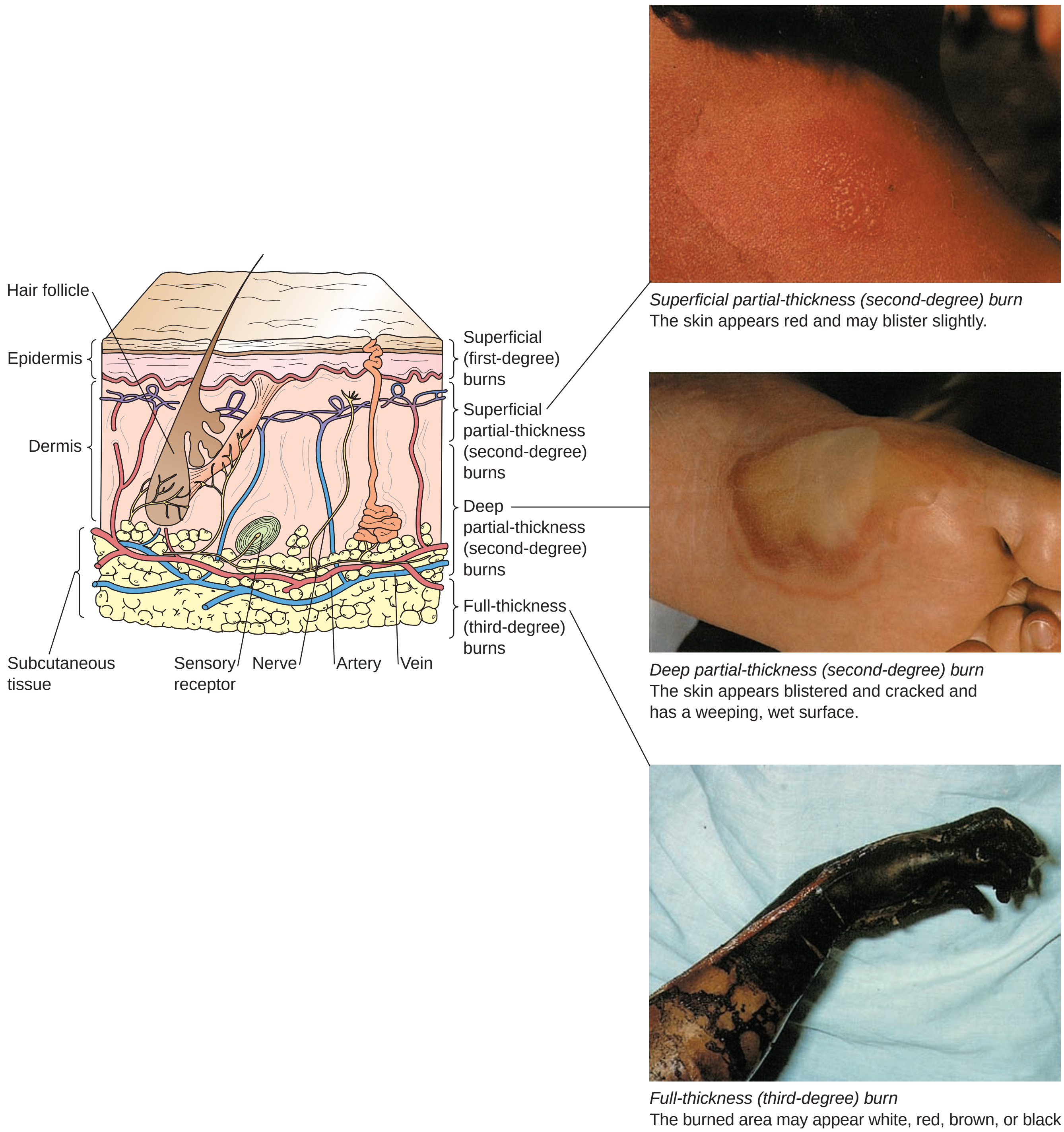
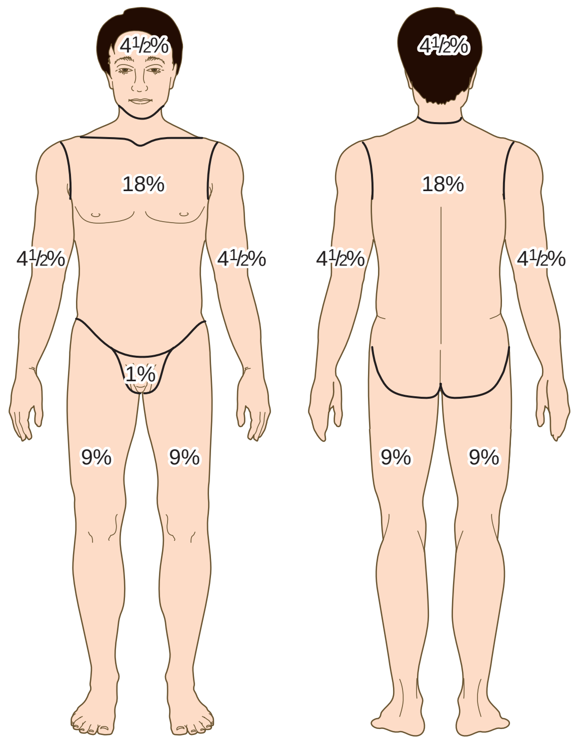


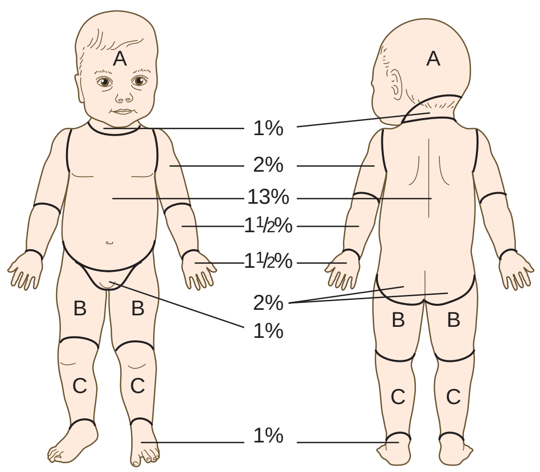
Figure 9-10
Burns are classified as superficial, superficial partial thickness, deep partial thickness, or full thickness depending on how many layers of tissue are involved.

to help prevent contractures. In the beginning, the health care team might have to move the person's joints through the exercises (passive range of motion). As the patient's condition improves, she may be able to participate in active-assistive or active range-of-motion exercises.

Pain from deep partial-thickness burns can be intense, requiring the use of narcotic pain medications. Remember that these medications can also depress the person's respiratory effort, so the person's respirations and blood oxygen levels need to be monitored constantly.



A. Rule of nines method



Area	Percent of Burn				
	0–1 year	1–4 years	5–9 years	10–15 years	Adult
Head (A)	19	17	13	10	7
Right thigh (B)	5½	6½	8½	8½	9½
Left thigh (B)	5½	6½	8½	8½	9½
Right leg (C)	5	5	5½	6	7
Left leg (C)	5	5	5½	6	7

B. Lund and Browder method

Figure 9-11
Several methods can be used to determine what percentage of the patient's body has been burned. **(A)** The rule of nines method divides the body into sections that each represent about 9% of the total body surface area. The chest/abdomen and the back each equal 18% of the total body surface area (or 9% multiplied by 2). The front and back of the head and the front and back of the arms each equal 4.5% of the total body surface area (or 9% divided by 2.) **(B)** The Lund and Browder method is often used with children because it takes into account that the amount of surface area represented by the head and legs changes as we grow older.

Chronic Phase of Rehabilitation

The chronic phase of burn rehabilitation can last for years. Multiple surgical procedures may be necessary to graft new skin onto the burned tissue. Often, the patient will undergo surgical débridement, mechanical débridement, or both (see Chapter 3) several times to remove dead tissue and allow healing to continue. These procedures are painful and frightening for the patient.

Depending on the extent of the burn and what areas of the body are affected, contractures may develop as a result of damage to the tendons and muscles. Proper body alignment and the use of splints and other supportive devices can help prevent contractures. Sometimes surgery is necessary to free tendons that tightened during the healing process. Special compression garments and skin coverings may be used to promote healing of grafted skin. Careful and thorough skin care is essential.

A burn injury can cause extreme changes in a person's appearance. Burns to the face can result in the loss of parts of the nose, ears, eyelids, lips, and hair. Although skin grafts restore function, they often differ significantly in appearance from the surrounding skin. The emotional impact of a burn injury is tremendous! Depression, anger, and frustration can affect the person's will to live and may cause the person to refuse to cooperate in the rehabilitation effort. Emotional counseling and the use of antidepressant medications may be necessary parts of the rehabilitation process.

GERIATRIC REHABILITATION

As we grow older, we tend to become more **frail** (physically weak and fragile). We also have a greater chance of developing one or more chronic illnesses and of experiencing an acute illness or injury. Many elderly people undergo rehabilitation after an acute illness or injury. Some may begin a rehabilitation program when a combination of factors, such as normal age-related changes and a chronic medical condition, begin to affect the person's ability to perform ADLs and stay safe.

Similar to all rehabilitation programs, geriatric rehabilitation programs focus on helping the person regain or maintain function and independence. Many elderly people entering rehabilitation programs were independent before rehabilitation and return to being independent after rehabilitation. Others enter rehabilitation with a certain degree of disability that is not expected to be resolved by rehabilitation. When this is the case, the rehabilitation effort focuses on helping the person regain strength and prevent the loss of additional function.

SUMMARY

- The goal of rehabilitation is to restore or maintain a person's physical, emotional, and social function. The ability to function is essential for maintaining or regaining independence and for ensuring the best quality of life.
- Nursing assistants working in advanced care settings are likely to care for patients requiring rehabilitation. Rehabilitation begins in the hospital as soon as the person's medical condition is stabilized and may continue for weeks or months afterward in a variety of different health care settings.
- The rehabilitation process takes place in three phases.
  - During the acute phase, the health care team focuses on keeping the person alive.
  - During the sub-acute phase, the health care team focuses on stabilizing the person's condition and preventing complications of immobility so the person's best rehabilitation potential is maintained.
  - During the chronic phase the health care team focuses on helping the person regain lost function.
- Many factors can affect the success of the rehabilitation process, including the person's attitude, the attitude of the person's family members and caregivers, the person's overall health status, and the person's age.
- A holistic, humanistic approach to rehabilitation should be taken.
- Common situations that result in the need for rehabilitation include spinal cord injuries, traumatic brain injuries (TBIs), stroke, cardiovascular disorders, musculoskeletal disorders, and burn injuries.
  - Spinal cord injuries can result in a partial or total loss of function, sensation, or both below the level of the injury. With rehabilitation, many people with spinal cord injuries become independent in all areas of daily life.
  - TBIs often cause severe disabilities that require long-term rehabilitation. The TBI may be mild and cause minimal disability, or it may be so severe that the person is unable to provide for her own care or remain safe.

- A stroke may be mild, resulting in very little disability, or it may be severe and very disabling. Prevention of future strokes and intensive rehabilitation to reduce the amount of disability are the primary focuses of care.
- Many people with cardiovascular disease benefit greatly from cardiac rehabilitation, especially if rehabilitation is started early. The goals of cardiac rehabilitation are to help the person regain strength and adopt habits that will help the cardiovascular system become healthier.
- Rehabilitation for musculoskeletal disorders or injuries, such as hip fractures and amputation, often focuses on restoring mobility, flexibility, and balance.
- Patients with burn injuries may require years of rehabilitation.

- Many elderly people enter rehabilitation programs when a combination of factors, such as normal age-related changes and a chronic medical condition, begin to affect the person's ability to perform ADLs and remain safe. Other elderly people enter a rehabilitation program after an acute injury or illness.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Someone who is *frail* is:
   a. Deformed
   b. Old
   c. Feeble or weak
   d. Demented
2. A primary focus of any rehabilitation effort is to help the person:
   a. Develop a better attitude
   b. Build up physical endurance
   c. Avoid an early death
   d. Achieve or maintain the ability to function
3. The rehabilitation process starts as soon as:
   a. The person's insurance gives the go-ahead
   b. The person is able to walk
   c. The person is medically stable
   d. The person is emotionally stable
4. The second phase of the rehabilitation process is called the:
   a. Chronic phase
   b. Sub-acute phase
   c. Active phase
   d. Acute phase
5. What does TBI stand for?
   a. Temporary brain infarction
   b. Traumatic brain injury
   c. Traumatic brain infarction
   d. Total brain injury
6. What is the Rancho Los Amigos Scale used for?
   a. To monitor the person's vital signs
   b. To measure the person's intracranial pressure (ICP)
   c. To rate the likelihood of a successful rehabilitation effort
   d. To identify the person's level of recovery
7. Tetraplegia results from an injury to:
   a. The spine, level T1 and above
   b. The front part of the brain
   c. The spine, level T1 and lower
   d. The left side of the brain
8. An ischemic stroke is caused by:
   a. A ruptured blood vessel
   b. A blocked coronary artery
   c. A blocked artery in the brain
   d. A contusion
9. Most hip fractures are stabilized with the use of:
   a. Splints
   b. Plaster casts
   c. Plates, screws, and pins
   d. Traction
10. A person who has just had an amputation is at risk for:
    a. Blood clot formation
    b. Diabetes
    c. Urinary incontinence
    d. Hemorrhage
11. Which type of burn is the most severe?
    a. Superficial
    b. Full thickness
    c. Deep partial thickness
    d. Superficial partial thickness

STOP and Think!

1. You have been helping care for Connie, a 19-year-old student who was involved in a car accident earlier this morning. So far, Connie has been alert and oriented every time you have checked her level of consciousness (LOC). It is time to check Connie's LOC and vital signs again, but when you enter Connie's room, she seems to be sleeping. You know that Connie's best friend died in the accident. As a result, you are hesitant to wake her up because you know how upset she is, and it looks like she is finally resting. What should you do?

2. Samuel is a new patient who has just been admitted to your surgical floor from the recovery room after an amputation of his right arm. Samuel is 23 years old. While working on his father's farm, he accidentally got his arm caught in a piece of heavy farm machinery. The damage was so severe that the surgeon had no choice but to amputate the arm. What complications should you be very observant for during the first few hours after surgery? What other complications might Samuel be more at risk for in the days after surgery? How can you help Samuel adjust emotionally to the loss of his arm?
3. Damon is a 45-year-old construction worker who was burned on the job 1 week ago. He has deep partial-thickness and full-thickness burns on his arms where his shirt caught on fire. He has superficial burns on his face, and his eyebrows were singed off. Damon is motivated to get well quickly so he can return to work, but he does not like to wear the splints that keep his elbows extended. He says they are uncomfortable. Why should Damon wear the splints? How can you help him?

CHAPTER

10

Care of the Surgical Patient

WHAT WILL YOU LEARN?

No matter where you work as a nursing assistant, it is likely that you will be involved in some aspect of caring for surgical patients. Some nursing assistants receive specialized training that allows them to assist surgical teams during surgical procedures. More commonly, nursing assistants are responsible for helping to prepare patients for the surgery, helping to care for patients in the recovery room in the hours immediately after surgery, or helping to care for patients on the surgical floor of the hospital, in a sub-acute care facility, in a long-term care facility, or in the patient's home in the days or weeks after the surgery. In this chapter, we will review the needs of a surgical patient before, during, and after surgery and the nursing assistant's role in helping to meet those needs. When you are finished with this chapter, you will be able to:

Caring for patients during surgery relies on the expertise of all members of the surgical team.

1. Discuss the reasons a person may need to have surgery and describe settings where surgery may take place.
2. List and define the three phases of surgical care.
3. Describe what needs to be done to physically prepare a patient for surgery and explain the nursing assistant's role in these preparations.
4. List and describe the members of the surgical team.
5. Describe the physical environment of the surgical suite.
6. List methods that are used to help prevent infection in the surgical suite.
7. Describe hazards that may affect a person working in the surgical suite and measures the nursing assistant can take to avoid these hazards.
8. Discuss the actions the health care team takes to keep the patient safe during surgery.
9. Describe the three phases of recovery that a patient goes through following surgery and the nursing assistant's role in providing care during these three phases.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Ambulatory surgical center (ASC) or outpatient surgical center (OSC)
Surgical suite
Sterile field
Flammable
Hypothermia
Hypovolemic shock

A person may have surgery for many different reasons (Table 10-1). Surgery can be *elective* (the person's health is not immediately threatened if the surgery is not performed right away), *urgent* (the person's health will suffer if the procedure is not performed within a few days or weeks), or *emergent* (the person's life is in danger unless the surgery is performed right away).

In the past, most surgeries were performed in the hospital. The patient was admitted to the hospital the day before the surgery and kept in the hospital for a few days after the surgery. Now

Table 10-1 Reasons for Surgery

TYPE OF SURGERY	WHY IT IS DONE	EXAMPLES
Diagnostic	To remove tissue from the person's body; the tissue is used to determine whether or not a person has a certain medical condition, such as cancer	Breast biopsy Colonoscopy
Exploratory	To look inside the body when a person has a significant medical problem but the doctors do not know how bad the problem is or exactly what is causing it; often involves using a scope inserted through a small incision	Open surgery or diagnostic laparoscopy to gain more information about abdominal or pelvic internal bleeding, pain, or a mass
Definitive (curative)	To remove or replace tissue to restore function	Joint replacement Cardiac bypass surgery Hernia repair
Palliative	To relieve uncomfortable symptoms of disease; the surgery is not a cure	Surgery to reduce the size of a cancerous mass
Plastic and reconstructive	To repair or replace damaged or diseased tissue to restore a person's appearance	Breast reconstruction (for example, after mastectomy) Cleft lip repair Rhinoplasty ("nose job") Skin grafting (after a burn injury)

many patients come to the hospital a few hours before the scheduled surgery, and many return home a few hours later. Some patients do not even go to the hospital to have surgery! Many surgeons, especially those specializing in plastic and reconstructive surgery, perform procedures in an operating room located in their office or clinic. In addition, many surgical procedures are now performed in **ambulatory surgical centers (ASCs)** or **outpatient surgical centers (OSCs),** facilities that specialize in providing surgical services on an outpatient basis (that is, the patient is admitted to and discharged from the facility on the same day). An ASC or OSC can be associated with a hospital or it may be a free-standing, independent facility. The procedures performed in an ASC or OSC are usually more complicated than those that can be performed in a doctor's office, but they are not so complicated that the patient requires overnight hospital care.

As you remember from your basic training, there are three phases of care for the person having surgery:

- The *pre-operative phase* begins when the doctor informs the person about the need for surgery and ends when the person actually enters the operating room.
- The *intra-operative phase* begins when the person enters the operating room and continues until the person is transferred to the post-anesthesia care unit (PACU, recovery room).
- The *post-operative phase* begins when the person enters the PACU and continues until the person recovers from the surgery.

The term *peri-operative period* is used to describe all three phases as a whole.

PRE-OPERATIVE PHASE

During the pre-operative period, the person receives information about the need for the procedure, how the procedure is done, the risks and benefits of the procedure, and alternatives to the procedure. The person uses this information to give the health care team informed consent (permission) to go ahead with the procedure, or to decline the procedure. Although as a nursing assistant, you are not responsible for providing the patient with the information she needs to give informed consent or for obtaining the person's informed consent, you should be alert to questions the patient or family may ask or statements they may make that indicate misunderstandings (for example, about the type of surgery). If it seems that a patient or family member has incorrect information or is uncertain about anything related to the surgery, alert the nurse immediately.

A person who is having surgery usually needs to have several tests done during the pre-operative phase. The doctor usually orders tests to assess the functioning of the person's cardiovascular, respiratory, and urinary systems. In addition, the doctor may request blood work. These tests allow the doctor to identify conditions that might complicate the person's surgery or recovery so the health care team can plan for and hopefully prevent these complications from occurring.

On the day of the surgery, many actions are taken to physically prepare the patient for the procedure. Many patients receive instructions and are responsible for completing several tasks at home before arriving at the facility where they will have surgery. If the person is a resident in a long-term care facility, the health care team at the long-term care facility will assist the person with completing many of these tasks ahead of time. A patient who has already been admitted to the hospital may be assisted with these tasks in her hospital room before being taken to surgery. In many facilities, especially ASCs or OSCs, the person is prepared for surgery in a special pre-operative holding area.

A pre-operative checklist is used to remind the health care team what tasks need to be done before the person goes to the operating room and to document that the tasks were completed (Fig. 10-1). The pre-operative checklist is placed in the person's medical record. Make sure that you are familiar with the types of pre-operative checklists that are used in your facility and that you know what tasks you are responsible for completing on the checklist. Common tasks you may assist a person with during the immediate pre-operative period are discussed in the sections that follow.

MAINTAINING NPO STATUS

Food and fluids are usually restricted before most surgical procedures, except for some of the most minor ones. The person is usually instructed to remain NPO (nothing by mouth, including water, gum, ice, and mints) after midnight the night

☐ EMR

Name of Procedure: **Date:**

YES Nurse Initial	N/A	Inpatient / Emergency Pre-Procedure Invasive Checklist (Section 1)
		Identification of Patient by 2 identifiers with stated name and birthdate
		Lab Work on chart CBC K+ UA Pregnancy
		X-ray on chart
		EKG on chart
		H & P on chart [ ] Short form [ ] Dictated [ ] 2 page History
		MAR on chart
		Underwear removed / Gown on
		Glasses / Contacts / Dentures / Hearing Aids removed
		Jewelry / Piercing removed
		VS recorded: T P R BP Ht. Wt. SAO2 Glucose Action
		Allergies: (List)
		Patient NPO since Blood Sterilization
		Patient / Surrogate decision maker verbalizes understanding of procedure
		Confirm Acknowledgement of Consent signed: 1. Consent Order 2. Patient Verbalization of Procedure

1st Signature ______________________ **Time**__________

2nd Signature **Time**

YES Nurse Initial	N/A	ALL PROCEDURE Acknowledgement of Site Verification / Procedure (Section 2)
		Patient's Acknowledgement of Consent is complete
		Verbally confirmed the operative site / laterality / procedure with patient / surrogate decision maker
		Review Medical Record for consistency in identifying the correct operative site (other confirmed with X-ray) / Procedure
		Operative Site marked with indelible marking pen over or as close to the operative incision site as appropriate - except GI / Cath Lab / Post-delivery tubals Patient refuses site marking: Patient Signature:______________

Signature **Time**

YES Nurse Initial	N/A	Site Verification / Procedure Verification (Dept. performaing procedure) (Section 3)
		Confirm patient identity, consent, operative procedure (OR) and laterality before begining procedure
		Medical Record reviewed for consistency in identifying correct operative site / procedure (if appropriate)
		Imaging Studies reviewed with operating physician and procedure / operative site confirmed (if appropriate)
		Operative Team / Procedural Team conducted "Time Out" immediately before incision or start of the procedure for final confirmation.

Signature **Time**

Account Number:	MR Number:
Patient Name:	
Admit Date:	

Davis Hospital
AND MEDICAL CENTER
1600 West Antelope Drive
Layton, UT 84041

DOB	Age	Sex	HT	WT	RM-BD	PT	SVC	FC
Allergies:								
Attending Physician Name:								

UNIVERSAL PROTOCOL CHECKLIST

OMDPRECHEC.DCL - 186 Crt

Figure 10-1

A pre-operative checklist documents that all of the tasks that must be completed during the pre-operative period have been completed. The pre-operative checklist goes in the person's medical record and must be completed before the person goes to surgery.

before surgery. Toothbrushing and the use of mouthwash are allowed, but the person must not swallow any liquid. Sometimes if the procedure is scheduled for later in the day or if the patient is an infant or small child, the patient may be allowed clear liquids up to 3 or 4 hours before the scheduled time for surgery. If the person takes daily medications in the morning, the doctor may request that the person take her medications with a small sip of water at the normal time.

SURGICAL SITE PREPARATION

How the site where the incision will be made is prepared depends on what type of surgery is being performed and on the surgeon's preferences. Many surgeons instruct the patient to bathe or shower the evening before and/or the morning of the surgery using a special antimicrobial soap to reduce the number of microbes on the skin. If the surgical site involves the neck, face, or scalp, washing the hair with antimicrobial shampoo may also be necessary.

In the past, it was routine to shave body hair from the area where the surgical incision would be made. However, this practice is no longer followed because shaving causes small nicks in the skin that promote bacterial growth and increase the chance that the surgical wound will become infected. Body hair is now only removed if it makes accessing the incision site difficult, and it is removed using disposable clippers instead of a razor. Hair removal, if necessary, is usually done in the operating room immediately before the procedure begins.

PREVENTING SURGICAL ERRORS

Stories about the wrong procedure being performed, the wrong body part being operated on, and surgical instruments being left behind in the patient's body are common in the media. To decrease the likelihood that errors like these will occur, precautions are taken during the pre-operative phase and again during the intra-operative phase. During the pre-operative phase, the nurse asks the patient what procedure she is having done and on what part of the body (for example, right knee, left breast). The nurse double checks the information provided by the patient against the operative permit and the surgery schedule to make sure the patient's understanding is consistent with the facility's information. After confirming the site, the nurse may use a marking pen to write "yes" on the surgical site and, if appropriate, "no" on the opposite side. The nurse may be required to document these actions on the pre-operative checklist (see Fig. 10-1).

DRESSING AND GROOMING

The patient is usually required to wear a clean hospital gown to the operating room. The patient may be allowed to wear undergarments if the undergarments will not affect access to the surgical site. If anti-embolism (TED) stockings are ordered by the surgeon, they are applied at this time.

Make-up (including nail polish), jewelry, wigs and other types of hair pieces, hair clips, and hair pins should be removed. Long hair may be braided or pulled back with an elastic band. A surgical cap is used to cover the person's hair.

Eyeglasses or contact lenses, dentures, hearing aids, and prosthetic limbs are removed unless the surgeon or anesthesia provider requests otherwise. Items that are removed from the person are documented and given to the person's family or placed in the facility safe.

ELIMINATION

The person's elimination needs should be met before the person goes to the operating room. Assist the person to the bathroom or offer a bedpan immediately before moving the person to the operating room. If ordered, record the amount voided.

Many patients need an indwelling urinary catheter during the surgery and for a short time afterward. Unless the person required the catheter before the surgical procedure, the catheter is usually inserted in the operating room after the person has been anesthetized.

Before some types of surgical procedures (for example, those involving the abdominal area or intestines), the person's bowels must be emptied of feces. When this is the case, the doctor may prescribe a laxative for the person to take the day before the surgery. A cleansing enema may also be given after the person arrives at the facility. If an enema is given, make sure that the person has an opportunity to completely expel the enema before going to the operating room.

MEDICATIONS

The person may be given medications to prevent nausea, relieve anxiety, or reduce secretions. These medications may be given by mouth with a very small sip of water, as an injection, or intravenously through a peripheral line. (If the person does not already have one, a peripheral line will be started before the person is transferred to the operating room.) Because some of these medications can make the person dizzy or weak, you should raise the side rails of the person's stretcher or bed and remind the person to ask for assistance before getting up.

If the person has diabetes and requires insulin, he may be allowed to take only part of his normal morning dose. An intravenous (IV) solution containing a small amount of glucose may be ordered, and it may be necessary to test the person's blood glucose level several times before surgery.

IV antibiotics may also be administered during the pre-operative period to lower the person's risk of infection.

TRANSPORT TO THE OPERATING ROOM

When the operating room has been prepared and the surgeon and other members of the surgical team are ready for the patient, the patient is moved to the operating room. The method used to move the patient depends on the facility, the patient's medical condition, and the type of surgery. The patient may simply walk to the operating room and be assisted onto the operating table. Or the patient may be transferred on a stretcher, in a wheelchair, or in a rolling reclining chair. A patient who is critically ill or in traction may be transferred in her bed to the operating room. When transferring a person, always remember to:

- Follow basic safety procedures (for example, fastening safety straps and raising side rails).
- Transport a person who is in a stretcher or bed "feet first."
- Make sure that traction weights, if in use, hang free and do not rest on the floor.

Helping Hands and a Caring Heart

FOCUS ON HUMANISTIC HEALTH CARE

Many of your responsibilities during the pre-operative phase have to do with physically preparing the person for surgery, but you must be aware of the emotional needs of the person and her family members during this phase as well. When you see a certain type of surgery performed frequently, you may come to think of that surgical procedure as "routine" or "minor." But the person who is actually having the surgery (and her family members) may not see the procedure that way at all!

Many people who are facing a surgical procedure worry about being "cut open," not waking up from the anesthesia, experiencing pain during or after the procedure, becoming disfigured, developing a serious infection, or having an unsuccessful outcome. They may also worry that the surgeon will make a mistake. If you notice that a patient or family member seems nervous or seems to have doubts about going ahead with the procedure, use your good communication skills to encourage the person to tell you more about her worries. Avoid offering false reassurance (for example, by saying, "Don't worry, everything will be okay.") Instead, report your observations to the nurse right away so the person can get the information she needs to feel reassured.

There are many simple things you can do that will make the pre-operative phase easier for the patient and family. Make sure you provide for privacy and keep the person covered while completing the tasks required before surgery. Position the person comfortably and offer warm blankets during the waiting period. Answer questions that you are qualified to answer and direct those about the procedure or that you are not able to answer to the nurse promptly. Often, family members feel helpless because there is nothing they can do for the patient other than wait. Show the person's family members where they can wait during the surgery and make sure they know where they can go to get something to eat and the locations of the restrooms and public telephones. Many family members become anxious if a procedure seems to be "taking too long." To help relieve some of this anxiety, a nurse usually provides the family with updates about how the surgery is progressing throughout the procedure. If a family member asks you for an update, report the request to the nurse immediately.

INTRA-OPERATIVE PHASE

During the intra-operative phase, the surgery actually takes place. Before we actually discuss the care given to patients during surgical procedures, it is important to understand a little bit about the team members responsible for providing that care and the environment where surgery takes place.

THE SURGICAL TEAM

The surgical team works together to ensure the patient's safety and comfort during the surgical procedure and to ensure a successful outcome. The surgical team is made up of many different health care workers, each with a special role. As in other areas of health care, the patient is the focus of the surgical team's efforts. In addition to the core members of the surgical team listed in Table 10-2, many other types of health care workers may join the surgical team, depending on the situation. For example, the surgical team may include health care workers trained to operate specialized equipment used during a certain type of surgery.

INFECTION CONTROL IN THE SURGICAL SUITE

Because surgery involves breaking the skin and entering the body with foreign objects, it carries a high risk of infection for the patient. If an infection occurs, it could have very serious consequences, such as the need for more surgery later, prolonged recovery times, or even death. Many special measures are taken to help protect the patient from infection.

Physical Environment

The **surgical suite** is the area of the facility where surgery is performed and care is provided in the

Table 10-2 Surgical Team Members

JOB TITLE	RESPONSIBILITIES	STERILE OR NON-STERILE ROLE
Surgeon	• Performs surgical procedures • Directs other team members	Sterile
Surgical assistant, registered nurse first assistant, physician assistant, or surgical technologist first assistant	• Assists the surgeon with surgical procedures by performing tasks such as keeping the surgical incision open, sponging, and suturing	Sterile
Scrub person, surgical technologist, scrub nurse, scrub technician, or operating room technician	• Sets up sterile supplies and instruments • Passes instruments and sterile supplies to the surgeon and surgical assistant during procedures • Keeps instruments clean and organized • Maintains the sterile field • Keeps count of surgical instruments and supplies	Sterile
Circulating nurse or circulator	• Manages the nursing care provided in the operating room • Ensures a safe, comfortable environment • Serves as the link between the sterile team members and the rest of the operating room • Opens additional sterile supplies during procedure using sterile technique • Completes necessary documentation	Non-sterile
Anesthesiologist or nurse anesthetist	• Administers anesthesia • Monitors the patient's response to anesthesia throughout the procedure	Non-sterile
Nursing assistant, health care assistant, orderly, or surgical aide	• Assists non-sterile team members with transporting, transferring, and positioning the patient • Additional duties vary according to facility policy	Non-sterile

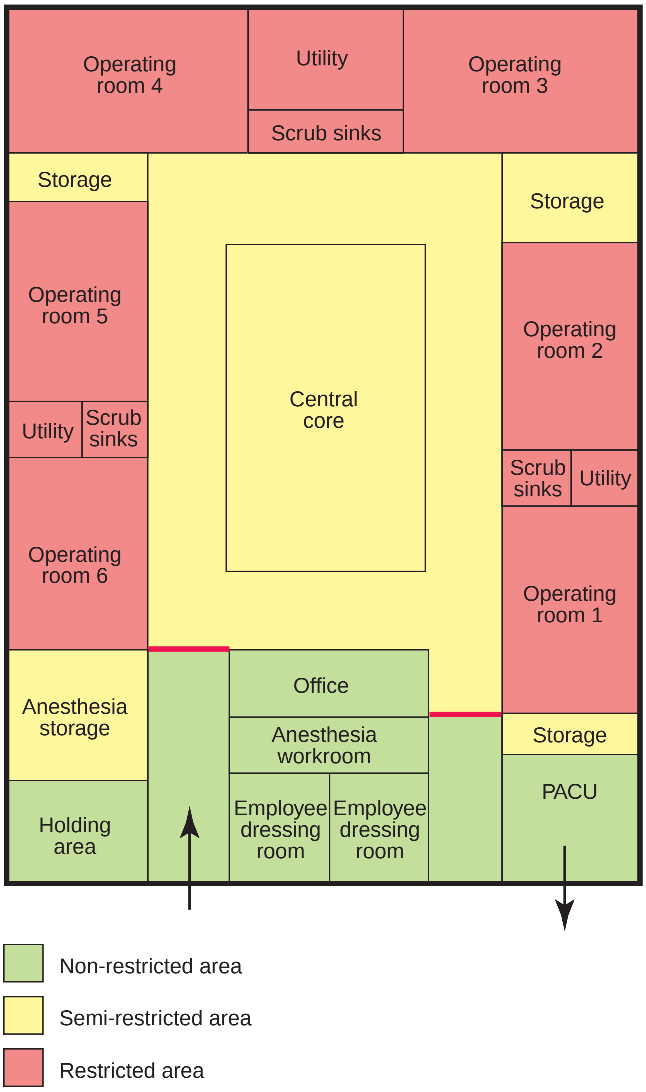


Figure 10-2
The surgical suite is divided into three zones: the non-restricted zone (*green*), the semi-restricted zone (*yellow*), and the restricted zone (*red*).

peri-operative period (Fig. 10-2). The surgical suite includes:

- The admissions area
- The pre-operative preparation and holding area
- One or more operating rooms, where surgery is actually performed
- A central core, where dirty instruments are processed, re-packed, and sterilized
- Employee dressing rooms
- A storage room for sterile supplies
- A storage room for non-sterile supplies
- The PACU
- Hallways connecting all of these areas

The surgical suite is divided into three defined zones (see Fig. 10-2). The purpose of these zones is to limit the introduction of microbes into the environment.

- The *non-restricted zone* includes the admission area, pre-operative preparation and holding areas, employee dressing rooms, PACU, and outer hallways that lead to these areas. People wearing street clothes instead of the typical surgical ("scrub") attire can be in the non-restricted zone.
- The *semi-restricted zone* includes the storage rooms for non-sterile supplies, the central core, and the inner hallways. People entering this area of the surgical suite must wear surgical scrubs and head coverings.
- The *restricted zone* includes the operating rooms and storage room for sterile supplies. People working in this area of the surgical suite must wear masks in addition to surgical scrubs and head coverings.

The environmental conditions in the surgical suite are also carefully controlled to create an environment that is unfriendly to microbes. Because most pathogens prefer warmth and dampness, the air inside the operating room is kept cool and dry. Special ventilation systems are used to create positive pressure inside the operating room. Because the air pressure is higher in the operating room than it is in the surrounding rooms and hallways, air flows out of the operating room when the door is opened, preventing airborne microbes from being drawn into the operating room.

Each day, the equipment, floors, and walls inside the operating room are thoroughly disinfected. In between surgical procedures, the operating table, instrument tables, light fixtures, and floors are wiped down with disinfectant. As a nursing assistant working in this environment, one of your responsibilities may be to help clean the operating room. Make sure you follow all of the procedures for cleaning the operating room exactly as they are outlined in your facility policy.

Surgical ("Scrub") Attire

Before entering the semi-restricted or restricted zones of the surgical suite, the surgical team members must change into clean surgical ("scrub") attire (Fig. 10-3). The proper use of scrub attire helps limit the introduction of microbes into the

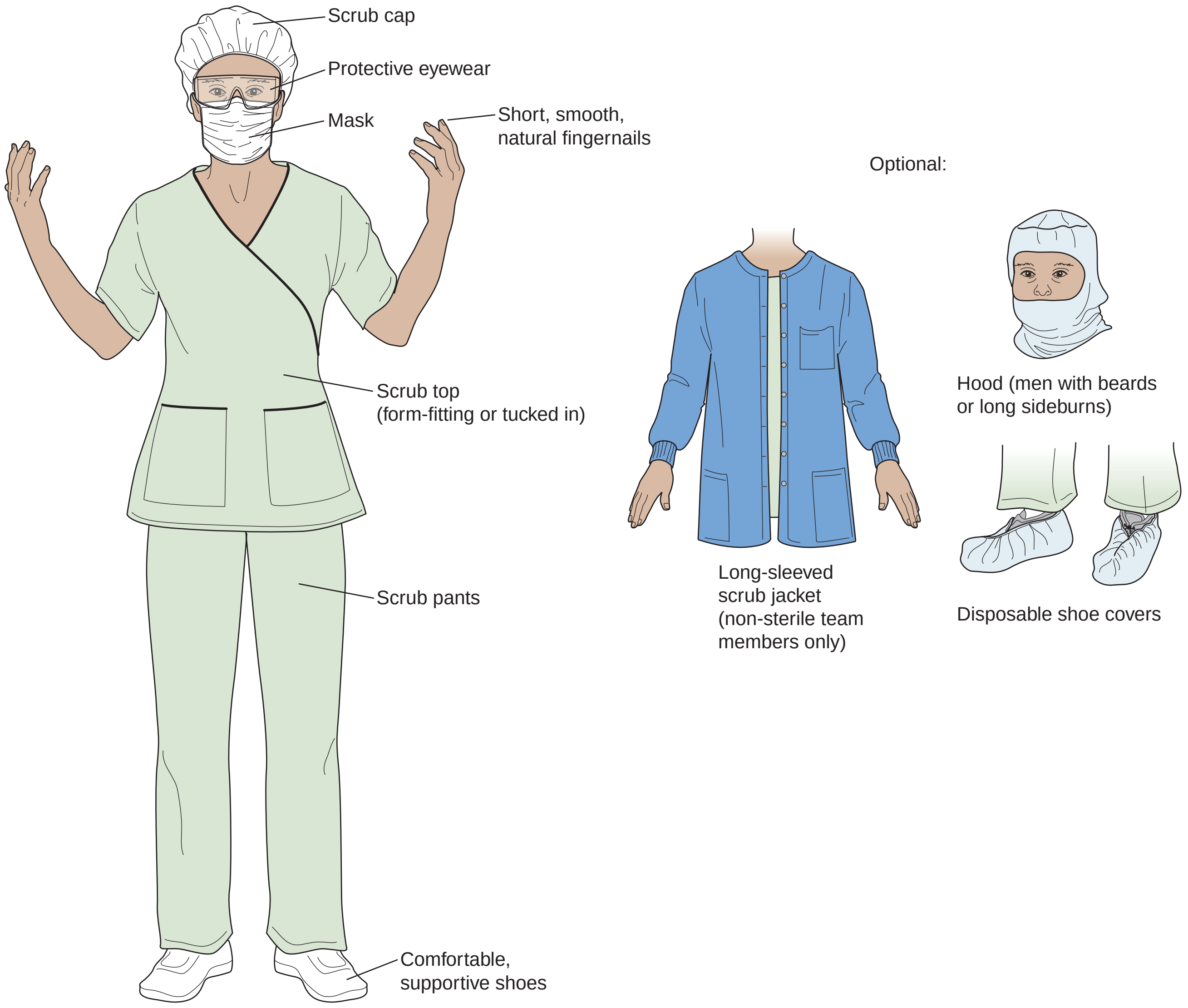


Figure 10-3
The proper use of surgical ("scrub") attire helps limit the introduction of microbes into the environment, reducing the patient's risk for infection. In addition, scrub attire helps limit the health care worker's exposure to pathogens.

environment, reducing the patient's risk of infection. In addition, the proper use of scrub attire helps to protect the members of the surgical team from exposure to infectious disease.

Basic scrub attire consists of a scrub top and scrub pants (see Fig. 10-3). The scrub top is either tucked into the scrub pants or is form fitting. Surgical scrubs are only worn in the surgical suite. If you leave the facility wearing your scrub clothes, you should change into clean scrubs when you re-enter the surgical suite. Per facility policy, you will be required to leave your dirty scrub clothes at the facility to be laundered.

A scrub cap is worn to completely cover your hair (see Fig. 10-3). If you have long hair, pull it back with elastics or clips before putting on the cap so strands of your hair do not escape from the edges of the cap. Men with beards or long sideburns should cover them with a surgical hood (see Fig. 10-3).

Your shoes should be supportive and comfortable to stand in for long hours. Wearing disposable shoe covers, although no longer required in the operating room, helps keep your shoes clean. In addition, wearing disposable shoe covers can help prevent tracking of blood through the surgical suite. When the shoe covers become soiled, you just remove them and put on a clean pair.

Health care workers who are working within the restricted zone of the surgical suite must wear a mask over the mouth and nose (see Fig. 10-3). The mask helps prevent microbes present in the mouth and respiratory tract from contaminating the air, lowering the patient's risk of infection. The mask also protects you from breathing in microbes through your nose and mouth and from substances that may splash. As always, tie the mask securely behind your head and neck so there are no gaps along the sides of the mask. Remember, the purpose of the mask is to filter the air you breathe in and out. If the mask is not secure against your face, air will enter and escape around the sides, and the air will not be filtered. Masks are changed between surgical procedures and whenever they become wet or soiled.

Health care workers who are working within the restricted zone of the surgical suite also wear protective eyewear (such as goggles or face shields) to protect their eyes from splashes and sprays during surgical procedures (see Fig. 10-3). Eye protection should be worn for every surgical procedure, no matter how minor the procedure seems. You would be surprised at how quickly and how far blood can spray when even a small artery is cut.

As always, you should keep your fingernails short, clean, and unpolished. False nails, acrylics, and wraps are not permitted. Leave your jewelry (especially bracelets and rings) at home. Practice good personal hygiene to reduce the number of microbes that are present on your skin and hair.

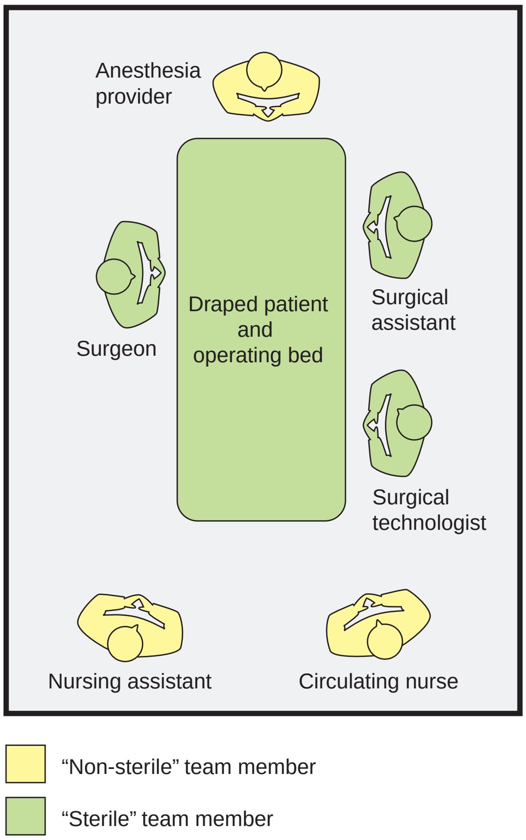


Figure 10-4
Members of the surgical team are considered either "sterile" team members or "non-sterile" team members. This separation of roles helps to keep the sterile field completely free of microbes during the procedure.

Sterile Technique

Any instrument or item that will be used in the patient's body or that will come in contact with the incision site must be kept totally free of microbes. To maintain sterility throughout the procedure, all surgical team members must follow the principles of sterile technique (see Chapter 2, Box 2-2). In addition, some team members are considered "sterile" team members and others are considered "non-sterile" team members (Fig. 10-4). Designating certain team members as "sterile" and others as "non-sterile" helps keep the **sterile field** (the area closely surrounding the operating table and the instrument tables) completely free of microbes throughout the procedure.

The surgeon, surgical assistant, and scrub person are "sterile" team members. These team members have direct contact with the open incision or instruments and items that are used inside the patient's body or on the incision site. To reduce the patient's risk of infection, the sterile team members perform a surgical scrub on their hands and arms and wear sterile gowns and gloves in addition to the standard surgical attire. All of their activity takes place within the sterile field.

The anesthesia provider, circulating nurse, and other assistive personnel are "non-sterile" team members. Team members who operate specialized equipment during the procedure, such as x-ray technicians, are also considered "non-sterile" team members. The "non-sterile" team members are free to move around the operating room outside of the sterile field. The "non-sterile" team members do not have direct contact with the open incision or instruments and items that are used inside the patient's body or on the incision site. As a result, they do not have to wear sterile gowns or sterile gloves. However, they may wear long-sleeved scrub jackets, both for warmth and to keep exposed skin on the arms covered when working around the sterile field.

Other Infection Control Methods

Situations that put a person at a higher-than-average risk for developing an infection after surgery include medical conditions and treatments that affect the functioning of the immune system (for example, diabetes or cancer), very young or very old age, and procedures that involve implanting devices in the body (for example, joint replacement surgery). In these cases, additional infection control measures might be used, such as limiting traffic in and out of the operating room during the procedure or using an operating room that is specially equipped with ventilation and lighting systems that kill microbes that may be present in the air.

WORKPLACE HAZARDS

Working as a member of the surgical team can be very exciting. However, the procedures that are performed in an operating room, the environmental conditions in the operating room, and some of the equipment that is used in an operating room can pose several hazards to the people who work there. You can keep yourself, your co-workers, and your patients safe by always following facility policy exactly.

Physical Injury

Working in an operating room is hard physical work. The surgical team spends long hours standing. Patients who are unresponsive must be lifted, repositioned, and transferred to beds and stretchers all day long. Equipment and furniture used in the operating room can be heavy and difficult to move. As with any area of health care, you must take precautions to protect yourself and your patients from physical injury. Always use good body mechanics, and ask for help when transferring or repositioning patients or moving heavy equipment or furniture.

Wet floors (for example, around scrub sinks) can put health care workers at risk for falling, which can also lead to physical injury. If you see a wet area, wipe or mop it up promptly according to facility policy. Remember to follow standard precautions when wiping or mopping up blood and body fluids.

Physical injury to a member of the surgical team or the patient can occur if equipment is not working properly. If you notice that a piece of equipment is malfunctioning or presents a safety hazard, follow your facility's policy for removing it from use and getting it repaired. If an accident does occur in the operating room, make sure you document it according to your facility's policy.

Exposure to Bloodborne and Airborne Pathogens

The act of performing surgery creates an environment where exposure to blood and body fluids is a constant threat. Blood often splashes and sprays. Surgical instruments and suture needles are sharp, and if they are not handled properly, needlesticks or cuts may result. Just as in any other health care environment, you may not necessarily know if a person has a bloodborne illness. To protect yourself and others, you must follow all standard precautions precisely and consistently and know what to do in the event of an exposure incident.

Equipment used in the operating room can also put you at risk for inhaling infectious particles. Laser devices (which use a very hot, focused beam of light) and electrocautery devices (which use heat) are often used during surgery to destroy diseased tissue and to seal off small blood vessels so they stop bleeding. The smoke produced by the burning tissue (called a "plume") may contain infectious particles. Inhaling this smoke can put health care workers at risk for infection. To lower this risk, special high-filtration masks and protective goggles are worn whenever laser or electrocautery devices are used.

Exposure to Radiation

Radiographic (x-ray) equipment is frequently used during surgical procedures. As a result, surgical team members can be exposed to radiation. Exposure to excessive amounts of radiation may cause cancer, birth defects, thyroid disease, and other problems. You can limit the amount of radiation you are exposed to through attention to time, distance, and shielding:

- **Time.** When radiographic equipment is used correctly, exposure time is shortened.
- **Distance.** The farther away you are from radiographic equipment when it is in use, the less radiation you will receive.
- **Shielding.** Lead aprons, vests, and thyroid protectors prevent radiation from entering your body. Wear the proper types of shielding equipment whenever x-ray equipment is being used.

Exposure to Chemicals

Anesthetic gases and other chemicals used in the operating room can be hazardous to the surgical team. Special filtering ventilation systems are now used on anesthesia machines to minimize exposure to the gases used for general anesthesia. Chemicals that are used to disinfect and sterilize equipment and instruments can also be hazardous if they are inhaled or splashed on the skin. Always wear eye protection when using cleaning and sterilizing agents that may splash or spray.

Fire

In the operating room, many factors combine to increase the risk of fire. Remember from your basic training that three elements must come together for a fire to start—fuel (something that burns), heat (something to ignite the fuel), and oxygen. In an operating room, cloth or paper drapes or a substance that easily catches fire (such as alcohol-based skin prepping solutions) could serve as the fuel for a fire. Heat can be provided by a spark caused by static electricity in the dry environment, by a laser or electrocautery device, or by fiberoptic cables (used with scopes during some surgical procedures; they can become very hot). Patients who are having surgery often receive supplemental oxygen during the procedure, which increases the oxygen content in the air. The members of the surgical team must take extra precautions to make sure a fire does not start in the operating room.

Today, anesthetic gases are less **flammable** (prone to catching fire) than they were in the past. Drapes are made from flame-retardant materials, making them slightly less likely to catch fire. Still, you must be aware that the potential for fire exists, and take measures to prevent fires from occurring. Your facility will have many policies and procedures in place that are related to preventing fires from breaking out in the operating room. Follow these policies and procedures carefully and consistently. Also, make sure you know what to do if a fire does break out.

INTRA-OPERATIVE CARE OF THE PATIENT

During the intra-operative phase of patient care, the surgery is actually performed. The intra-operative phase can last from less than 1 hour to 20 hours or more, depending on the procedure that is being performed.

Preparing the Person for the Procedure

Anesthesia prevents the person from feeling pain during the surgery and is accomplished through the use of medications. Anesthesia is administered by an anesthesiologist (a doctor who specializes in the administration of anesthesia) or a nurse anesthetist (a registered nurse who has received extensive additional training to learn how to administer anesthesia). Depending on the situation, the doctor may choose to use a general anesthetic, a regional anesthetic, or a local anesthetic.

- **General anesthesia** causes a loss of consciousness. By using a combination of inhaled anesthetic gases and IV medications, the anesthesia care provider puts the person "to sleep" for the duration of the procedure. Most types of general anesthesia also have a paralyzing effect that causes the person to stop breathing. The person is intubated and placed on a mechanical ventilator. When the surgery is completed, the medications are stopped. The person starts breathing on his own and slowly wakes up. The person will be sleepy for several hours after the procedure and may experience some nausea or vomiting during the recovery period.
- **Regional anesthesia** causes a loss of sensation in part, but not all, of the body. The person remains conscious throughout the procedure. The anesthesia care provider injects a numbing medication either into the person's spinal column or near a nerve pathway, causing the part of the body beyond the injection site to become numb. A sedative may be given in addition to the anesthetic to help the person relax. After the procedure, sensation returns gradually. The person may experience temporary paralysis and weakness in the area until the anesthetic has completely worn off.
- **Local anesthesia** causes a loss of sensation in only a very small part of the body (the surgical site). As with regional anesthesia, the anesthetic is injected near a nerve pathway, and a sedative may be given to help the person relax. Most adult eye surgeries and minor procedures, such as hernia repairs and breast biopsies, can be performed using a local anesthetic. After surgery, the person recovers very quickly and is able to return to her room or home in a very short time.

After the person has received the appropriate anesthetic, additional tasks are done to prepare the person for the surgical procedure. A urinary catheter (if necessary) and any invasive monitoring devices that may be needed (such as an arterial line or a central line) are inserted. Then the person is positioned on the operating table in a way that will allow the surgeon to have the best access to the surgical site. Many different positions are used for surgical procedures, but they are all variations of the basic positions that you already know: supine, lateral, prone, and sitting (Fig. 10-5). Special positioning aids and supportive devices are routinely used to ensure safe, comfortable positioning on the operating table. In addition, safety straps are always used to keep the person securely on the table.

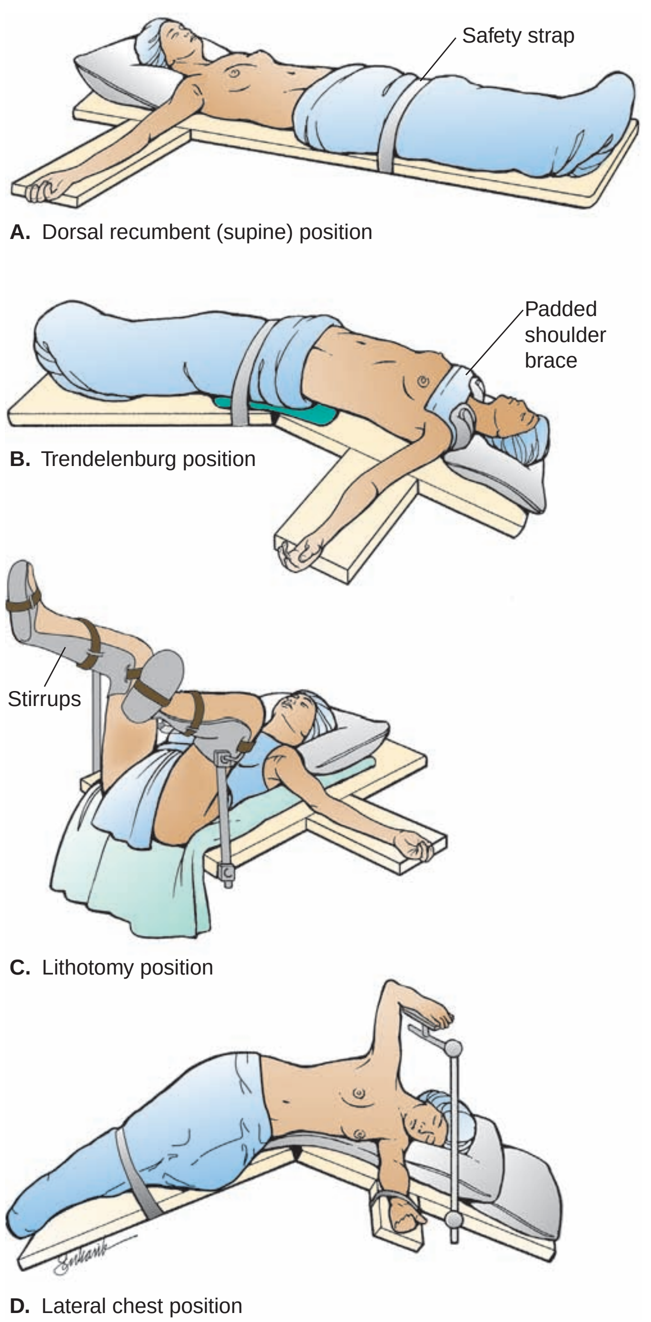


Figure 10-5
Common surgical positions.

When helping to position a person on the operating table, make sure to move the person carefully and slowly so that the joints are protected. Positioning an elderly patient may be difficult because of joint stiffness and limited range of motion. When positioning an elderly patient, you should take extra care to be gentle, and you may need to use extra positioning aids and supportive devices.

The person cannot change position during the procedure, which may be quite lengthy. In addition, the person may be either unconscious or numb and therefore may be unable to detect pressure on pressure points. The surgical team members make sure that the pressure points are well-padded and that the position does not affect the patient's circulation and breathing. Because an elderly person's skin is fragile and prone to pressure damage, extra padding and heel booties may be used for these patients.

After the patient has been positioned and safely secured on the operating table, the skin around the surgical site is "prepped" or cleaned with a special antiseptic solution to reduce the number of microbes present on the skin. After the surgical site has been prepped, the "sterile" team members carefully place sterile drapes around the site to create a sterile field.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Inside the operating room, a very "high-tech" place, it is easy to become fascinated by the sophisticated equipment that is being used and the delicate surgeries that are being performed. But it is important never to forget about the person on the table! Your patient is counting on you and the other members of the surgical team to keep him safe and to treat him with respect. The patient is very vulnerable. Because of the anesthesia, he cannot move or even tell you if his position is uncomfortable. The surgical incision disrupts his first line of defense against infection. Many surgical procedures involve exposing the most private parts of a person's body.

Be sure to make every effort to position your patient carefully and comfortably. Protect the person's modesty by keeping as much of his body covered as possible. Care for your patient and show him the same respect that you would want shown to you or to one of your loved ones in the same situation.

Preventing Surgical Errors

Before surgery begins, a "surgical time-out" is taken by all members of the surgical team in the room. The team pauses to identify the patient, verify the procedure that is being performed, and verify the surgical site. The "surgical time-out" may be documented on the pre-operative checklist (see Fig. 10-1).

Sharps, sponges, and instruments are counted and recorded before the procedure begins. They are counted again right before the surgical incision is closed. If the closing count is not correct, the count is repeated, and the room is carefully searched for the missing item. You may be asked to help search through trash or linens in the operating room to help find the missing item. If the missing item is not found, an x-ray will be taken to see if the missing item remains in the patient. This procedure helps to ensure that nothing is left in the surgical wound after the procedure.

Medications that will be used during the procedure are transferred to small cups and placed on the sterile field. Each cup is carefully labeled and documented.

Preventing Hypothermia

Because the operating room is kept at a cool temperature, the patient is at risk for developing **hypothermia** (a body temperature that is too low). Infants, small children, and elderly people are especially sensitive to the cold temperature in the operating room and need additional measures to keep them warm. For example, the room temperature may be raised to keep an infant from getting too cold during surgery.

Warm blankets are used to keep the patient comfortable before the anesthetic is administered and again after the procedure has been completed. During the procedure, a forced-air warming unit (a device that forces warm air through a covering placed over the person) may be used. The use of warm irrigation solutions also helps prevent hypothermia.

Monitoring

During the procedure, surgical team members carefully monitor the patient to prevent complications:

- All team members monitor the sterile field to prevent breaks in sterile technique that could result in a surgical wound infection.
- The anesthesia care provider constantly monitors the amount of blood that the patient loses. Some patients may require blood replacement. Infants and small children are more sensitive to blood loss than other patients.
- The anesthesia care provider also constantly monitors the patient's vital signs and oxygenation status.

Finishing Up

When the surgical procedure is nearly completed, preparation for wound closure occurs. After the closing count is correct, the circulating nurse opens the sterile dressing materials onto the sterile field. The surgeon closes the wound in layers. The anesthesia provider slowly decreases the amount of anesthetic the patient is receiving so he will begin to wake up. After the dressing is applied, the drapes are removed and placed in a facility-approved waste container. The patient's skin is carefully cleaned of any remaining prep solution and blood and then tape or a bandage is applied. If the patient's gown is soiled, it is replaced with a clean gown. The patient is covered with a warm blanket.

Unless the patient is critically ill or has had extensive surgery, the anesthesia provider will have him awake enough to breathe on his own. The patient will still be very sleepy and unable to move if a general or regional anesthetic was used. You will need to assist the surgical team members with carefully transferring the patient from the operating table onto the stretcher or bed. Make sure you keep the patient covered and warm and that you safeguard any tubing or peripheral lines to keep them from being pulled out or disconnected. Remember to fasten the safety strap and raise the side rails on the stretcher before transporting the patient from the operating room.

POST-OPERATIVE PHASE

The post-operative phase begins when the patient is transported to the PACU (recovery room). The patient passes through three phases of recovery:

- **Phase I** care is given immediately after the patient is transferred to the PACU. Phase I patients are generally still deeply affected by the anesthetic and require close monitoring. The patient remains in phase I until his motor and sensory function has returned; he is oriented to person, place, and time; his vital signs are stable; and there are no signs of hemorrhage or other post-operative complications.
- **Phase II** care begins when the patient's condition is stable and he no longer requires intensive monitoring. A patient who has had general or regional anesthesia may still be very sleepy but should arouse easily. Patients who have had local anesthesia may go directly from the operating room to phase II recovery.
- **Phase III** care prepares the patient to be discharged from the facility.

PHASE I

During phase I, the patient is monitored very closely until she is stable and awake. Patients who are recovering from general anesthesia receive supplemental oxygen and are connected to a pulse oximeter and an electrocardiography monitor. The patient's vital signs are measured and recorded immediately after she arrives in the PACU and then again every 5 to 10 minutes as ordered. Dressings, drains, and IV lines are observed, and the type of drainage is noted. Warm blankets or a forced-air warming unit is used to keep the patient warm and reverse the effects of hypothermia (Fig. 10-6).

Figure 10-6
During the post-operative period, the nursing assistant provides warmth and comfort to the patient.

Monitoring the airway and oxygenation status of a patient who is recovering from general anesthesia is very important. Several factors can affect the person's ability to meet his need for oxygen:

- In a person who is unconscious or heavily sedated, the lower jaw can fall open and the tongue can fall backward into the throat, blocking the passage of air into the body. To ensure an open airway, the doctor may order insertion of an oropharyngeal or nasopharyngeal airway (see Chapter 6) until the person is more awake.
- Narcotic medications used during surgery and for pain control may cause the person's respirations to be slow and shallow, limiting his intake of oxygen. Make sure you monitor the person's respiratory rate and depth very carefully and record the pulse oximeter readings. You may need to remind the person to take deep breaths until he is more awake.
- Many patients (especially children) become nauseated and vomit after surgery. A sedated person can easily choke if he vomits. Suction equipment should be available for every patient who has just come from the operating room. If you notice that a patient is starting to vomit, quickly turn him onto his side so that he does not aspirate the vomit into the airway. Use the suction device to clear the vomit from the mouth.

Post-operative hemorrhage, although not very common, can be life threatening and may lead to **hypovolemic shock** (a condition that occurs when the organs and tissues of the body do not receive enough blood, for example, because of blood loss during or after surgery). Hypovolemic shock must be quickly corrected by replacing the fluids and blood that the patient has lost. Hemorrhage can be external (bleeding through the surgical incision or drainage tubes) or internal. Closely monitoring the amount of blood present on dressings and in drainage collection devices is important so excess bleeding can be stopped quickly (Fig. 10-7). Make sure to check the bedding and clothing underneath the patient for blood as well.

Figure 10-7
The health care team monitors the post-operative patient closely for internal or external hemorrhage. Here, a nursing assistant checks the patient's dressing for excessive bleeding.

TELL THE NURSE !

Internal hemorrhage is not as easy to detect as external hemorrhage. The following signs or symptoms may indicate internal hemorrhage and should be reported to the nurse immediately:

- There is increased swelling around the surgical site.
- The patient seems apprehensive or restless.
- The patient is thirsty.
- The patient's skin is cold, moist, and pale.
- The patient's blood pressure is decreased.
- The patient's pulse rate is increased.
- The patient's respirations are deep and rapid.

An increase in a person's blood pressure may also be noted in the immediate post-operative phase. The most common reasons for an increase in blood pressure immediately after surgery are pain, an inability to urinate (a distended bladder), and hypoxia. Make sure you observe the patient for signs of pain. The surgical incision may not be the only source of pain. When you ask the patient if she is in pain, also ask where she is hurting and have her describe the pain. Back or joint pain may result from the way the person was positioned during the surgery, especially if the person is elderly or has arthritis. If the patient is recovering from abdominal surgery and has a distended bladder because of an inability to urinate, the bladder can cause increased pain at the incision site. If the person is unable to void into a urinal or bedpan, a urinary catheter may need to be inserted. Make sure to note the amount, color, and quality of any urine the person voids.

When the patient has fully recovered from the anesthesia, she is ready to be transferred to a hospital room or the phase II section of the PACU to continue recovering from the surgery. The person is considered recovered from the anesthesia when the following criteria are met:

- The person's vital signs become and remain stable.
- The person is oriented to person, place, and time.
- The person's pulse oximetry readings indicate adequate blood oxygenation.
- The person's pain is controlled or minimal.
- Nausea and vomiting are absent or controlled.
- The person has an Aldrete score of 7 or higher (Fig. 10-8).

PHASE II

The length of time required for phase II of recovery depends on the type of surgery performed and the physical condition of the patient. A person who has had a complex surgical procedure or who has many other medical conditions may remain in phase II for several days. A person who is otherwise healthy and has had a minor procedure may only remain in phase II for an hour or so.

During phase II recovery, the patient is monitored for changes in vital signs and signs of complications that can develop later in the post-operative period (Box 10-1). In addition, the health care team works to prevent complications from developing and to promote healing of the incision site (see Chapter 3). The person may need assistance with positioning, nutrition, elimination, hygiene, and ambulation. Guidelines for caring for a patient in phase II of recovery are given in Guidelines Box 10-1.

(Text continues on page 226)

Post-Anesthesia Care Unit

MODIFIED ALDRETE SCORE

Patient: ____________________ Final score: ____________________

Room: ____________________ Surgeon: ____________________

Date: ____________________ PACU nurse: ____________________

Area of Assessment	Point Score	Upon Admission	After 15 min	After 30 min	After 45 min	After 60 min
Activity						
(Able to move spontaneously or on command)						
• Ability to move all extremities	2					
• Ability to move 2 extremities	1					
• Unable to control any extremity	0					
Respiration						
• Ability to breathe deeply and cough	2					
• Limited respiratory effort (dyspnea or splinting)	1					
• No spontaneous effort	0					
Circulation						
• BP ± 20% of preanesthetic level	2					
• BP ± 20%–49% of preanesthetic level	1					
• BP ± 50% of preanesthetic level	0					
Consciousness						
• Fully awake	2					
• Arousable on calling	1					
• Not responding	0					
O_2 Saturation						
• Able to maintain O_2 sat >92% on room air	2					
• Needs O_2 inhalation to maintain O_2 sat >90%	1					
• O_2 sat <90% even with O_2 supplement	0					
Totals:						

Required for discharge from post-anesthesia care unit: 7–8 points

____________________ ____________________

Time of release Signature of nurse

Figure 10-8
The Aldrete scoring system is a tool that can be used to help determine whether the person is ready to move on to phase II of recovery. The patient is evaluated in the areas of activity, respiration, circulation, consciousness, and blood oxygen level (O_2 saturation). When the patient achieves a combined score of 7, he is ready to move on to phase II of recovery. In some facilities, nursing assistants are responsible for helping to complete this form. *BP* = blood pressure.

BOX 10-1 Complications That Can Develop Later in the Post-operative Period

Respiratory Complications

The combined effects of general anesthesia, pain medications, and a painful incision make it difficult for a person who is recovering from surgery to clear the lungs and airways of fluid and mucus. As a result, the person is at risk for developing *pneumonia* (fluid fills the alveoli) or *atelectasis* (collapse of the alveoli). Both atelectasis and pneumonia make it difficult for oxygen to pass into the blood and carbon dioxide to pass out of it.

To prevent fluid and mucus from collecting in the person's lungs, you may need to assist the person with performing respiratory exercises every few hours or as directed. Commonly used respiratory exercises include coughing and deep breathing (the person takes a few deep breaths and then coughs forcefully while supporting the incision site) and incentive spirometry (the person inhales through an incentive spirometer with the goal of causing the balls to rise in the chamber).

Coughing and deep breathing

Incentive spirometry

Cardiovascular Complications

Anesthetic agents, pain medications, and general immobility after surgery can cause the body's circulation to slow down, leading to pooling of the blood in the legs. When blood flow slows and blood pools, a thrombus (blood clot) may form. A thrombus in one of the veins of the legs causes inflammation and pain, a condition known as *thrombophlebitis*. Sometimes the blood clot breaks loose and travels through the bloodstream. When this occurs, the blood clot is known as an *embolus*. An embolus that travels to the brain and gets stuck in one of the blood vessels there can cause a stroke. An embolus that blocks the pulmonary artery (the artery that carries blood from the heart to the lungs so that it can receive oxygen) results in the often-fatal condition known as *pulmonary embolism*. Restlessness and shortness of breath may be signs of pulmonary embolism and should be reported to the nurse immediately.

To prevent blood from pooling in the veins of the legs, you may need to assist the person with performing leg exercises every 1 to 2 hours or as ordered. The doctor may also order the use of anti-embolism (TED) stockings, a sequential compression device (SCD), or both.

Leg exercises

Anti-embolism (TED) stockings

Guidelines Box 10-1 Guidelines for Caring For a Patient in Phase II Recovery

WHAT YOU DO	WHY YOU DO IT
Monitor the person's vital signs every hour for the first 4 hours and then every 4 hours or as ordered.	In a person who is recovering from surgery, a change in a vital sign could be the first sign that the person is developing a post-operative complication.
Position the person comfortably and in a way that will prevent stress on the surgical incision.	A comfortable position and good body alignment help reduce pain. Additional stress on the surgical incision could cause the wound to dehisce ("pop open").
Assist the person with frequent repositioning and respiratory exercises (such as coughing and deep breathing or incentive spirometry) as ordered.	These actions help prevent the person from developing serious respiratory complications, such as pneumonia and atelectasis, after surgery.
Assist the person with applying anti-embolism (TED) stockings or performing leg exercises as ordered.	These actions help prevent the person from developing serious cardiovascular complications, such as thrombus formation or pulmonary embolism, after surgery.
Assist the person with nutrition and hydration as ordered. After the person is able to take fluids orally and is no longer nauseated, he will usually be started on a clear liquid diet. The diet is progressed as the person's condition improves.	Good hydration and nutrition help promote wound healing and recovery.
Observe for signs that the person may be having difficulty voiding and report the person's first voiding after surgery.	Many people have difficulty voiding after surgery. If the person cannot void on his own, a straight catheter may be needed to empty the bladder.
Observe for signs that the person may be constipated.	NPO status, pain medications, and immobility can lead to constipation. Constipation is uncomfortable for the person and can lead to more serious conditions, such as fecal impaction, if it is not relieved.
Measure and record the person's intake and output (I&O) as ordered.	The health care team uses this information to monitor the person's fluid balance.
Assist the person with hygiene as needed.	Assisting with showers, baths, or bed baths reduces the number of microbes on the skin and lowers the person's risk of infection. Assisting with frequent oral care, helping the person wash her face and hands, and promptly changing soiled gowns promotes comfort and health.
Assist the person with ambulation as ordered.	Early and frequent ambulation is helpful in preventing many of the complications that can result from surgery.

PHASE III

The last phase of recovery occurs when the patient is stable enough to return to his home, a long-term care facility, or a sub-acute care facility. The doctor determines that the patient is ready to be discharged from the hospital or PACU. You may be responsible for gathering the person's belongings in preparation for discharge and helping the person to dress. The nurse teaches the patient and family how to continue to provide care at home (Fig. 10-9). For example, the nurse explains:

- How to care for the incision site
- What to do to prevent common complications
- Signs or symptoms of complications that should be reported, and to whom
- Dietary guidelines that should be followed
- How to take any prescribed medications
- Rehabilitation goals and how to achieve these goals
- Follow-up appointments with the surgeon

In addition to a verbal explanation, the nurse provides the patient and family with a written copy of these instructions (Fig. 10-10). In many facilities, the nurse calls the patient a day or so after discharge to make sure that recovery is progressing normally and to answer any additional questions that the patient or family members may have.

Figure 10-9
A nurse teaches a patient and his family member how to care for the incision site, in preparation for discharge from the hospital.

OUTPATIENT DISCHARGE INSTRUCTIONS

1. DIET:
☐ No restrictions
☐ Begin with clear liquid and light foods such as Jello, soup, or toast.
If no nausea, you may progress to a regular diet. Avoid greasy and spicy food.
☐ No alcoholic beverages for 24 hours when taking pain medication.

2. ACTIVITY:
☐ No restrictions
☐ If you received anesthesia or sedation, do not drive, operate machinery, or plan to return to work today.
The medication may affect your judgment and reflexes. Do not make important decisions or sign legal documents today.
☐ Restrict your activities as suggested by your doctor.
☐ Do not drive or operate hazardous machinery for 24 hours after anesthesia or when taking pain medication.
☐ Take deep breaths hourly while awake for first 24 hours.

3. MEDICATIONS:
Rx ________________ **Purpose** ________________
Rx ________________ **Purpose** ________________
Rx ________________ **Purpose** ________________
☐ Eat or drink before taking pain medication to avoid stomach upset.
For less severe pain, take non-prescription, non-aspirin products. Follow directions on label.
☐ When taking pain medication, do not drive. Be careful as you walk or climb stairs. Dizziness can be a side effect.

4. WOUND CARE:
☐ A small amount of bright red blood is to be expected. Do NOT be alarmed.
(If you feel that the amount is excessive, call your doctor.)
☐ Do NOT change your dressing until you are seen by your doctor.
☐ Shower and get incision wet.
☐ Do not drive when eye is patched.
☐ May remove dressing in:________days.
☐ Use walker/crutches________weight bearing as instructed.
☐ Keep operative extremity elevated above heart for________hours.
☐ Ice packs to operative area for________hours________on,________ hours off.
☐ Avoid bending, heavy lifting, and straining.
☐ No water or foreign objects in ear.
☐ D & C and laparoscopic patients may have varying amounts of vaginal drainage for a few days.
☐ Pelvic rest—Nothing in vagina—No intercourse, tampon, or douching.
☐ Change dressing as necessary.
☐ Keep incision dry.
☐ Depth perception may be affected while the eye is patched.
Other ________________________________
Discharge vital signs T________P________R________B/P________________

5. CONTACT YOUR DOCTOR IF ANY OF THE FOLLOWING PROBLEMS OCCUR.
A) Severe pain, unrelieved by pain medication
B) Increased swelling
C) Excessive bleeding (saturating your dressing)
D) Persistent nausea and vomiting (unable to keep liquids down)
E) Temperature elevation over 100.6°F
F) Inability to urinate within 8 hours after discharge
G) Operative extremity becomes cold to touch, blue, tingly or numb
H) Persistent dizziness or fainting continuing into the next day
I) Signs of infection (increased pain, redness, swelling, foul odor, discharge)
J) Difficulty breathing—pain or feeling short of breath

6. FOLLOW UP:
Call Dr.________________ for an appointment in ________________ days/weeks/months. Phone# ________________
If unable to reach your surgeon with a severe or urgent problem, call ________________

Community Resources/Referrals ☐ Yes ☐ No Agency________________ Phone: ________________ ☐ Health Agency
Address:________________________________ Contact:________________________
Other (cast, stoma, wounds equipment, home 0_2, cath care, etc________________________

I have read and understand the above instructions. I have received a copy of these instructions and have possession of all my clothing and valuables.
Signature of responsible adult accompanying patient   Date
Signature of nurse   Date

Davis Hospital and Medical Center
1600 West Antelope Drive
Layton Ut 84041

Lawson# 8000975 Form# 4013887 Rev 01/2007

Figure 10-10
Written instructions like these are given to patients and family members to help them after discharge from the hospital.

SUMMARY

- Surgery is done for many different reasons. Surgery can be done in a hospital, doctor's office or clinic, or ambulatory surgical center (ASC) or outpatient surgical center (OSC). Many surgical patients are admitted and discharged from the facility on the same day.
- The three phases of care for a person having surgery are the pre-operative phase, the intra-operative phase, and the post-operative phase. The term *peri-operative period* is used to describe all three phases as a whole.
- The pre-operative phase begins when the doctor tells the person about the need for surgery and ends when the person actually enters the operating room.
  - Many of the tasks that must be done to prepare the person for surgery may be done before the person arrives at the facility to have the surgery. As a nursing assistant working in any health care setting, you may be responsible for helping patients physically prepare for surgery.
  - Nursing assistants who provide pre-operative care should be alert to comments that a patient or family member makes that indicate concerns or misunderstandings about the planned procedure.
- During the intra-operative phase, surgery actually takes place.
  - The surgical team works together to ensure the patient's safety and comfort during the procedure. Core members of the surgical team include the surgeon, surgical assistant, scrub person, circulating nurse, anesthesia provider, and (in some facilities) nursing assistant.
    - The surgeon, surgical assistant, and scrub person are "sterile" team members, which means they work within the sterile field.
    - Other team members are "non-sterile." These team members assist the sterile team members during the surgical procedure.
  - Infection control is a top priority in the surgical suite.
    - The surgical suite is divided into three zones to help limit the introduction of microbes into the environment. These three zones are the non-restricted zone, semi-restricted zone, and restricted zone.
    - Environmental controls within the restricted area, such as positive-pressure air flow, temperature and humidity control, and special cleaning techniques, help limit the patient's exposure to microbes.
    - The use of surgical ("scrub") attire helps prevent the introduction of microbes into the surgical suite. It also helps limit the health care workers' exposure to microbes. A scrub top, scrub pants, a scrub cap or hood, and a mask are worn inside the operating room. Eye protection is worn to protect the eyes from splashes and sprays during procedures.
- The operating room exposes the people who work there to several occupational hazards, including physical injury, infection, radiation exposure, chemical exposure, and fire. Knowing your facility's policies and following them at all times is the key to keeping yourself and others safe.
- Many measures are taken to keep patients safe and free of pain during procedures.
  - General, regional, or local anesthesia is administered so the patient does not feel pain during the procedure. Anesthesia often leaves the patient unconscious or unable to feel or move parts of his body, leaving him totally dependent on the surgical team for safe care.
  - The patient is positioned on the operating table so that the surgeon can access the surgical site. Care is taken to pad pressure points and to avoid extending the joints past their natural range of motion. The patient is secured with safety straps.
  - The patient's vital signs and the amount of blood lost are carefully monitored throughout the procedure. Measures are taken to prevent hypothermia.
  - The sterile field is monitored and maintained at all times.

- The postoperative phase begins when the patient is transported to the post-anesthesia care unit (PACU).
  - During phase I, the person is monitored closely until she is stable and awake. Monitoring the patient's airway and oxygenation status is very important during phase I.
  - When a person is awake and stable and has an Aldrete score of 7 or more, she is moved to phase II of recovery. The person is monitored for complications of surgery that can develop later in the post-operative period, such as wound dehiscence, thrombus formation, and pulmonary embolism.
  - Phase III recovery begins when the person is stable enough to return to her home, long-term care facility, or extended-care facility. The nurse teaches the patient and family how to continue to provide care at home.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Surgery that must be completed within a few days or weeks is classified as:
a. Elective
b. Optional
c. Urgent
d. Emergent

2. A surgery that is performed to remove or replace tissue to restore function is called:
a. Diagnostic
b. Definitive (curative)
c. Cosmetic
d. Palliative

3. Which one of the following tasks might a nursing assistant be responsible for during the pre-operative phase?
a. Assisting the person to eat something for breakfast
b. Shaving the surgical site
c. Helping the person remove items that are not permitted in surgery and storing those items safely
d. Assisting the person to dress in surgical ("scrub") attire

4. In which area of the surgical suite must health care workers wear masks in addition to surgical scrubs and head coverings?
a. Non-restricted zone
b. Post-anesthesia care unit (PACU)
c. Phase II zone
d. Restricted zone

5. Which type of anesthesia makes the patient totally unconscious?
a. Regional anesthesia
b. General anesthesia
c. Local anesthesia
d. Topical anesthesia

6. Which one of the following tasks might a nursing assistant be responsible for during the intra-operative phase?
a. Opening sterile supplies onto the sterile field
b. Helping to position the patient on the operating table
c. Monitoring the patient's response to the anesthesia
d. Handing the surgeon instruments as they are needed

7. Which of the following is a possible complication of surgery that the health care team monitors for during phase I recovery?
a. Hypovolemic shock
b. Pulmonary embolism
c. Pneumonia
d. Hyperthermia

8. A nursing assistant who is working in the operating room is allowed to wear all of the following EXCEPT:
a. A form-fitting scrub top
b. A scrub jacket
c. Disposable shoe covers
d. Artificial nails

9. Which of the following measures is taken in the surgical suite to reduce the patient's exposure to microbes?
   a. Negative-pressure ventilation
   b. Use of protective eyewear
   c. Division of the surgical suite into non-restricted, semi-restricted, and restricted zones
   d. Soaking surgical instruments in disinfectant in between procedures

10. When is a patient ready to move to phase II recovery?
   a. After the nurse has explained to the patient and family how to continue to care for the surgical wound at home
   b. When the patient is oriented to person, place, and time
   c. As soon as the surgical incision has been closed and dressed
   d. As soon as the person is able to void

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Pre-operative phase
_____ **2.** Intra-operative phase
_____ **3.** Post-operative phase
_____ **4.** Phase I recovery
_____ **5.** Phase II recovery
_____ **6.** Phase III recovery

a. After the patient is stable and awake, he is transferred here to continue recovery
b. This surgical phase begins when the patient is transferred into the operating room and onto the operating table
c. The goal during this phase is to provide care for the patient until his motor and sensory function returns
d. This surgical phase begins when the patient learns of the need for surgery
e. The goal during this phase is to prepare the patient to be discharged from the facility
f. This surgical phase begins when the surgical procedure is completed

STOP and Think!

1. Anna, a nursing assistant working in the pre-operative area of the surgical suite, is helping prepare Mrs. Madson for a surgical procedure. As Anna takes Mrs. Madson's vital signs, she notices that Mrs. Madson seems quite anxious. Because Anna is always concerned about what her patients are thinking and feeling, she says, "Mrs. Madson, you seem a little bit nervous!" Mrs. Madson replies, "I wish someone would tell me more about this procedure. I'm not sure why I even need it! Isn't there any other way to treat this problem?" In this scenario, what did Anna do right? Should the procedure continue as planned because Mrs. Madson has given informed consent for the procedure? What should Anna do next?

2. You work as a surgical aide in a busy surgical suite. It has already been a frustrating day because an earlier emergency procedure has caused all of the day's other scheduled surgeries to be delayed. The surgeon who will be performing the next surgical procedure in Room 5 is in the hall, loudly complaining that it is taking too long to get the room ready for his patient. You are responsible for cleaning the room in between surgical procedures. You could speed things up by only wiping off a few things instead of everything in the room. What might happen if you take these shortcuts? What should you do?

3. You are working in the phase I recovery room. Tuesdays are always very busy because the ear, nose, and throat (ENT) surgeon schedules for this day all the children who need their adenoids and tonsils removed. You know from experience that many of these children vomit after surgery. What are some things that can be done to prevent aspiration? What should you do if a child starts to vomit?

CHAPTER

11

Care of the Pediatric Patient

WHAT WILL YOU LEARN?

Pediatric patients are children and adolescents. Pediatrics has become a specialty because special considerations must be taken into account when providing treatment and care for children. A child's body does not function in exactly the same way an adult's does, and children and teenagers are at risk for some diseases that adults are not. As a nursing assistant working in an advanced care setting, you may have the opportunity to care for children. In this chapter, we will review some of the special needs of pediatric patients and their families, as well as some of the common disorders that affect children. When you are finished with this chapter, you will be able to:

1. Describe some of the ways a pediatric unit differs from an adult unit in an advanced care facility.
2. Discuss the effects of hospitalization on the child and family.

A child may require care in an advanced care setting.

3. Discuss fears that hospitalized children commonly experience.
4. Describe the importance of play for children in an advanced care setting.
5. Discuss the different ways that children express pain.
6. Describe the nursing assistant's role in helping to minimize a child's pain.
7. Describe some of the special considerations that a nursing assistant must take into account when providing basic nursing care for a pediatric patient.
8. Describe some of the most common respiratory, cardiovascular, neurologic, gastrointestinal, endocrine, genitourinary, and musculoskeletal disorders that can affect children.
9. Discuss the special care needs that children who have cancer may have.
10. Discuss signs of child abuse and the nursing assistant's role in reporting suspected abuse.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Rooming-in
Mutilation
Therapeutic play
Anomaly
Bronchiolitis
Croup
Epiglottitis
Cystic fibrosis
Patent
Patent foramen ovale
Patent ductus arteriosus
Coarctation of the aorta
Tetralogy of Fallot
Transposition of the great arteries
Meningitis
Lumbar puncture
Rotavirus
Atresia
Esophageal atresia
Imperforate anus (anal atresia)
Omphalocele
Appendicitis
Peritonitis
Appendectomy
Cryptorchidism
Hypospadias
Epispadias
Hip dysplasia
Reverse (protective) isolation

THE PEDIATRIC UNIT

Many advanced care facilities provide care for patients of all ages. These facilities usually have a specific unit set aside to care for pediatric patients. Children with many different types of diseases or disorders are admitted to the pediatric unit for care.

Some facilities provide care only for children. In a facility like this, patients are usually admitted to units according to the type of care they need. For example, there may be a neurology unit, a burn unit, a cardiac intensive care unit, a cancer unit, and a trauma unit.

Units that provide pediatric care are usually decorated in child-friendly colors and designs (Fig. 11-1). In addition, the health care workers on the unit usually wear brightly colored uniforms, often with cartoon characters or animals on the tops. The equipment, beds, and bathroom facilities are sized appropriately for children.

Most pediatric units have central activity areas. A play area may contain toys and activities that are suitable for younger children (Fig. 11-2A). Older children and adolescents may have their own area where they can read magazines, play video games, or use computers (see Fig. 11-2B).

Most pediatric units also make accommodations so that a family caregiver can stay overnight with the child in the hospital. This is called **rooming-in**. The child's room contains a chair that can be pulled out into a bed, or an additional bed (Fig. 11-3). Meals ("parent trays") can be ordered through the dietary department so that the family caregiver and child can eat together. Rooming-in is important because having a family caregiver nearby helps relieve some of the stress and anxiety the child might have as a result of being ill and hospitalized.

EFFECTS OF HOSPITALIZATION ON THE CHILD AND FAMILY

A child's illness or injury, especially if it results in the need for hospitalization, is very stressful for the child and family. When caring for children and their families, it is important to remember

Figure 11-1
Pediatric units are designed to create a welcoming, comfortable environment for children. (*Photograph courtesy of Primary Children's Medical Center, Salt Lake City, Utah.*)

Figure 11-3
Many pediatric units make accommodations for family caregivers to spend the night. (*Photo courtesy of The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania.*)

A

B

Figure 11-2
Most pediatric units have central activity areas where patients on the unit can socialize. (**A**) A play area for younger children. (**B**) An activity area for older children and adolescents. (*Part B, AP Photo/Elise Amendola.*)

that families come in all different shapes and sizes. Families can consist of one parent or two. Many children are raised by people other than their parents, such as grandparents or other relatives, guardians, foster parents, or other caregivers. Regardless of the family structure, the effects of the child's illness on the child and on the people who care about the child are the same.

EFFECTS OF HOSPITALIZATION ON THE CHILD

Children, especially young children, become stressed when they are separated from their family caregivers. Most young children who are separated from their family caregivers go through three stages:

- **Protest.** The child will usually cry and often refuses to be comforted by other people. She will actively look for the caregiver and keep asking for her.
- **Despair.** The child becomes depressed and listless. The child thinks that the caregiver will not be coming back.
- **Denial.** The child seems to be feeling better about the situation and takes an interest in her surroundings. She may interact with health care workers and take part in activities. However, when the caregiver does return, the child may reject her. It may take a while before the child trusts that the caregiver will not leave her again. The child's reaction can be very difficult for the caregiver, especially if the caregiver could not avoid leaving the child in the hospital for a period of time. It is important to reassure the caregiver that the child's behavior is normal.

Older children and adolescents can be affected by separation from a caregiver as well. An older child or adolescent may act like he does not care, but he may be feeling very frightened and alone.

EFFECTS OF A CHILD'S HOSPITALIZATION ON THE FAMILY

Family members also experience a great deal of stress when a child is hospitalized. Often the child's family caregivers feel very overwhelmed by a child's illness or injury. They may blame themselves for a child's injury or think they did not seek medical care soon enough for an illness. Watching a child suffer or struggle to recover can make caregivers feel helpless. Many caregivers hesitate to leave the child's bedside. Reassure them that you will watch over the child while they take a break. Leaving the facility for a meal, a shower, or some sleep can do wonders for a caregiver's state of mind.

Encouraging and allowing a family caregiver to stay with the child and participate in the child's care is an important part of caring for a child. The family caregiver provides emotional security and stability for the child. In addition, being actively involved in the child's care can help the family caregiver feel less helpless. A family caregiver should never be forced to participate in providing care, but if the caregiver shows interest in helping to provide care, you should encourage that interest.

Stress can cause caregivers to act in unpleasant ways. The caregiver may become angry and lash out at you or other health care workers. She may question every move you make and suggest that you are doing things the wrong way. Other caregivers become depressed and withdrawn and seem to have no interest in the child or the child's care. Be careful not to be judgmental of the caregiver's behavior. Instead, try to understand the source of the behavior and report any behavior that concerns you to the nurse. Many facilities have counselors and social workers who are able to help caregivers manage the stress of having a sick or injured child.

FEARS OF THE HOSPITALIZED CHILD

A child who is hospitalized may have many fears.

PAIN

Many children associate doctors, nurses, and other health care workers with painful procedures, such as injections. A child who has experienced a painful procedure in the past will expect future procedures to be painful as well. The equipment used for some procedures might look like it will cause pain, even if the procedure is actually not painful. Be honest with the child about how much the procedure is going to hurt. If you say, "This won't hurt a bit" and then the procedure does hurt, the child will not be able to trust you in the future. Instead, let the child know what to expect (for example, by saying, "You are going to feel a pinch, and then it will be over.")

PUNISHMENT

Many preschoolers and younger school-age children view surgery and other painful procedures as forms of punishment. At this stage of development, the child is beginning to learn that actions (such as misbehaving) result in consequences. As a result, the child may believe that a procedure is necessary because of something he did. Also, sometimes parents make the mistake of saying things like, "If you don't behave, the nurse will have to give you a shot." Statements like this relate the procedure to the child's behavior, when actually, there is no connection between the two. It is important to reassure the child that he did nothing wrong and that the procedure is just to help him get better.

MUTILATION

Many preschoolers and young school-age children who are hospitalized fear **mutilation** (physical injury resulting in a permanent change in appearance). Children in these age groups have very active imaginations and worry that someone will "cut off" a body part while they are hospitalized, especially if they need surgery. When discussing surgery or another procedure with a child of this age, tell the child the procedure is to "fix" the disorder, not to "cut it out." Most children this age are very interested in seeing the surgical wound after the procedure. Looking at the incision site after the procedure and seeing that everything is actually "fixed" and put back together can be very reassuring to the child.

Although older children and adolescents have a more realistic view of what a procedure involves, they still have fears related to mutilation. An older school-age child or adolescent may worry that a procedure will alter her appearance and that other kids will make fun of her. For example, some procedures require hair to be removed from the head. While one child may think his new "look" is exciting, another may be very upset at the thought of having his head shaved. When caring for an older child or adolescent, be sensitive to the fact that body image may be a huge concern for your patient.

DEATH

For many children, their only past experience with a hospital might have been going there to visit someone who later died, or being told that "Grandpa died in the hospital." As a result, many children fear that they, too, will die because "people die in the hospital." A child may also have been told that someone who died "went to sleep and never woke up" or that an injured or sick pet had to be "put to sleep." If a young child is going to have general anesthesia, avoid telling the child that the doctor is going to "put him to sleep." Instead, tell the child that the doctor will give him medicine to help him take a nap and that he will wake up when the surgery is finished.

THE IMPORTANCE OF PLAY

It has been said that "play is the business of children." Children use play to help them learn, grow, develop, act out feelings, and work through problems. Play is especially important for hospitalized children. Play helps them relieve boredom. It also helps to minimize the stress of illness and hospitalization and allows children to feel in charge and in control. For example, playing with toy hospital equipment can help children work through their feelings associated with being hospitalized and help them feel like they can control part of that experience (Fig. 11-4).

The central activity area gives children the chance to play and socialize with each other. If a child is unable to go to the central activity area (for example, because he has a contagious disease),

Figure 11-4
Playing helps children work through their emotions.

Figure 11-5
Therapeutic play involves using play to help a child understand what is going to happen to him. Here, a nurse is using a doll to help a child with cancer understand the effects of chemotherapy.

age-appropriate toys and activities should be brought to the child's room. You should take the opportunity to play with all of your young patients while you are in the room providing other care. Reading a story or coloring a picture together lets the child know that you care about her and can help her feel less frightened and alone.

Therapeutic play is a play technique that is often used to help a child have a better understanding of a treatment or surgical procedure. For example, dolls with visible organ systems can be used to help a child understand how the doctor will "fix" something that is wrong. Reading an age-appropriate book about a child who went through a similar experience can also be reassuring to the child. Any type of play that increases the child's understanding of what is going to happen will help decrease the child's anxiety (Fig. 11-5).

PAIN AND THE PEDIATRIC PATIENT

Children, like other patients, can experience pain as a result of procedures, treatments, or the disease or disorder itself. Many children will not complain of pain because they are afraid that they will have to get an injection (more pain) or that they will have to stay in the hospital for a longer period of time. Younger children may not have the vocabulary they need to be able to explain where the pain is or how much it hurts. Older children and adolescents may not complain of pain for fear that complaining makes them seem "childish." Pediatric patients, like all patients, respond to pain in individual ways.

When caring for children, especially infants and toddlers, you should be especially aware of facial expressions and behaviors that indicate pain. An infant's facial expression is often the first clue you may have that the infant is uncomfortable or in pain. The infant may also express pain by drawing the knees up toward the abdomen, squirming, or writhing; becoming restless; or crying or screaming loudly. Even if the infant is easily comforted, he may still be in considerable pain.

Toddlers may be quite dramatic when responding to pain, whether the pain is real or anticipated. A toddler who has had a painful experience remembers the pain and will expect other experiences to be painful as well. Therefore, the toddler may cry and physically resist a procedure, even one that is not painful. A toddler who is in pain may act aggressively or show body language that indicates pain (for example, grimacing, clenching the teeth, opening the eyes wide, rocking back and forth, or rubbing the painful area). Although the toddler may not be able to tell you where he hurts, he may be able to point to the area.

Older children are more likely to be able to use verbal statements to express pain. When discussing pain with a younger child, it is often helpful to use words the child is familiar with, such as "boo-boo" or "owie." One tool that is useful for helping a child describe the amount of pain she is experiencing is the FACES pain rating scale (Fig. 11-6). The child points to the face on the scale that most closely represents how she feels about the pain.

As always, if you think that one of your patients is in pain, you should report it to the nurse immediately so that steps can be taken to identify the source of the pain and treat it. In addition to reporting pain, there are many other things you can do to help a child who is in pain. Repositioning and using supportive devices can help to improve comfort. Many children are soothed by a massage or simply a gentle touch. Smaller children may be comforted by being held or rocked. Activities, such as talking, playing, listening to music, reading stories, or watching television, can help distract the child from the pain.

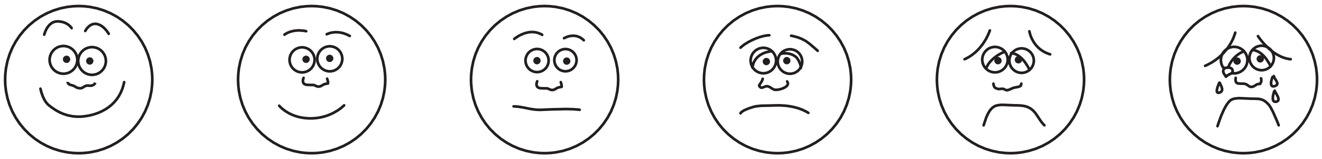


Figure 11-6
The FACES pain rating scale is often used to help children communicate the amount of pain they are having. The child chooses the face that best describes his pain. (*From Hockenberry MJ, Wilson D, Winkelstein ML:* Wong's Essentials of Pediatric Nursing, *ed. 7, St. Louis, 2005, p. 1259. Used with permission. Copyright, Mosby.*)

THE ROLE OF THE NURSING ASSISTANT IN CARING FOR PEDIATRIC PATIENTS

The duties required of a nursing assistant employed on a pediatric unit vary greatly from facility to facility. For example, on a unit that provides care for critically ill children, the nurses may be responsible for providing most of the physical care to the patients. Your responsibilities may have very little to do with direct patient care. Instead, they may be more clerical in nature. However, on other types of pediatric units, you may be responsible for assisting the nurse by providing basic nursing care, just as in any other care setting. Special considerations for some of the tasks you might be responsible for when caring for pediatric patients are described in the sections that follow. As you know from your basic training, when caring for a child, you must consider the child's developmental stage. Special considerations for each developmental stage are given in Table 11-1.

ASSISTING WITH NUTRITION

Like all patients, children who are hospitalized need adequate nutrition to heal. Many children are "picky" eaters even when they are healthy. Being sick and in the hospital can further decrease a child's appetite. If the child does not have any dietary restrictions, family caregivers may be encouraged to bring in favorite foods and snacks from home to tempt the child to eat. Offering small amounts of favorite foods that are high in nutritional value frequently throughout the day often results in a much greater intake of food. Many sick children are also often a bit dehydrated and need to increase their intake of fluids. Offering favorite drinks in small amounts is useful. Many children enjoy eating popsicles, ice cream, gelatin, and pudding, all of which count toward liquid intake (Fig. 11-7). If you are responsible for assisting with nutrition, make sure you measure and record the child's food and liquid intake accurately and remind family caregivers to do the same.

Figure 11-7
Popsicles, gelatin, pudding, and ice cream are all treats that count toward a child's fluid intake. (*Index Stock Imagery, Inc.*)

Table 11-1 Special Considerations by Developmental Stage

DEVELOPMENTAL STAGE	CONSIDERATIONS RELATED TO MEETING THE CHILD'S PHYSICAL NEEDS	CONSIDERATIONS RELATED TO MEETING THE CHILD'S EMOTIONAL NEEDS	SAFETY CONSIDERATIONS
Infant (0–1 year)	• Completely dependent on the caregiver to meet basic physical needs	• Needs to feel secure • Needs to be spoken or sung to softly, held, and rocked	• At risk for rolling off surfaces, choking, suffocating, and drowning
Toddler (1–3 years)	• Learning how to perform activities of daily living (ADLs), such as dressing and using the toilet, but still needs help meeting most physical needs • May have limited appetite; "finger foods," such as crackers, dry cereal, and cut-up fruit, can help toddlers meet their nutritional needs	• Regression (returning to an earlier stage of development) is a common way of coping with stress • It is important to allow the toddler to remain as independent as possible by providing realistic, limited choices ("Do you want to wear your red pajamas or the blue ones?") • Are often afraid of strangers and prefer their regular caregivers; may be more cooperative during procedures if they are allowed to sit in caregiver's lap and handle equipment before it is used • Can become bored quickly; blocks, simple puzzles, stuffed toys, and "sing-alongs" can help ease boredom	• At risk for accidental poisoning, choking, drowning, suffocating, electrocution, and wandering away • Restraints may be needed to prevent removal of lines, drains, catheters, and other medical devices
Preschooler (3–5 years)	• May need help with ADLs if sick or injured • May be a "picky" eater; offering small amounts of nutritious foods throughout the day can help preschoolers meet their nutritional needs	• May fear having a body part "cut off" or view the hospital as a place where people go to die • May think that illness, surgery, or a painful procedure is punishment for being "bad" • Need questions answered simply and honestly • Because preschoolers like physical activity, being confined to bed can lead to boredom; activities such as arts and crafts, games, movies, and television can help ease boredom	• Able to follow the "rules of safety" if these are explained but still needs supervision
School-age child (5–12 years)	• May need help with ADLs if sick or injured	• Very independent; likely to resist asking for help • Expect direct, simple answers to questions • Rewards and praise work well with children of this age • Reading, arts and crafts, video games, and visits and cards from friends and family can help relieve boredom	• In a health care setting, the desire to be independent can put school-age children at risk for injuries such as falling
Adolescent (12–20 years)	• May need help with ADLs if sick or injured • Offering "teen-friendly" yet nutritious foods, such as pizza, milkshakes, yogurt, peanut butter and crackers, cheese, fruit, and ice cream, can help adolescents meet their nutritional needs	• Likely to be very self-conscious about exposing the body; make a special effort to preserve modesty • Need to be involved in decisions regarding their care; need to feel that their opinions count • Tears and anger may be used as coping mechanisms for situations that seem frightening or out of control	• In a health care setting, most adolescents are fairly safe • May need to be observed closely for depression, suicide attempts, and attempts to obtain medication that is not needed

If a child is not able to take food or fluids orally for a period of time, enteral feedings might be provided through a nasogastric tube or a gastrostomy tube. If you are caring for a child who is receiving enteral feedings, make sure you are aware of any special positioning requirements during and after the feeding.

ASSISTING WITH ELIMINATION

Because of the strange environment, a child's normal voiding and bowel elimination patterns may be altered. Children who are potty trained may regress and revert back to wetting or soiling their pants. Reassure the family caregivers that this type of behavior is a normal reaction to the stress of being ill or hospitalized.

Many pediatric patients have conditions that make monitoring fluid balance important. You may be asked to assist by measuring the child's urine output. Accurately measuring the child's urine output is essential because the health care team will use this information to make sure the child's fluid balance is adequate. The child can urinate into a potty chair, bedpan, or urinary collection device that has been placed on the toilet. You may be asked to weigh an infant's diapers to determine urine output. Remind family caregivers not to dispose of urine until you have had a chance to observe the urine and measure and record the amount.

ASSISTING WITH PROCEDURES

You may be responsible for helping to position or hold a child for a procedure. You must hold the child gently but securely. Many children react to painful or frightening procedures quite aggressively and may bite, pinch, hit, or kick to break loose from your grip. The child must remain completely still so the procedure can be completed safely and accurately.

ASSISTING WITH RESTRAINTS

Restraints may be necessary to keep a younger child from removing catheters and tubes that are necessary for treatment. Elbow restraints are used quite frequently. Sometimes jacket restraints are used to keep an infant or toddler from climbing or falling out of a crib or chair. As with all patients, restraints are considered a last resort, and alternatives to restraints are tried first. When caring for a child who has been restrained, be sure to follow your facility's policy exactly and remember the basic safety rules that apply to the use of restraints that you learned as part of your basic training.

Care Alert!

RESTRAINTS, especially when used on small children, are extremely dangerous. Check on a child who is restrained at least every 10 minutes, and remove the restraint for a short period of time every 2 hours.

ASSISTING WITH TRANSPORT

Children may need to be transported from one area to another in the health care facility. Infants can either be carried or transported in their bassinets. Older infants and toddlers can be transported in special cribs that have high rails or a plastic top (Fig. 11-8A). Many facilities use wagons to transport children (see Fig. 11-8B). Make sure that the child is able to sit in the wagon steadily so he does not topple over and fall out. A child who is too ill to sit up can be placed in the wagon with pillows and can ride lying down. Strollers and small wheelchairs can also be used for transporting young children. Older children and adolescents can be transported in wheelchairs or on stretchers. When transporting a child, regardless of her age or the method of transport, make sure the safety straps are secured and side rails, if applicable, are up. Never leave a child alone during transport.

COMMON DISORDERS AFFECTING CHILDREN

A child may require care in an advanced care setting for many different reasons. The primary reasons that children require care in an advanced care setting are:

- **Congenital disorders.** A congenital disorder is one that is present at birth.

A

B

Figure 11-8
Special devices are sometimes used to transport young children. (**A**) A crib with high rails. (**B**) A wagon. No matter what method of transport is used, always observe standard safety precautions, such as securing safety straps and raising side rails. Never leave a child unattended in a transport device.

Many congenital disorders involve physical anomalies. An **anomaly** is something that is different (in this case, anatomy that differs from what is normally expected). Examples of physical anomalies include a "hole in the heart" and cleft lip and palate. A child who is born with a physical anomaly may need one or more surgeries to repair the anomaly so he can grow and function normally.

- **Trauma.** Injuries resulting from accidents are the leading cause of death and disability in children. Fractures or traumatic brain injury (TBI) can result from accidents that occur while a child is playing (for example, falling from a tree or bicycle or darting into the path of a car to chase a ball). Burns, near-drowning, and accidental poisoning are other reasons a child may be hospitalized.
- **Infectious disease.** Some infections are seen in people of all ages, including children. Other infections tend to affect only children, often children of a specific age. Many infections are more severe in children or cause complications (such as dehydration or difficulty breathing) that make hospitalization necessary.
- **Chronic illness and developmental disabilities.** Chronic illnesses (such as diabetes, cystic fibrosis, asthma, and juvenile rheumatoid arthritis) and developmental disabilities (such as Down syndrome, cerebral palsy, and spina bifida) can lead to more frequent hospitalizations. Children with chronic illnesses or developmental disabilities may be more likely to get certain types of infections or other illnesses, and these infections or illnesses may be more difficult to treat. "Flare-ups" of a chronic condition, or complications resulting from that condition, can also lead to many hospital admissions.
- **Cancer.** Cancer does not occur as frequently in children as it does in adults, although some types of cancer affect mostly children.

In the sections that follow, we will introduce you to some of the most common disorders that could cause a child to be admitted to the pediatric unit of a general hospital. As you care for children with these disorders (or others not discussed here), make an effort to learn more about their conditions. For example, you might ask the nurse if she can explain the child's condition to you more fully, or you can look the condition up in journal articles or books. Increasing your knowledge about the types of conditions you see most frequently in your facility allows you to provide better care for your patients.

RESPIRATORY DISORDERS

Respiratory disorders are the most common cause of emergency hospital admissions for children. Most respiratory disorders in children are the result of a viral or bacterial infection. A respiratory infection can worsen very quickly in a small child, causing acute respiratory distress that is very frightening for both the child and the family.

TELL THE NURSE !

When caring for a child with a respiratory disorder, be sure to report any of the following signs or symptoms to the nurse right away:

- The child is having difficulty breathing.
- The child's lips appear blue (cyanosis).
- There is a change in the child's vital signs.
- The child is becoming restless.

Respiratory Syncytial Virus (RSV)

Respiratory syncytial virus (RSV) can cause **bronchiolitis** (inflammation of the bronchioles, the tiny airways that lead to the alveoli in the lungs) and pneumonia (inflammation of the lungs) in very young children. It is most common in children 6 months of age or younger and is rarely seen in healthy children older than 2 years. RSV produces very thick mucus that quickly plugs the bronchioles, making it difficult for the child to breathe.

Because RSV is caused by a virus, antibiotics are not effective. Instead, the doctor may order an antiviral medication. A peripheral line is usually inserted to give the child fluids. Pulse oximetry is used to monitor the child's blood oxygen level. The child may be placed in a mist tent, which is a tent-like structure over the bed or crib that is made of clear heavy plastic supported by a frame (Fig. 11-9). Humidified air, or mist, is mixed with extra oxygen and pumped into the tent for the child to breathe. The fluids and extra humidity help to thin the mucus, making coughing more effective. Because of the extra moisture in the air inside the mist tent, you will need to change the child's clothing and bedding frequently to prevent skin irritation from contact with wet clothing and linens.

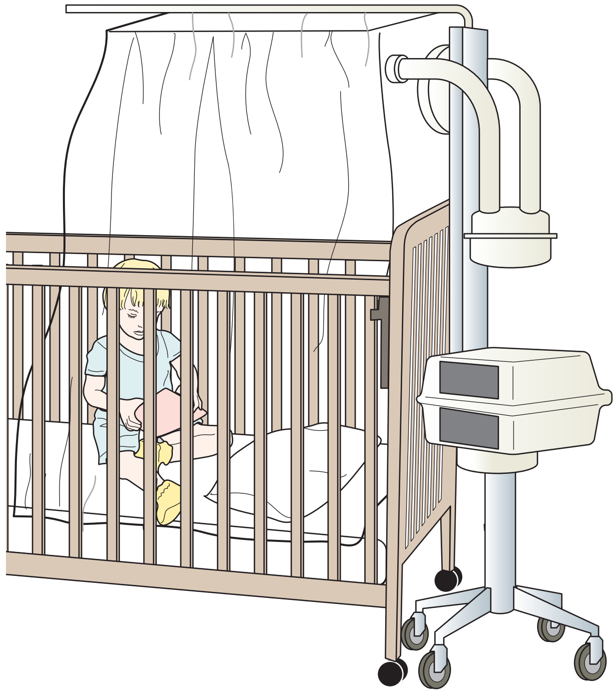


Figure 11-9
A mist tent may be used to increase the oxygen and humidity content of the air a child breathes.

Croup

Croup is the general name for a group of disorders caused by viral or bacterial infection of the upper respiratory tract (that is, the larynx, epiglottis, trachea, or bronchi). Croup typically affects children younger than 3 years. A child with croup will have a harsh, bark-like cough and difficulty breathing. Most types of croup are very effectively treated by using humidified air. The child's oxygenation status is continuously monitored with a pulse oximeter, and a mist tent may be used to provide extra humidity and oxygen.

Epiglottitis is a form of croup that is caused by *Haemophilus influenzae* type B, a type of bacteria. The infection causes inflammation of the epiglottis, the flap of cartilage that covers the opening to the larynx. Epiglottitis is a medical emergency because the swollen, enlarged epiglottis can block the airway, preventing air from reaching the lungs. Steps must be taken to open and maintain the child's airway. If intubation is successful, the child may be sedated and placed on a ventilator for a short time until treatment with antibiotics and steroids reduces the swelling. In severe cases, an emergency tracheostomy may be necessary.

Asthma

Many children have asthma, a condition that affects the bronchi and bronchioles. In people with asthma, triggers (such as allergies, activity, smoke, or weather changes) cause the bronchi and bronchioles to constrict. This makes breathing difficult because air does not flow freely through the airway. An asthma attack can be very frightening for both the child and the family because the child cannot breathe.

An acute asthma attack is usually treated with inhaled medications called bronchodilators. When a child has been diagnosed with asthma, the caregivers (and child, if he is old enough) are taught how to use the inhaler to stop an asthma attack. However, if the attack is very severe and the child does not respond to the inhaled medication, he may be admitted to the hospital for additional treatment. In addition, children with asthma are often admitted to the hospital for the treatment of respiratory infections, which are often more frequent and more severe in children with asthma. The child may be hospitalized to receive breathing treatments and supplemental oxygen.

A child who has recently had an asthma attack that resulted in difficulty breathing may be very worried about being left alone. Checking on the child frequently and responding promptly to the call light helps reassure the child that you will come quickly if he has trouble breathing again.

Cystic Fibrosis

Cystic fibrosis is an inherited disorder that affects the body's exocrine glands. The exocrine glands produce substances and release them into a hollow organ or onto a surface. Examples of exocrine glands include the salivary glands (which produce saliva), the sweat glands (which produce sweat), the mucous glands (which produce mucus), the liver (which produces bile), and the pancreas (which produces digestive enzymes).

A child with cystic fibrosis is likely to be hospitalized many times for the treatment of respiratory, gastrointestinal, and nutritional problems. In a child with cystic fibrosis, the body's mucous glands produce mucus that is abnormally thick and sticky. This mucus blocks the airways in the lungs, causing airway obstruction and putting the child at increased risk for severe respiratory infections. The thick, sticky mucus also blocks the ducts that allow bile and digestive enzymes to move from the liver and pancreas into the intestines. This affects the body's ability to break down and absorb the nutrients in food.

CARDIOVASCULAR DISORDERS

Most cardiovascular disorders in children are congenital and involve a physical anomaly in the structure of the heart, the large blood vessels that carry blood from the heart, or both. When a child has multiple anomalies or the anomaly is severe, the heart is not be able to send enough oxygen-rich blood to the body's tissues, and the child shows signs and symptoms of the disorder in infancy. For example, an infant may become cyanotic because the tissues of the body are not receiving enough oxygen. Immediate surgical repair may be necessary to give the infant a chance of survival.

In other cases, the physical anomaly is less serious. The child may not show signs and symptoms until later in life, if at all. Surgery to repair the anomaly may be delayed or may not be necessary at all.

When caring for a child with a cardiovascular disorder, you should frequently check the child's blood oxygen level and vital signs. Be especially observant for cyanosis ("blue baby") or difficulty breathing. The child may become tired very easily and may need frequent rest periods. Small, frequent feedings help the child meet her nutritional needs and are less tiring. Elevating the head of the bed or crib may make breathing easier. The doctor may also prescribe supplemental oxygen.

Some of the more common congenital heart anomalies are described in the sections that follow.

Septal Anomalies

When a baby's heart is developing, during the very early stages of pregnancy, a wall (or "septum") is formed that separates the right side of the heart from the left side. A septal anomaly (or "hole in the heart") is an opening in this wall that should not be there after the baby is born. Common septal anomalies include patent foramen ovale and ventricular septal defect.

Patent foramen ovale

In the developing fetus, a small opening in the septum called the *foramen ovale* allows blood that enters the right atrium to pass across to the left atrium and bypass the baby's lungs. Because the baby receives oxygen from the mother through the placenta, he does not need to pump the blood through his own lungs. However, after the baby is born, the blood must pass through the baby's lungs to receive oxygen. Normally, the foramen ovale closes within 24 hours of the baby's birth, and the pattern of circulation that you are already familiar with begins (that is, right atrium → right ventricle → pulmonary artery → lungs → pulmonary vein → left atrium → left ventricle → out to body). However, sometimes the foramen ovale fails to close and remains **patent** (open), resulting in the condition known as **patent foramen ovale**. Because the pressures in the left side of the heart are greater than those in the right side after birth, the oxygenated blood that enters the left atrium from the lungs flows into the right atrium through the patent foramen ovale and circulates back through the lungs instead of being pumped out to the tissues in the rest of the body (Fig. 11-10). If the child has signs or symptoms as a result of the patent foramen ovale, surgery may be done to repair the anomaly.

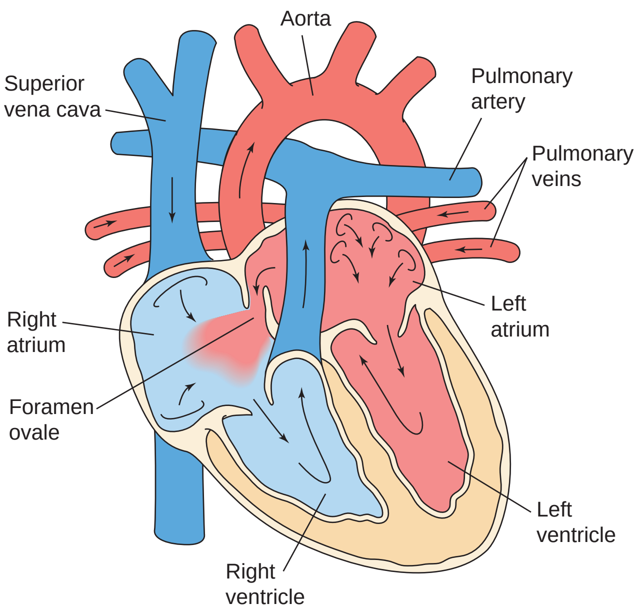


Figure 11-10
The foramen ovale is an opening between the two atria that is present during fetal development. Normally, it closes after the baby is born. If it does not close, the condition known as patent foramen ovale results. In this condition, some of the oxygenated blood (*red*) that enters the left atrium from the pulmonary vein flows back into the right atrium instead of being pumped into the left ventricle and out to the rest of the body.

Ventricular septal defect

Occasionally, the septum that separates the ventricles fails to form properly, causing a ventricular septal defect. As with patent foramen ovale, blood passes from the left side of the heart to the right side of the heart through the opening in the wall. Small ventricular septal defects may require no treatment. Larger defects are usually repaired when the child is between 18 and 24 months old.

Disorders of the Great Vessels

Structural anomalies of the large blood vessels that carry blood away from the heart can also cause circulatory problems.

Patent ductus arteriosus

In the developing fetus, a vessel called the *ductus arteriosus* connects the left pulmonary artery to the aorta. The ductus arteriosus lets oxygenated blood from the mother pass directly into the aorta, bypassing the baby's lungs. After the baby is born and the baby's heart begins to pump blood through the lungs, the ductus arteriosus normally closes. However, in some cases, the ductus arteriosus remains patent, or open, resulting in the condition known as **patent ductus arteriosus** (Fig. 11-11). This allows oxygenated blood to flow from the aorta into the pulmonary artery, where it re-circulates through the lungs instead of going out to the body. Many children grow to adulthood with this disorder and do not have any signs, symptoms, or complications. Other children have signs, symptoms, or complications and need to have surgery to close off the ductus arteriosus.

Coarctation of the aorta

Coarctation of the aorta is a narrowing of the aorta shortly after it leaves the left ventricle (Fig. 11-12). Because of the narrowing of the aorta, the left ventricle has to work against extra pressure to pump blood to the body. As time goes on, the left ventricle may pump less effectively, causing left-sided (congestive) heart failure to develop. Many children show no signs or symptoms until late childhood or young adulthood, at which time surgery is usually done to correct the problem. If the narrowing of the aorta is very severe, the child will show signs and symptoms (such as dyspnea, cyanosis, and tachycardia) as an infant and will need surgery to repair the aorta.

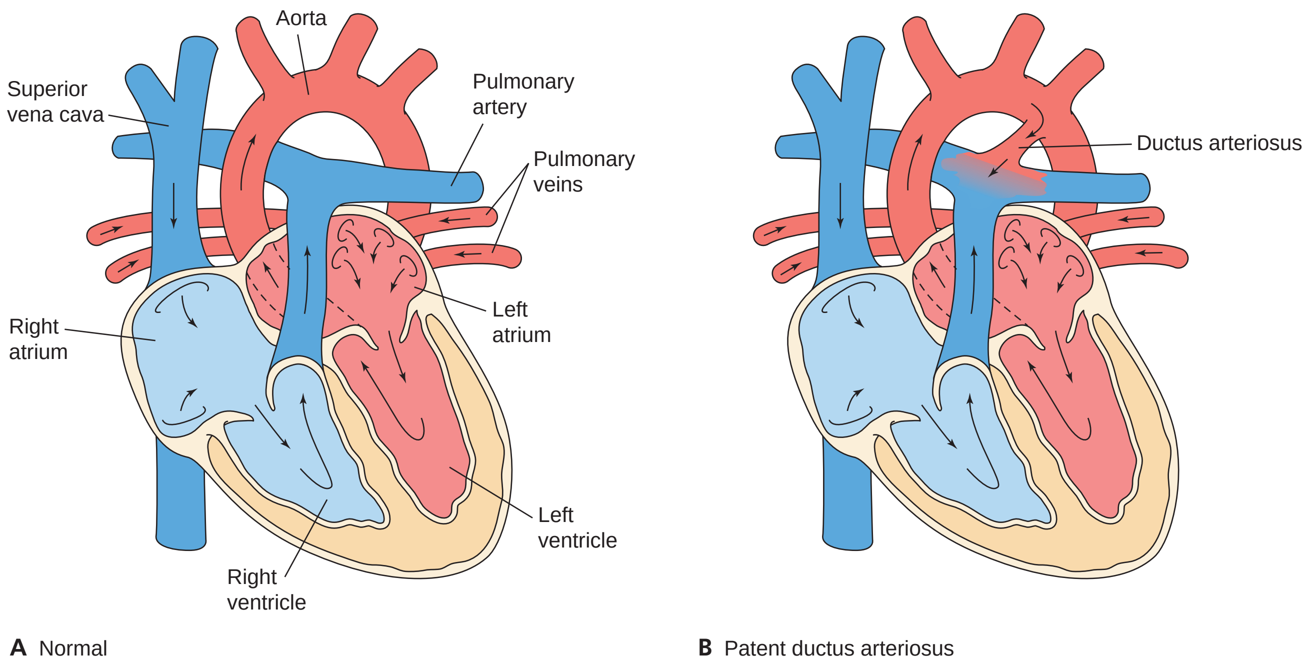


Figure 11-11
The ductus arteriosus is a vessel that connects the pulmonary artery and the aorta during fetal development. Normally, it closes after the baby is born. If it does not close, the condition known as patent ductus arteriosus results. In patent ductus arteriosus, oxygenated blood (*red*) flows from the aorta into the pulmonary artery, where it re-circulates through the lungs instead of going out to the body.

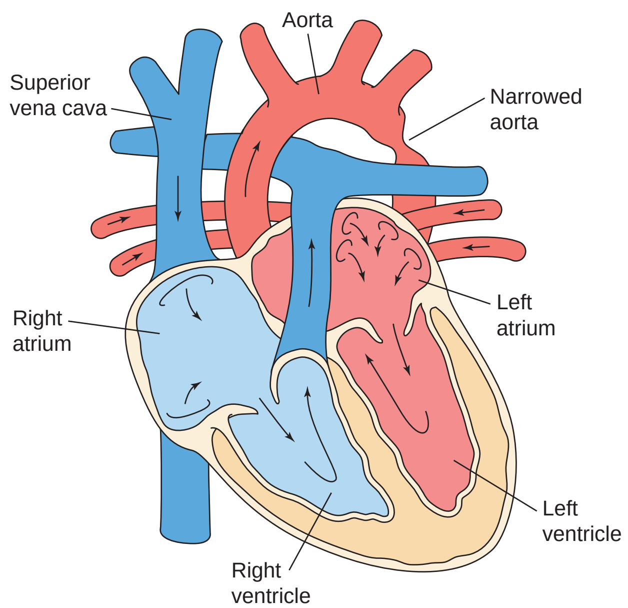


Figure 11-12
Coarctation of the aorta is a narrowing of the aorta shortly after it leaves the left ventricle.

Tetralogy of Fallot

Tetra- means "four." In **tetralogy of Fallot,** the child has four heart anomalies: narrowing of the pulmonary artery, a ventricular septal defect, an abnormally placed ("overriding") aorta that is positioned over the ventricular septal defect instead of over the left ventricle, and thickening of the muscular walls of the right ventricle. The child will need open heart surgery, usually before she reaches 1 year of age, to repair the anomalies.

Transposition of the great arteries

To "transpose" means to "switch." In **transposition of the great arteries,** the pulmonary artery and aorta are switched. As a result, the right ventricle pumps oxygen-poor blood into the aorta, where it is sent to the rest of the body, instead of into the pulmonary artery, where it can be sent to the lungs to receive oxygen. The left ventricle pumps oxygen-rich blood into the pulmonary artery, where it is sent to the lungs, instead of into the aorta, where it can be sent to the rest of the body. Because very little oxygen reaches the tissues of the body, this condition must be corrected quickly or the baby will die. Surgery immediately after birth increases the baby's chances of survival.

NEUROLOGIC DISORDERS

Like adults, children can be affected by many different types of neurologic disorders. Common causes of neurologic disorders in children include congenital anomalies of the brain or spinal cord, infections, and trauma.

Congenital Anomalies

Congenital anomalies that affect the brain or spinal cord, such as cerebral palsy, hydrocephalus, and spina bifida, can lead to frequent hospitalizations throughout childhood. Children with these disorders are often hospitalized to receive treatment related to the congenital anomaly. In addition, the congenital condition may put the child more at risk for disorders affecting other organ systems (such as respiratory infections), which may also lead to hospitalization. A child who uses a wheelchair may be hospitalized for the treatment of pressure ulcers.

- *Cerebral palsy* is caused by damage to the cerebrum, the part of the brain involved with motor control. A person with cerebral palsy has difficulty voluntarily moving parts of her body and may use a wheelchair.
- *Hydrocephalus* ("water on the brain") results from a build-up of cerebrospinal fluid (CSF). The CSF puts pressure on the delicate tissues of the brain. To relieve the pressure, a tube (called a *shunt*) may be placed to drain the fluid, relieving the pressure. A child with hydrocephalus may need surgery to replace the shunt with a larger one as he grows.
- *Spina bifida* is a congenital anomaly of the vertebrae. The vertebrae do not close properly during development, leaving the spinal cord exposed. Many children with spina bifida require frequent hospitalizations for therapy and surgery to correct urinary and musculoskeletal problems.

Meningitis

Meningitis is inflammation of the meninges, the three layers of connective tissue that surround the brain and spinal cord. Meningitis can be bacterial or viral. Although meningitis affects people of all ages, bacterial meningitis is most common in infants and children, and viral meningitis is most common in people older than 16 years.

Bacterial meningitis is a very severe illness that may occur quite suddenly after an upper respiratory tract infection. The most common symptoms include fever, irritability, headache, and a stiff neck. The child may have seizures or go into a coma. The doctor will perform a **lumbar puncture** ("spinal tap"). During a lumbar puncture, a needle is inserted into the spinal canal in the lumbar area (that is, the lower back), and a sample of the CSF is withdrawn (Fig. 11-13). The CSF is analyzed to determine the cause of the meningitis so it can be treated effectively. You will need to monitor a child with meningitis closely for changes in level of consciousness (LOC), increased irritability, an increase in blood pressure, and signs of respiratory distress. Because fever can lead to dehydration, you will also be responsible for closely

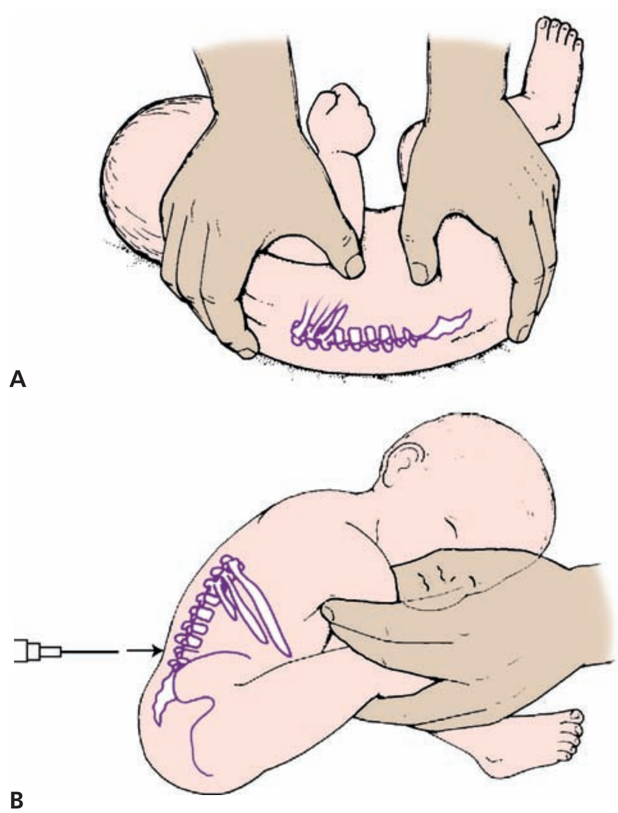


Figure 11-13
A lumbar puncture is done to obtain a sample of the cerebrospinal fluid (CSF). A needle is inserted into the spinal canal in the lower back (lumbar) region, and a sample of the fluid is withdrawn. The child can be held in the knee-to-chest position (**A**) or a sitting position (**B**).

monitoring the child's intake and output. Because bacterial meningitis is a contagious disease, droplet precautions must be taken for at least 24 hours after antibiotics have been started.

Traumatic Brain Injury and Spinal Cord Injury

Trauma involving the brain or spinal cord is a very common cause of death and permanent disability in children. TBI and spinal cord injury most often result from motor vehicle or bike accidents, falls, sports injuries, and acts of violence. TBI can also result from events that deprive the brain of oxygen (such as near-drowning). You can read more about TBI and spinal cord injury in Chapter 9.

Initially, a child with TBI will be in the intensive care unit. He may be placed in a "medication-induced coma," which means that medication will be given so the child remains unconscious and unresponsive. In some cases, this coma-like state reduces swelling of the brain and promotes healing. The child is brought out of the coma slowly when the period of greatest danger has passed. After the acute phase of injury has passed, the child may go through weeks or months of intense rehabilitation. The lasting effects of the injury depend on how much brain tissue was damaged and where the damage occurred. Some children are able to return to functional, near-normal lives. Others are left with severe physical or mental disabilities (or both).

A spinal cord injury may result in total or partial paralysis, depending on the severity of the injury and what part of the spinal cord was injured. A child with a spinal cord injury may face a long period of treatment and rehabilitation. The rehabilitation effort is often very successful in children because children are usually otherwise healthy and tend to be very adaptable.

GASTROINTESTINAL DISORDERS

Many different disorders can affect a child's gastrointestinal system. Some of these disorders can lead to severe vomiting and diarrhea, making hospitalization necessary. A child may be hospitalized for surgical repair of a congenital anomaly involving a gastrointestinal organ. Appendicitis, which is inflammation or infection of the appendix (part of the large intestine), is the most common surgically corrected childhood disorder.

Diarrhea and Vomiting

In babies and small children, diarrhea, vomiting, or both can quickly lead to dehydration. The most common cause of severe diarrhea and vomiting in infants and children younger than 5 years is rotavirus infection. **Rotavirus** is a virus that infects the bowels. Several types of bacteria can also cause serious diarrhea, vomiting, or both in children.

Infections (such as rotavirus) that result in vomiting and diarrhea can be easily spread to other children, especially if careful handwashing routines are not followed. When caring for a child with rotavirus or another type of infectious diarrhea, you will need to wash your hands carefully and frequently, and you should remind family caregivers to do the same. Contact precautions will be in effect, so gloves and a gown are required when changing diapers, changing soiled linens or clothing, or bathing the child. Diapers, clothing, or linens that have been soiled with feces need to be contained and disposed of or prepared for the laundry properly.

The doctor may order the administration of intravenous (IV) fluids to treat dehydration. The child may need to remain NPO for a period of time to allow the digestive system to "rest." You will need to carefully monitor the child's intake and output and observe the appearance of all bowel movements. Note the stool's amount, consistency (for example, "liquid" or "semi-solid"), and appearance (for example, "foamy," "frothy," "mucus-containing," "bloody"). Diarrhea can quickly cause irritation of the skin around the anus and on the buttocks. Gently and thoroughly clean the skin after each bowel movement. If ordered, an ointment (such as A&D ointment) may be applied to help protect the skin.

Congenital Anomalies

Many different types of congenital anomalies can affect the organs of the gastrointestinal system. Some of the most common are esophageal atresia, imperforate anus, hernia, and omphalocele.

Esophageal atresia

Atresia is a condition that occurs when a passageway in the body that is usually open or clear becomes closed or blocked. The esophagus is the part of the digestive tract that connects the mouth to the stomach. In **esophageal atresia,** the esophagus does not develop properly. There are a few different forms of esophageal atresia. In the most common form, the upper (proximal) end of the

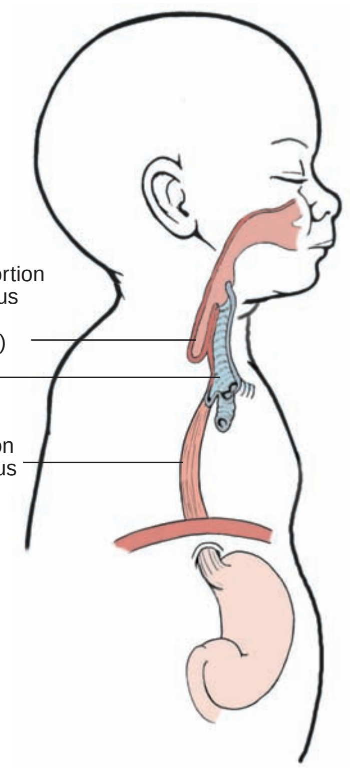


Figure 11-14
In esophageal atresia, the esophagus does not form properly. In the most common form, the proximal (top) portion of the esophagus ends in a blind pouch, and the distal (bottom) portion of the esophagus opens into the trachea.

esophagus ends in a blind pouch, and the lower (distal) end of the esophagus opens into the trachea (the pathway from the larynx to the lungs) (Fig. 11-14). Often there is an opening between the upper esophagus and the trachea, which allows liquid that the newborn swallows to enter the lungs, causing aspiration. Babies with this condition need immediate surgery to close the opening into the trachea. Depending on the situation, the surgeon may or may not be able to connect the two ends of the esophagus to restore the normal pathway to the stomach. If the surgeon is not able to connect the two ends of the esophagus at the same time the opening into the trachea is fixed, a small gastrostomy tube will be inserted so that nutrition can be placed directly in the baby's stomach, bypassing the esophagus. When the child is older, she may have reconstructive surgery to rebuild the esophagus so that food and fluids can be taken orally.

Imperforate anus

In **imperforate anus,** there is no anal opening. Either a membrane blocks the opening of the rectum to the outside of the body or the rectum ends in a blind pouch (Fig. 11-15). Surgery is performed very soon after birth to create an anal opening. In some cases, it is not possible to create an anal opening right away, and the infant will instead have a temporary colostomy. When the child is a little bit older, he may have additional surgeries to create an anal opening and reverse the colostomy.

Hernias

A hernia occurs when an organ bulges through the muscular wall of the abdominal cavity. Umbilical, inguinal, and hiatal hernias are fairly common in infants.

- *Umbilical hernias* occur when a loop of intestine bulges through the abdominal wall near

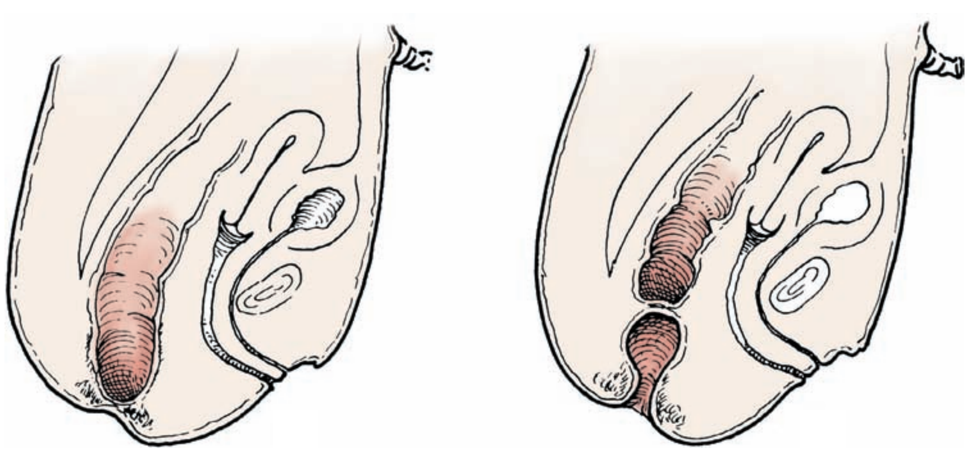

A B

Figure 11-15
In imperforate anus, there is no anal opening to the outside of the body. There may just be a membrane between the rectum and the outside of the body (**A**), or the rectum may end in a blind pouch a little farther up (**B**).

Figure 11-16
In an umbilical hernia, a loop of intestine bulges through a weakness in the muscular abdominal wall near the umbilicus (bellybutton).

Figure 11-17
In omphalocele, some of the internal abdominal organs protrude through an opening near the umbilicus. They are contained within a transparent membrane sac. This child has a large omphalocele containing the liver and part of the intestine.

the umbilicus (belly button) (Fig. 11-16). Most umbilical hernias close by themselves by the time the child is 3 years old. If the hernia does not close, the child will have surgery to correct the weakness.

- *Inguinal hernias* occur when a loop of intestine bulges through the abdominal wall in the groin area. Inguinal hernias are usually surgically repaired soon after they are discovered because they can become strangulated (the muscle tightens around the trapped tissue, cutting off its blood supply). A strangulated hernia is a medical emergency.
- *Hiatal hernias* occur when abdominal organs pass through the hiatus, the opening in the diaphragm that allows the esophagus to pass into the abdominal cavity. (The diaphragm is the muscle that separates the chest and abdominal cavities.) If the hiatus is too large or fails to close properly as the diaphragm develops, it allows some of the abdominal organs to move up into the chest cavity. This pushes the heart to the right side and squeezes the left lung, causing severe difficulty with breathing. Emergency surgical repair of the hernia is necessary as soon as possible after birth.

Omphalocele

In **omphalocele,** the infant's intestines or other abdominal organs protrude through an opening around the umbilicus. The organs are visible on the outside of the body and are covered with a thin, transparent membrane (Fig. 11-17). If the omphalocele is small, one surgical procedure may be all that is needed to repair the anomaly. However, if the omphalocele is large, several reconstructive surgeries may be needed to complete the repair.

Appendicitis

The appendix is a tiny, closed pouch that dangles from the end of the cecum (the part of the large intestine that receives food from the small intestine) (Fig. 11-18). The appendix can become infected and inflamed. This results in the condition known as **appendicitis**. Appendicitis most commonly affects boys and men between the ages of 10 and 30 years. Signs of appendicitis include fever, nausea and vomiting, and right lower quadrant abdominal pain. If the appendix is not surgically removed, it can rupture, causing a life-threatening condition known as **peritonitis** (inflammation of the thin membrane that lines the abdominal wall and the organs in the abdominal cavity).

Appendicitis is treated with an **appendectomy** (surgical removal of the appendix). When caring for a patient who has had an appendectomy, you will need to monitor his temperature,

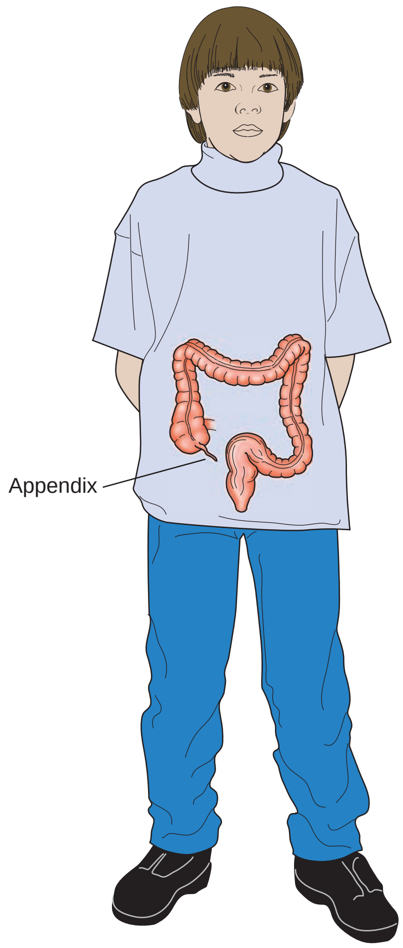


Figure 11-18
The appendix is a small pouch that dangles from the end of the cecum, the first segment of the large intestine. Appendicitis can occur if fecal material becomes trapped in the appendix, leading to inflammation and infection.

intake, and output closely. The patient may have a small wound drain in the surgical incision if the appendix was badly infected or ruptured. Make sure you note the color and amount of wound drainage by observing the dressing every time you take the patient's vital signs.

ENDOCRINE DISORDERS

One of the most common endocrine disorders in children is type 1 diabetes mellitus. Type 1 diabetes mellitus is caused by destruction of the insulin-producing cells of the pancreas. Most people who have type 1 diabetes mellitus are diagnosed while they are children or young adults. The first signs of type 1 diabetes mellitus are usually weight loss, slowed growth, and a lack of energy.

To keep blood glucose levels within the range of normal, three factors must be balanced: insulin, food intake, and energy expenditures (exercise or activity). Maintaining normal blood glucose levels can be difficult in a child because a child's growth occurs in spurts instead of in a regular pattern, causing his energy requirements to vary. It may also be difficult for a child to eat the proper amounts of the right kinds of food, especially if the child is a picky eater. As a result, children with type 1 diabetes mellitus are at risk for developing hypoglycemia (also called insulin reaction or insulin shock). Hypoglycemia occurs when the blood glucose level drops too low. A number of situations, including too much insulin, too much exercise, not enough food, or a delayed meal, can cause the blood glucose level to drop too low. Mild to moderate hypoglycemia can be treated by giving the child a small amount of a sugary food, such as a few ounces of orange juice or a piece of hard candy. If the child has severe hypoglycemia or if the episodes of hypoglycemia are very frequent, hospitalization may be necessary.

Children who have type 1 diabetes mellitus are also at higher risk for urinary and respiratory tract infections. The child may need to be admitted to the hospital for treatment. If you are caring for a hospitalized child with type 1 diabetes mellitus, be aware that an infection or other acute illness will affect the child's blood glucose levels and insulin requirements. You will need to assist with monitoring the child's blood glucose level as ordered. Many children are very comfortable monitoring their own blood glucose levels and may want to do this task themselves. In this situation, you should allow the child to help you by performing his own fingersticks. This allows the child to hold onto a bit more personal independence while in the hospital.

TELL THE NURSE !

When caring for a hospitalized child with type 1 diabetes, you will need to be especially observant for signs of hypoglycemia. The following signs and symptoms of hypoglycemia in a child should be reported to the nurse right away:

- Odd, unusual, or antisocial behavior
- Weakness, fatigue, or lethargy (lack of energy)
- Nervousness

- Headache
- Blurred vision
- Dizziness
- Hunger
- Pallor
- Sweating

GENITOURINARY DISORDERS

Genitourinary is a term used to describe the urinary and reproductive systems together. Several congenital anomalies can affect the organs of the genitourinary system. Three of the most common are cryptorchidism, hypospadias, and epispadias.

Cryptorchidism means "hidden testes" (*crypt-* means "hidden," and *-orchis* means "testes"). Shortly before a baby boy is born, the testes descend from the abdominal cavity into the scrotum. Cryptorchidism occurs when the testes fail to descend. Cryptorchidism may involve both testes or just one. In many instances, the testes descend on their own by the time the child begins to walk. If they have not descended by that time, they are usually surgically brought down into the scrotum before the child is 2 years old.

Hypospadias occurs when the urethral opening (urinary meatus) is located on the underside of the penis instead of the tip. A similar condition, **epispadias,** occurs when the urethral opening is located on the top of the penis. Surgery to repair the anomaly is usually performed when the child is between the ages of 6 and 18 months. Some repairs may be accomplished in stages if the anomaly is severe.

MUSCULOSKELETAL DISORDERS

Many different musculoskeletal disorders can affect children and make hospitalization necessary. Some of the most common are fractures, hip dysplasia, juvenile rheumatoid arthritis, and muscular dystrophy.

Fractures

Common causes of fractures in children include falls, bicycle accidents, automobile accidents, and physical abuse. Many simple fractures are easily treated with closed reduction (the doctor lines up the ends of the broken bone by pushing them back into place) followed by the application of a cast. Fractures that are complex or displaced may require open reduction (surgical exposure of the broken bone) followed by internal fixation (the insertion of pins, plates, or rods to hold the bone stable).

When caring for a child who has a cast, keeping the casted extremity elevated on a small pillow or folded blanket helps prevent swelling and pain. The skin under the cast can start to itch, and the child may try to slide an object between the cast and the skin to scratch the itchy area. This can injure the skin and lead to infection, so it should be avoided. You must check the fingers or toes of the casted extremity every hour or so to make sure that the tissue is receiving enough oxygen. You must also be aware of signs or symptoms that could indicate necrosis or infection of the skin under the cast.

TELL THE NURSE !

When caring for a child with a cast, the following signs or symptoms should be reported immediately:

- The fingers or toes are pale, blue, or cold.
- The child complains of increased pain, numbness, or tingling.
- There is increased drainage on the cast.
- There is a foul odor.

Hip Dysplasia

Hip dysplasia is the result of an anomaly of the acetabulum, the place on the pelvis where the ball of the femur fits, forming the hip joint. Because the acetabulum is not formed properly, the ball of the femur tends to easily pop out of place (in other words, the hip joint dislocates).

If the condition is discovered early enough, it can often be successfully treated by placing the baby in a brace that holds the legs in wide abduction (Fig. 11-19). Using the brace to hold the legs in wide abduction for a period of time causes the ball of the femur to sit in the proper position in the socket, and eventually, the pressure causes the socket to become deeper and wider. This allows the ball of the femur to sit properly in the socket, preventing the hip joint from dislocating.

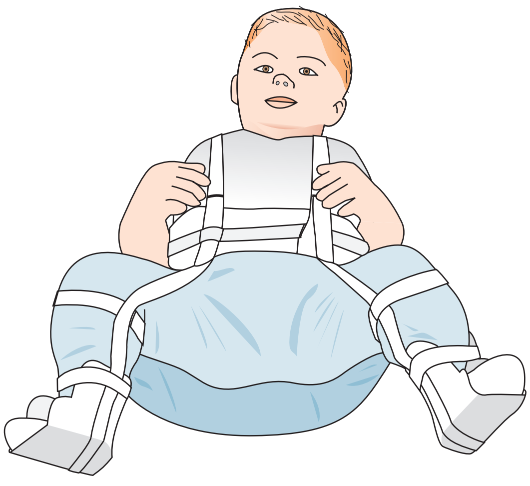


Figure 11-19
A child with hip dysplasia may be fitted for a special brace that holds the legs in wide abduction. The child may have to wear the brace for several months.

If the condition is discovered later or the brace fails to correct the defect, then the joint will be reduced surgically, and the baby will be placed in a hip spica cast until the joint is healed. The hip spica cast begins at the chest or waist and extends down to cover each leg, keeping the legs abducted.

Juvenile Rheumatoid Arthritis

Arthritis is inflammation of the joints, usually associated with pain and stiffness. Although we often think of arthritis as a condition that affects older people, juvenile rheumatoid arthritis is a type of arthritis that affects children (*juvenile* means "young"). Juvenile rheumatoid arthritis is thought to be an autoimmune disorder, which means that the body's immune system begins to attack the body's own tissues (in this case, the cartilage that covers the ends of the bones). Juvenile rheumatoid arthritis may affect only some of the joints or many of them. Systemic juvenile rheumatoid arthritis can affect other organs (such as the heart, lungs, and liver) as well as the joints.

Medications, physical therapy, and surgery are all used to maintain mobility and preserve joint function. Range-of-motion exercises, the application of heat, and the use of splints are all necessary parts of daily physical therapy. It is important to encourage the child to be as independent as possible with activities of daily living (ADLs). Performing ADLs puts many of the joints through their normal ranges of motion, which is important for preserving joint function.

Muscular Dystrophy

Muscular dystrophy is a general term for a group of inherited disorders that cause the skeletal muscles to become progressively weaker over time. Duchenne's muscular dystrophy is the most common, and most severe, form of muscular dystrophy. Some children with this disease may also have mild mental retardation. Duchenne's muscular dystrophy affects only boys. The first signs of the disease are usually noticed by the time the child is 4 years old. The child may be delayed in learning to walk and unable to climb stairs. By the time the child is 10 to 12 years old, he usually needs to use a wheelchair. As the muscles of the back and chest become weaker, the child may sit slumped forward in the wheelchair. This makes breathing difficult and puts the child at increased risk for developing pneumonia. At this time, there is no cure for Duchenne's muscular dystrophy. Most children with this condition do not live past the age of 20 years.

CANCER

Childhood cancer is the second leading cause of death (after trauma) in children between the ages of 1 and 14 years. The most common type of childhood cancer is leukemia (cancer of the blood-forming cells in the bone marrow). In leukemia, the bone marrow produces excessive numbers of abnormal white blood cells (leukocytes). The abnormal leukocytes are unable to function properly to protect the body from infection. When leukemia occurs in a child, the first sign of the illness is usually an inability to recover from a viral infection or similar illness. Other cancers that affect children include lymphomas (cancers of the lymphatic system), brain tumors, and Wilms' tumor or nephroblastoma (cancer of the kidney). Possible signs of cancer in children are listed in Box 11-1.

The same methods used to treat cancer in adults (that is surgery, chemotherapy, and radiation) are used to treat cancer in children. Treatment methods may be used alone or in combination with each other, depending on the type and the extent of the cancer. Bone marrow transplant may also be used to treat certain types

BOX 11-1 Signs of Cancer in Children

- Unusual mass or swelling
- Unexplained pallor and loss of energy
- Sudden tendency to bruise
- Persistent, localized pain or limping
- Prolonged, unexplained fever or illness
- Frequent headaches, often with vomiting
- Sudden eye or vision changes
- Excessive, rapid weight loss

of cancer in children, especially when other treatment methods have failed to destroy the cancer cells. In preparation for a bone marrow transplant, the child receives very strong chemotherapy medications that destroy the blood-forming cells in the bone marrow. After the blood-forming cells in the bone marrow have been destroyed, the child receives new bone marrow from a matched donor. The hope is that the new bone marrow will begin to produce healthy blood cells that function normally. Bone marrow transplants are successful about 50% of the time.

A child who is undergoing a bone marrow transplant will be hospitalized for several weeks. Because the child cannot produce new blood cells, her body becomes immunocompromised and thus very susceptible to any type of infection. Many normal childhood infections (such as chickenpox, measles, or mumps) can be deadly for an immunocompromised child. A simple cold can turn into a severe pneumonia. To help protect the child from infection, she will be placed in reverse (protective) isolation. In **reverse (protective) isolation,** the patient is isolated not because she has an infectious disease, but because she is at high risk for becoming very ill if she gets an infectious disease. The patient must stay in a private room. Anyone entering the room must perform a special handwash with antibacterial soap and wear a gown and a mask. If the patient must leave the room to go to another department in the hospital, she must wear a mask.

As in adults, the cancer itself may cause pain. In addition, the treatment of cancer can cause many uncomfortable side effects, including nausea, vomiting, diarrhea, stomatitis (painful mouth sores), and anorexia. These side effects can affect the child's fluid balance and nutritional status. Enteral feedings through a nasointestinal tube may be necessary to provide adequate nutrition. Alopecia (hair loss), fatigue, and an increased risk of infection are other common side effects of cancer treatment. It is very important to carefully monitor children with cancer for signs of infection.

CHILD ABUSE

As a nursing assistant working with children in an advanced care setting, you may care for children who you suspect are being abused. As you know from your basic training, abuse can be physical, psychological (emotional), or sexual in nature. You may see physical signs that suggest abuse, or the child's behavior or play-acting may raise your suspicions (Box 11-2). In some cases,

BOX 11-2 Signs of Child Abuse

- Unclean or unsafe living conditions, as evidenced by rotting food, unchanged sheets, or a lack of heat or water services
- Poor personal hygiene, as evidenced by an unclean body, clothes, or both; uncombed hair; skin irritation (from wearing urine-soaked undergarments for long periods of time); dried stool on buttocks; or a lack of oral hygiene
- Loss of weight or dehydration
- Multiple, unexplained fractures or bruises in various stages of healing; explanations of injuries that are not consistent with the location of the injury
- Burn marks (for example, from cigarettes or stove burners) or scalds (for example, from having a hand or foot held in hot water)
- Abrasions from ropes or other bindings
- Patches of missing hair
- Vaginal bleeding or discharge; urinary tract infection; or pain, itching, redness, or bruising around the genitals or anus
- Excessive sexual curiosity or play
- Sleeping problems or nightmares
- An anxious, fearful or withdrawn demeanor, especially in the presence of the abuser
- Uncontrolled medical conditions (possibly the result of a lack of prescribed medication or treatment)
- A history of requiring health care for similar injuries

the child might tell you something that makes you suspicious. Make sure to listen carefully to what the child is telling you. Report the child's words exactly as you heard them. Be very careful not to influence the child's ideas or "put words in her mouth." In the event of an abuse investigation, a young child may repeat what she has been told rather than describe what actually happened. If you are suspicious about something a child has told you, do not question the child further yourself. Report your suspicions to the nurse and allow a person who has experience and training in detecting child abuse to continue the questioning.

It may be very difficult to work with parents or caregivers if you suspect that their child has been abused. You may feel angry toward the parents or caregivers or disgusted by their behavior. Remember that it is not your place to pass judgment on a parent or caregiver. Your responsibility is to simply report your suspicions and to let the state agencies that handle abuse reports determine if abuse has occurred and, if so, who did it. The agencies will also determine how the child will be protected going forward. Your top priority is to meet the child's physical and emotional needs as best you can while the child is in your care. If you think that your emotions about a particular situation may affect your ability to provide care, talk with your supervisor and ask for help or to be assigned to another area.

SUMMARY

- Pediatric units are designed especially for children and their families. Special features include child-friendly decorating, central activity areas, child-sized fixtures and equipment, and accommodations for family caregivers.
- A child's illness or injury and hospitalization are stressful for both the child and family. Allowing family caregivers to stay overnight with the child and assist with the child's care can help both the child and the family caregiver feel less stressed.
- Children who are hospitalized often fear pain, punishment, mutilation, and death.
- Play and other activities are important to help children relieve boredom and stress. Therapeutic play can be used to help a child have a better understanding of a treatment or surgical procedure, which helps decrease anxiety.
- Many pediatric patients do not complain of pain or lack the vocabulary to describe pain. Nursing assistants must be very observant for body language that suggests that a child is in pain. The FACES pain rating scale is a useful tool that can help young children express the levels of pain they are experiencing.
- Care must be tailored to the developmental stage of the child.
- Congenital anomalies, trauma, infectious diseases, chronic illnesses or developmental disabilities, and cancer are major reasons children require care in an advanced care setting. These disorders can affect any organ system. This chapter provided only an overview of the most common disorders that affect children. If you work in a pediatric setting, you should take every opportunity to learn more about your patients' disorders.
  - Respiratory disorders are the most common cause of emergency hospital admission for children.
    - Respiratory syncytial virus (RSV) can cause bronchiolitis and pneumonia in very young children. A mist tent may be used to administer extra oxygen and humidity.
    - Croup may cause respiratory difficulty, resulting in the need for advanced care. Epiglottitis is a severe form of croup that can become a medical emergency if the inflamed epiglottis blocks the airway.
    - A child who is experiencing a severe asthma attack may require hospitalization.
    - Cystic fibrosis is a hereditary disorder that causes thick mucus to collect in the lungs and airways, causing airway

obstruction and increasing the risk for respiratory infections.

- Cardiovascular disorders are usually the result of congenital anomalies of the heart or large vessels.
  - Septal anomalies, such as patent foramen ovale or ventricular septal defect, affect the wall that separates the left side of the heart from the right.
  - Disorders of the great vessels include patent ductus arteriosus, coarctation of the aorta, tetralogy of Fallot, and transposition of the great arteries.
- Neurologic disorders in children can be caused by congenital anomalies of the brain or spinal cord, infections (such as meningitis), and trauma (such as traumatic brain injury or spinal cord injury).
- Gastrointestinal disorders are commonly the result of infection or congenital anomalies.
  - Diarrhea and vomiting can have many causes. Dehydration in an infant or toddler can occur quickly and can create a serious medical situation.
  - Congenital anomalies that can affect the digestive tract include esophageal atresia, imperforate anus, hernias, and omphalocele.
  - Appendicitis most often affects boys and men between the ages of 10 and 30 years. A ruptured appendix can cause peritonitis.
- Endocrine disorders can also affect children. The most common endocrine disorder that affects children is type 1 diabetes mellitus. Childhood diabetes is very unstable, and the child may require hospitalization to regulate insulin levels or to treat related infections.
- Genitourinary disorders affect the organs of the reproductive and urinary systems. Common genitourinary anomalies include cryptorchidism (undescended testes), epispadias, and hypospadias.
- Musculoskeletal disorders that are common in children include fractures, hip dysplasia, juvenile rheumatoid arthritis, and muscular dystrophy.
- Childhood cancer is the second leading cause of death in children between the ages of 1 and 14 years. Leukemia, lymphoma, brain tumors, and Wilms' tumor are cancers that may be seen in children.

- Nursing assistants who care for children in advanced care settings may care for abused children. If you suspect that a child in your care is being abused, you are legally obligated to report your suspicions to the proper authorities for further investigation.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. All of the following are fears that a child may have while in an advanced care setting EXCEPT:
   a. Pain
   b. Death
   c. Regression
   d. Mutilation
2. Which of the following can be offered to a small child to help increase his fluid intake?
   a. Banana slices
   b. Gelatin
   c. Cheese and crackers
   d. Scrambled eggs
3. A young child who has been separated from his familiar caregivers goes through three stages of response. The second stage, when the child becomes depressed and listless, is called:
   a. Denial
   b. Despair
   c. Protest
   d. Desperation
4. A play technique that is often used to help a child understand a treatment or surgical procedure is:
   a. Play therapy
   b. Transitional play
   c. Age-appropriate play
   d. Therapeutic play
5. Which of the following is most likely to be used to increase the oxygen and water content of the air a small child breathes?
   a. Mist tent
   b. Nasal cannula
   c. Face mask
   d. Fog tent
6. A hereditary disorder that affects the body's exocrine glands is:
   a. Diabetes mellitus
   b. Muscular dystrophy
   c. Cystic fibrosis
   d. Juvenile rheumatoid arthritis
7. A heart defect that occurs in the atrial septum is the result of a failure of the _______ to close properly.
   a. Foramen magnum
   b. Ductus arteriosus
   c. Aortic valve
   d. Foramen ovale

Matching

Match each disorder with the organ system it affects.

_____ **1.** Cryptorchidism

_____ **2.** Juvenile rheumatoid arthritis

_____ **3.** Tetralogy of Fallot

_____ **4.** Meningitis

_____ **5.** Rotavirus

a. Cardiovascular system
b. Musculoskeletal system
c. Gastrointestinal system
d. Genitourinary system
e. Nervous system

STOP and Think!

1. You are helping to care for Cedrick, a 7-year-old boy who is scheduled for surgery tomorrow. You can tell that he is frightened and anxious. What are some fears that Cedrick may have about the surgery? What can you do to help reduce those fears?
2. You work on the pediatric unit of a busy general hospital. One of your young patients, 8-year-old Amanda, is being treated for multiple fractures that she received when she was hit by a car while riding her bike. Amanda is a sweet child, and you enjoy caring for her. Her mother, however, is not so sweet. She watches everything you do closely and is very critical of the care her daughter is receiving. Lately, you have found yourself wishing that Amanda's mother would just go away and let you do your job! Why do you think Amanda's mother might be behaving this way? Why is it important for you to continue to allow Amanda's mother to be involved in Amanda's care as much as possible?
3. Missy is a 9-year-old girl with leukemia who has been admitted to your pediatric cancer unit. She is undergoing chemotherapy in preparation for a bone marrow transplant. What special care measures will be necessary to protect Missy from infection? What can you do to help Missy feel less isolated?

CHAPTER

12

Care of the Obstetric Patient

WHAT WILL YOU LEARN?

Obstetric patients are those who are pregnant or have just given birth. Although pregnancy, labor, and delivery are natural processes, complications can arise very suddenly and put the health and safety of both the mother and baby at risk. For this reason, most nursing care of obstetric patients is provided by registered nurses. However, many advanced care settings are recognizing the benefit of adding well-trained nursing assistants to the obstetric care team. As a nursing assistant working in an advanced care setting, you may be responsible for providing basic care to pregnant women who have been hospitalized because of complications affecting their pregnancy, or for new mothers who are recovering from labor and delivery. In some facilities, nursing assistants receive advanced training that enables them to assist

Working as part of an obstetric care team can be very exciting. Here, a nursing assistant takes the blood pressure of a woman in labor.

the obstetric care team during the labor and delivery process. When you are finished with this chapter, you will be able to:

1. Describe some of the common pre-existing health conditions that a woman may have that can complicate pregnancy.
2. Describe some of the complications that can develop during pregnancy.
3. Discuss how multiple gestation can cause a pregnancy to be "high risk."
4. List and describe the stages of labor and a vaginal delivery, and explain the responsibilities a nursing assistant may have during each stage.
5. List reasons why a cesarean delivery might be necessary and explain the responsibilities a nursing assistant may have during a cesarean delivery.
6. List common postpartum complications and observations that the nursing assistant should immediately report to the nurse.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

High-risk pregnancy
Ectopic pregnancy
Spontaneous abortion
Threatened abortion
Products of conception
Incompetent cervix
Dilate
Cervical cerclage (Shirodkar) procedure
Hyperemesis gravidarum
Gestational hypertension
Preeclampsia
Eclampsia
Gestational diabetes
Placenta
Placenta previa
Abruptio placentae
Pre-term labor
Rupture of membranes (ROM)
Premature rupture of membranes (PROM)
Pre-term premature rupture of membranes (pre-term PROM)
Multiple gestation
Triplets
Quadruplets
Quintuplets
Monozygotic
Dizygotic
Obstetrician
Certified nurse midwife
Lightening
Bloody show
Efface
Braxton Hicks contractions
Primipara
Multipara
Crowning
Cephalopelvic disproportion (CPD)
Cephalic presentation
Breech presentation
Shoulder presentation
Vaginal birth after cesarean (VBAC)
Dystocia
Uterine rupture
Prolapsed cord
Nuchal cord
Puerperal infection

HIGH-RISK PREGNANCY

If you are employed on the obstetric unit of an advanced care facility, chances are that you will provide care for women who have a **high-risk pregnancy** (a pregnancy in which some condition puts the mother, the baby, or both at a higher-than-normal risk for complications during the prenatal period, during labor and delivery, or during the postpartum period). Special measures are taken before, during, and possibly even after the birth to ensure the safety of the mother and the child.

PRE-EXISTING CONDITIONS THAT CAN COMPLICATE PREGNANCY

Many chronic conditions that affect the health of the mother can make a pregnancy "high risk." Common examples include diabetes mellitus, heart disease, and substance abuse.

Diabetes Mellitus

A woman who has diabetes mellitus may have difficulty keeping her blood glucose level within the normal range during pregnancy. Blood glucose levels that remain too high over a period of time increase the mother's risk for developing common complications of diabetes (such as atherosclerosis, high blood pressure, heart disease, kidney disease, blindness, and peripheral nerve damage), and they put her at high risk for infections, such as urinary tract infections and vaginal yeast infections. In addition, the mother's high blood glucose levels may cause her to miscarry, or the baby may be born with congenital anomalies. Chronically elevated blood glucose levels can also cause the baby to become very large, which can complicate labor and delivery. To help prevent these complications from occurring, the health care team works closely with the woman throughout her pregnancy to make sure her blood glucose levels remain within a healthy range.

Heart Disease

Heart disease may also complicate a pregnancy. During pregnancy, the mother's body produces more blood to meet the fetus' demand for oxygen and nutrients. The extra blood in the mother's bloodstream forces the heart to work harder. These normal changes can cause problems in a pregnant woman with heart disease. Frequent monitoring, medication, and bed rest may be necessary to reduce the strain on the mother's heart during pregnancy. In addition, the physical work of labor and delivery can place stress on the mother's heart. The use of an epidural anesthetic during labor may help the mother to conserve energy and decrease the workload of the heart. A cesarean delivery may be necessary.

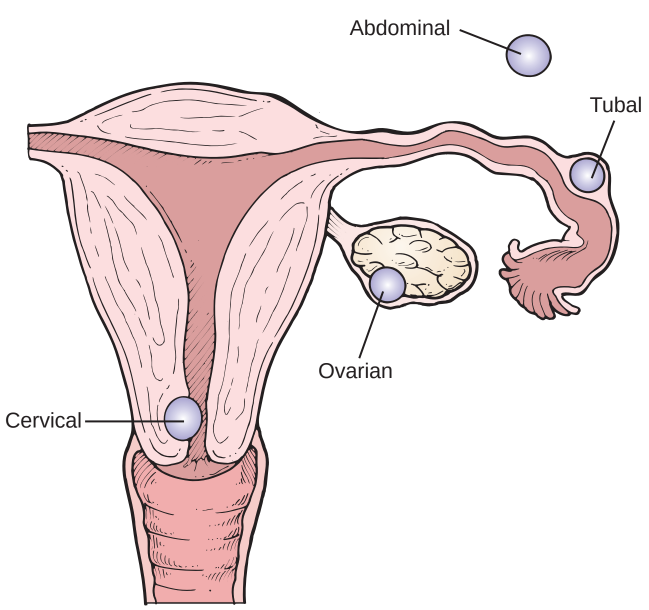


Figure 12-1
In an ectopic pregnancy, the fertilized egg implants outside of the uterus. A tubal ectopic pregnancy (one that occurs in the fallopian tube) is the most common type. Abdominal, ovarian, and cervical ectopic pregnancies can also occur.

Substance Abuse

The use of illegal drugs, alcohol, and tobacco during pregnancy can greatly affect the developing baby. All of these substances have been shown to cause low birth weight, growth and mental retardation, and congenital anomalies. A baby born to a woman who has used illegal drugs throughout pregnancy may go through physical withdrawal from the drugs after delivery. The baby is also at a higher risk for being born with hepatitis B infection and human immunodeficiency virus (HIV) infection.

CONDITIONS THAT CAN DEVELOP DURING PREGNANCY

Many conditions can develop during the course of a pregnancy that can place the mother, the baby, or both at high risk. Some of the more commonly seen complications that can develop during a woman's pregnancy are described in the sections that follow.

Ectopic Pregnancy

Normally, the sperm fertilizes the egg while the egg is still in the fallopian tube, and then the fertilized egg moves through the fallopian tube into the uterus. After it is in the uterus, the fertilized egg attaches itself to the endometrium (the tissue that lines the uterus). This process is called *implantation*. In an **ectopic pregnancy,** the fertilized egg implants outside of the uterus. (An "ectopic" location is one that is abnormal.) In most ectopic pregnancies, the fertilized egg implants in the fallopian tube (Fig. 12-1). Very rarely, the fertilized egg may implant in the cervix, ovary, or abdomen. The ectopic pregnancy must be removed or the mother's health is at great risk.

A woman who has an ectopic pregnancy usually has signs and symptoms of a normal pregnancy early in the pregnancy. However, as the fetus grows, she may start experiencing abdominal pain and vaginal bleeding. Because the fallopian tube cannot expand to make room for the growing fetus, the fallopian tube will eventually rupture, causing severe, life-threatening bleeding. If the fallopian tube ruptures, the woman will need emergency surgery to stop the bleeding and remove the fallopian tube.

When caring for a patient who is recovering from an ectopic pregnancy, you will need to provide routine post-operative care. The patient may also have many emotional needs resulting from the loss of the pregnancy and the possibility that future pregnancies will be jeopardized because of the loss of a fallopian tube.

Spontaneous Abortion

A **spontaneous abortion** (miscarriage) is the loss of the fetus before the 20th week of pregnancy. In **threatened abortion,** the woman has signs and symptoms (such as cramping and bleeding) that indicate that a spontaneous abortion might occur.

Most spontaneous abortions occur fairly early in the pregnancy. Many are the result of fetal anomalies or problems related to the fertilized egg's ability to properly implant into the lining of the uterus. Hormone imbalances may also play a role in causing a spontaneous abortion. Spontaneous abortions that occur later in the first half of pregnancy are more often caused by infection, uterine abnormalities, or abdominal trauma.

Treatment of a spontaneous abortion depends on whether or not all of the **products of conception** (that is, the fetus, placenta, and amniotic sac) have been expelled from the uterus. Spontaneous abortions are classified as follows:

- In a *complete* abortion, all of the products of conception are expelled.
- In an *incomplete* abortion, some, but not all, of the products of conception are expelled. (For example, the placenta may remain in the uterus.)
- In a *missed* abortion, the fetus dies, and the products of conception remain in the uterus.

In many patients, the spontaneous abortion will complete itself naturally over time. Other patients require dilation and curettage (D&C) of the uterus to make sure the products of conception are completely removed. The products of conception must be removed because if they remain in the uterus, they could result in infection and prolonged uterine bleeding. During a D&C, the cervix is dilated, and the products of conception are gently removed using either a suction cannula or a curette (a spoon-shaped surgical instrument used for scraping).

If you are caring for a patient who has had or is having a spontaneous abortion, you will need to carefully monitor her vital signs. An elevated temperature could be a sign of infection. Note the amount of vaginal bleeding and watch for blood clots or products of conception that may be passed. Large blood clots can indicate hemorrhage and should be reported to the nurse immediately. You may need to collect any passed products of conception and place them in a specimen container so they can be sent to the laboratory for analysis.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

When caring for a patient with a high-risk or complicated pregnancy, the health care team focuses on keeping the mother and baby safe for the duration of the pregnancy with the goal of eventually delivering a healthy infant. Unfortunately, this is not always the outcome. When caring for a woman who has lost a baby, acknowledge the family's need to grieve. Even if the loss occurred very early in the pregnancy, the expectant parents will still grieve for the loss of their baby. Well-meaning comments, such as, "You can always try again for another baby," "This happens all the time," or "Thank goodness for your other two lovely children," are seldom reassuring to the parents. A simple and heartfelt "I'm sorry for your loss" and a willingness to listen are likely to be much more comforting. Be aware that different people react to their loss in different ways. Remain supportive and nonjudgmental during this difficult time.

Incompetent Cervix

The cervix (the lower, narrow portion of the uterus) normally remains closed throughout pregnancy until labor begins. To be "incompetent" means to be "unable." In **incompetent cervix,** the cervix is unable to stay closed for the duration of the pregnancy. The cause of incompetent cervix is not known. However, a woman who has lost a previous pregnancy because of an incompetent cervix is at increased risk for developing this complication during later pregnancies as well.

In incompetent cervix, the woman's pregnancy progresses normally through the first trimester. The uterus enlarges, the baby grows normally, and the mother can feel the baby's movements. Then, during the second trimester or early in the third trimester, the cervix begins to **dilate** (open), causing delivery of the baby too early for him to survive. Dilation of the cervix usually occurs quickly, painlessly, and without warning.

If the dilating cervix is discovered in the early stages before the amniotic sac that surrounds and protects the fetus ruptures, the doctor may be able to perform a **cervical cerclage (Shirodkar) procedure**. During this procedure, the doctor places a large suture around the cervix to help keep it closed. After the baby has matured enough to be delivered, the suture is removed.

A patient with incompetent cervix will be on complete bed rest before the cervical cerclage procedure and for a short time afterward. The doctor may order the patient's bed to be placed in Trendelenburg's position to reduce pressure on the cervix. The patient will likely be anxious and worried about losing her baby and will need a lot of emotional support from the health care team.

TELL THE NURSE !

When caring for a patient with incompetent cervix, be sure to report any of the following signs or symptoms to the nurse right away:

- The patient has abdominal pain.
- The patient has uterine contractions.
- There is fluid leaking from the vagina.

Hyperemesis Gravidarum

Hyperemesis gravidarum is severe nausea and vomiting in a pregnant woman (*hyper-* means beyond or excessive, *-emesis* means vomiting, and *gravid* means pregnant). Many women experience nausea and vomiting in the form of "morning sickness" during the first trimester of pregnancy. The nausea and vomiting of morning sickness are unpleasant but are not severe enough to cause dehydration or weight loss. Most women stop experiencing morning sickness after the 12th week of pregnancy. The nausea and vomiting of hyperemesis gravidarum, on the other hand, are so severe that the woman may become dehydrated and lose weight. In addition, hyperemesis gravidarum often continues into the second trimester.

A woman with hyperemesis gravidarum may require hospitalization for treatment with intravenous (IV) fluids to reverse the dehydration. The woman may also receive medication to help control vomiting. In severe cases, the woman may require enteral nutrition or total parenteral nutrition (TPN) to ensure that the baby receives the nutrients he needs to grow. Close monitoring of the woman's intake and output (I&O) status is necessary.

Gestational Hypertension

Gestational hypertension, also known as pregnancy-induced hypertension (PIH), is an elevated blood pressure (greater than 140/90 mm Hg) that develops in a pregnant woman after the 20th week of pregnancy. ("Gestation" is another word for pregnancy.) Gestational hypertension can quickly progress into **preeclampsia** (elevated blood pressure in a pregnant woman accompanied by protein in the urine and edema) or **eclampsia** (elevated blood pressure in a pregnant woman accompanied by protein in the urine, edema, and seizures).

If it is not controlled, preeclampsia or eclampsia can lead to the death of both the mother and the baby. The doctor may order bed rest, antihypertensive medication, and hospitalization for frequent monitoring. Delivery of the baby is the only cure.

TELL THE NURSE !

When caring for a pregnant patient with preeclampsia or eclampsia, be sure to report any of the following signs or symptoms to the nurse right away:

- The patient complains of a headache.
- The patient complains of blurred vision.
- The patient is irritable or seems especially tense.
- The patient complains of severe heartburn.
- The patient's urinary output is decreased.
- The patient's face and hands are puffy or swollen.

Gestational Diabetes

Gestational diabetes is diabetes that develops during the second trimester of pregnancy in a woman who never had diabetes before. Gestational diabetes usually goes away after the baby is born, but a woman who has had gestational diabetes once is likely to develop it again in later pregnancies. In addition, a woman who develops gestational diabetes during pregnancy may be at increased risk for developing type 2 diabetes mellitus later in life.

Because gestational diabetes develops later in pregnancy, after the baby's organs have already been formed, congenital anomalies are not as much of a concern as they are with babies born to mothers who had diabetes before becoming pregnant. However, the baby may grow too large, which can complicate delivery. In addition, gestational diabetes puts the mother at risk for complications related to having elevated blood glucose levels for a prolonged period of time. The health care team works with the woman to teach her how to keep her blood glucose levels under good control for the rest of the pregnancy.

Placental Complications

The **placenta** is an organ that develops along with the fetus (Fig. 12-2). One of the main roles of the placenta is to transfer oxygen and nutrients from the mother's blood to the fetus' blood and to transfer waste products from the fetus' blood to the mother's blood. The placenta also acts as a barrier to some substances, helping to protect the fetus, and is responsible for secreting some pregnancy-related hormones.

For a developing baby to receive proper nutrition and oxygen from the mother, the placenta must attach firmly to the wall of the uterus. Normally, the placenta attaches in the upper portion of the uterus. Complications can occur if the placenta attaches too low in the uterus (toward the cervix) or if the placenta separates from the uterine wall before the birth of the baby.

Placenta previa

In **placenta previa,** the placenta attaches in the lower portion of the uterus (Fig. 12-3). The severity of this complication depends on how low the placenta attaches. If the placenta attaches so low that it partially covers the cervix, the placenta will tear away from the wall of the uterus when labor begins and the cervix starts to dilate. Because the baby depends on the placenta for oxygen until he takes his first breath after delivery, separation of the placenta before delivery can result in the baby's death. Separation of the placenta before delivery can also result in hemorrhage, leading to the mother's death.

Placenta previa can be diagnosed by ultrasonography late in the second trimester or during

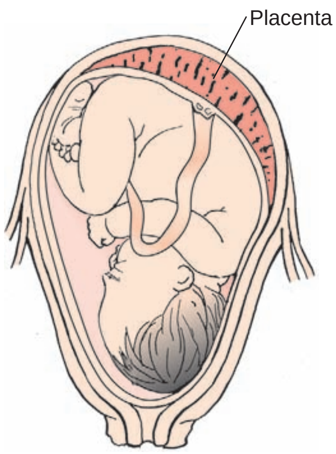


Figure 12-2
The placenta is an organ that develops along with the fetus and attaches to the wall of the upper portion of the uterus. The placenta serves as an organ of exchange for oxygen, nutrients, and waste products. In addition, the placenta helps screen some substances from reaching the fetus and secretes some pregnancy-related hormones.

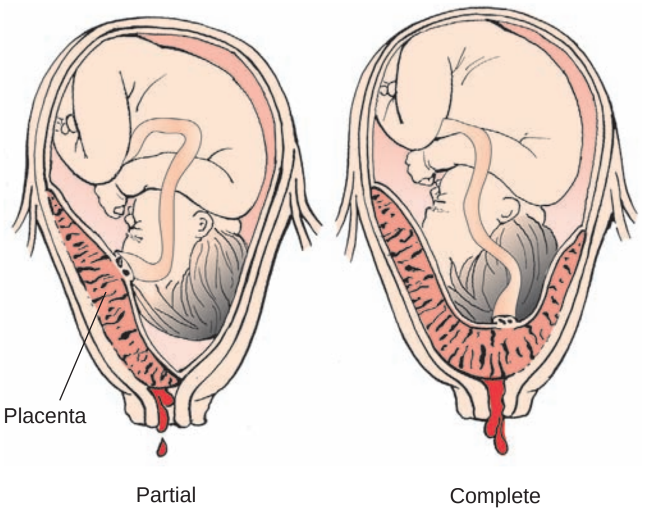


Figure 12-3
In placenta previa, the placenta attaches in the lower portion of the uterus, partially or completely covering the cervix.

the third trimester. Frequent ultrasounds closer to the time of delivery help the doctor decide if the placenta's position is likely to cause complications during labor and delivery. If the placenta is likely to cause complications during labor and delivery, a cesarean section will be performed as soon as the baby is mature. If the patient starts having severe vaginal bleeding, she will need to have an emergency cesarean section.

After delivery of the baby, whether vaginally or by cesarean section, the patient will be at an increased risk for hemorrhage. The muscular walls of the lower portion of the uterus are thinner than the muscular walls of the upper portion of the uterus. As a result, they do not contract as strongly, making it more difficult to control bleeding from the site where the placenta tears away from the uterine wall. If uterine bleeding cannot be controlled, emergency surgery and possibly removal of the uterus (hysterectomy) may be necessary.

Abruptio placentae

Abruptio placentae is separation of the placenta from the wall of the uterus before delivery. Abruptio placentae can be partial (only a portion of the placenta separates from the wall of the uterus) or complete (the entire placenta separates from the wall of the uterus) (Fig. 12-4). Signs of a worsening abruptio placentae include abdominal pain, a firm uterus, tachycardia (a rapid heart beat), hypotension, and other signs of shock. The woman may or may not have vaginal bleeding.

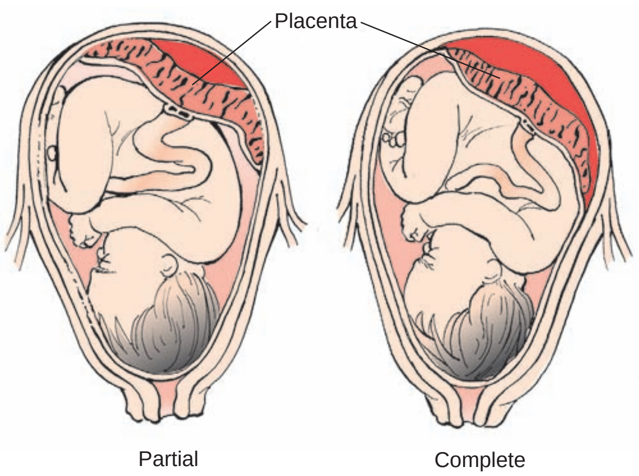


Figure 12-4
In abruptio placentae, the placenta separates from the wall of the uterus before delivery of the baby.

Abruptio placentae usually occurs late in the third trimester. In a patient with abruptio placentae, ultrasonography may reveal blood that has collected between the wall of the uterus and the placenta. If the section of the placenta that separates from the wall of the uterus is small and the condition is detected early enough by ultrasonography, the baby may be delivered by cesarean section before the baby's oxygen supply is affected. However, if the section of placenta that separates from the uterus is large, the baby's oxygen supply can become compromised in a very short time. The mother may also go into shock. An emergency cesarean delivery will be necessary to save the lives of both the mother and the baby. After an emergency cesarean delivery, the mother may be in critical condition as the result of hemorrhage and will need to be monitored very closely.

Pre-term Labor

Pre-term labor is labor that begins after the 20th week but before the 37th week of pregnancy. At this point, the fetus' lungs may not be developed enough to allow the fetus to survive on its own. Often, the reason a woman goes into pre-term labor is not known. However, risk factors for pre-term labor include previous pre-term labor, carrying more than one fetus at once, uterine or cervical anomalies (such as incompetent cervix), age younger than 16 years or older than 40 years, smoking, substance abuse, gestational hypertension, trauma, and infection.

The goal of treatment is to prolong the pregnancy to give the fetus' lungs as much time as possible to mature. The mother may be hospitalized and on bed rest. The doctor may order medications to stop the contractions. Corticosteroids may be administered to help the fetus' lungs mature more quickly. You will need to help the woman with her activities of daily living (ADLs).

TELL THE NURSE !

When caring for a woman with pre-term labor, report the following signs and symptoms to the nurse immediately. They may indicate that labor is starting again.

- The woman complains of low back pain or abdominal pain.
- The woman has urinary urgency.
- Fluid is leaking from the vagina.

Premature Rupture of Membranes

Normally, the amniotic sac (the fluid-filled sac that surrounds and protects the fetus) ruptures during the early stages of labor, causing amniotic fluid to flow from the vagina. This is called **rupture of membranes (ROM),** or "water breaking," and is a normal occurrence when a woman is in labor. In **premature rupture of membranes (PROM),** the amniotic sac ruptures before labor begins in a woman who is near her due date. This is different from **pre-term premature rupture of membranes (pre-term PROM),** rupture of the membranes that occurs before labor begins and before the 37th week of pregnancy.

Because the protective amniotic sac is ruptured, PROM puts the mother and the fetus at risk for infection. Usually, a woman with PROM will go into labor within 24 hours, but the doctor may choose to administer medications that make labor begin sooner to lower the risk of infection.

Pre-term PROM is a more difficult situation because the fetus is not able to survive on its own, and pre-term PROM often leads to pre-term labor. In addition, as in PROM, the mother's and baby's risk for infection increases as the length of time between the rupture of the membranes and delivery increases. A woman with pre-term PROM will be hospitalized and monitored for signs of infection and pre-term labor. Bed rest may be ordered, and the woman may need assistance with all of her ADLs. The woman's vital signs will be monitored at least every 4 hours. A change in temperature or a change in the color or smell of the amniotic fluid leaking from the vagina should be reported right away because these could be signs of infection. If an infection develops, the fetus will need to be delivered right away, even if the fetus is not old enough to survive on its own.

MULTIPLE GESTATION

A **multiple gestation** is a pregnancy in which the mother is carrying more than one baby. Twins (two babies) are the most common type of multiple gestation. Other types include **triplets** (three babies), **quadruplets** (four babies), and **quintuplets** (five babies).

As the number of babies in a multiple gestation increases, so does the mother's risk for developing complications during pregnancy, labor and delivery, and the postpartum period. Multiple gestation puts the mother at higher-than-normal risk for developing gestational hypertension, placental complications, pre-term labor, and anemia. A woman with a multiple gestation may be placed on bed rest before delivery to lower her risk for pre-term labor.

Depending on how the babies are positioned in the uterus, a cesarean delivery may be necessary. Normally, after delivery of a baby, the uterus contracts to help control the bleeding that occurs when the placenta detaches from the wall of the uterus. Because in a multiple gestation the uterus is stretched much more than it would be if only one baby were present, it is not able to contract as strongly to control the bleeding, putting the woman at risk for postpartum hemorrhage.

Multiple gestation also poses some risk to the babies. For example, the babies may be born prematurely. Even if the pregnancy goes to term, the babies may be smaller than normal when they are born. Sometimes complications can develop when twins share a placenta. Twins may be monozygotic (identical) or dizygotic (fraternal):

- **Monozygotic** (*mono-* means "one," and *zygote* means "egg") twins result when one egg is fertilized by one sperm and the initial cells divide into two separate babies. There is usually only one placenta with separate umbilical cords that attach to each baby (Fig. 12-5A). Monozygotic twins are always the same gender.
- **Dizygotic** (*di-* means "two," and *zygote* means "egg") twins result when two eggs are fertilized by two sperm. Each baby has its own placenta (see Fig. 12-5B). Dizygotic twins may be the same gender or different genders.

LABOR AND DELIVERY

As a nursing assistant, you may receive advanced training that allows you to assist during labor and delivery. The most common method of delivering a baby is through the vagina. Vaginal delivery is preferred unless there are complications that may cause undue stress on either the mother or the baby.

Your responsibilities during labor and a vaginal delivery vary greatly from facility to facility.

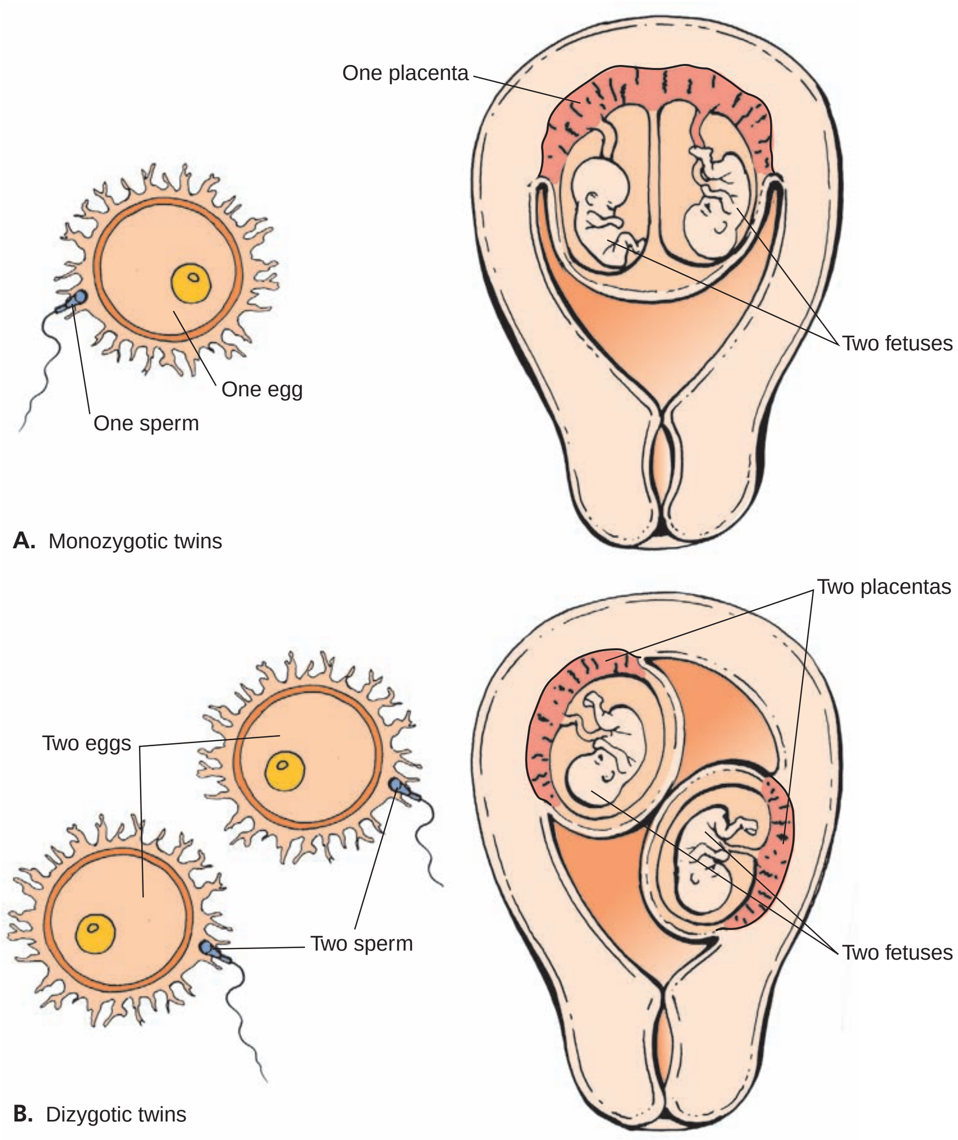


Figure 12-5
Twins can develop from one fertilized egg or two. (**A**) Monozygotic (identical) twins develop from one fertilized egg that splits to form two babies. Monozygotic twins often share a placenta. (**B**) Dizygotic (fraternal) twins develop from two fertilized eggs. Each twin has its own placenta.

In many facilities, nursing assistants are primarily responsible for providing basic care to the woman in labor, such as taking routine vital signs, assisting with ambulation, assisting the woman to the bathroom or with a bedpan, and providing ice chips. Some facilities provide nursing assistants with additional training so they are able to take more active roles during the delivery of a baby. For example, you may be responsible for preparing the sterile supplies and instruments that will be used during delivery (Fig. 12-6).

Immediately after the delivery, you may be responsible for collecting blood samples from the umbilical cord that will be sent to the laboratory for analysis. Another of your responsibilities after delivery may be to help clean the patient's perineal area of blood, skin prepping solution, and amniotic fluid. Make sure that you clean and dry the area thoroughly and gently. If ordered, you may be responsible for applying an ice pack to the perineal area to reduce swelling. A perineal pad is applied to the perineal area to absorb blood. You will also be responsible for safely discarding any suture needles or scalpel blades that have been used. Handle them carefully to avoid accidental sticks that could expose you to bloodborne pathogens and practice strict standard precaution techniques when handling used instruments and other supplies. Dispose of disposable items appropriately and clean re-useable supplies according to facility policy.

Figure 12-6
In some facilities, nursing assistants receive additional training and are responsible for helping to prepare the labor room for delivery. Supplies and instruments used during labor and delivery are opened using sterile technique after performing a sterile hand scrub and putting on sterile gloves. The sterile supplies are arranged in a fashion that makes it easy for the doctor or certified nurse midwife to locate and use necessary supplies and equipment during the delivery.

LABOR AND VAGINAL DELIVERY

During labor, the upper muscular portion of the uterus contracts in response to the release of the hormone oxytocin by the pituitary gland. These contractions push the baby downward, forcing the baby against the cervix, causing the cervix to dilate. When the cervix is fully dilated, the baby passes into the birth canal and is born. The birth of the baby is followed by delivery of the placenta.

Complications can arise at any time during the process of labor or delivery. The complications that arise during labor and delivery may occur suddenly, without warning, and can jeopardize the life of the unborn baby, the mother, or both. That is why thorough and frequent monitoring of a patient in labor is crucial. Your observations are very important and need to be reported accurately and immediately.

An obstetrician or a certified nurse midwife may serve as the primary health care provider during the labor and delivery process. An **obstetrician** is a doctor who has completed a 4-year residency in obstetrics and gynecology in addition to medical school. An obstetrician is trained to handle high-risk pregnancies and complications that develop during labor and delivery and is licensed to order and administer medications. A **certified nurse midwife** is a registered nurse who completes 1 to 2 years of additional graduate training to learn how to assist women through pregnancy and childbirth. Certified nurse midwives cannot perform cesarean sections, and in some states, they are not permitted to order or administer medications. A woman who has had an uncomplicated pregnancy and who desires a more "natural" childbirth experience may choose to have a certified nurse midwife serve as her primary health care provider.

Signs of Labor

As a pregnancy progresses, changes occur in the woman's body in preparation for labor and delivery of the baby. Early signs that labor will begin soon include lightening, bloody show, and Braxton Hicks contractions.

- **Lightening** occurs when the baby begins to move down into the pelvis. The woman's abdomen will change in appearance, shifting down and forward, and she may feel like the baby has "dropped." The woman will usually start experiencing urinary frequency because the baby is pressing against the bladder. The woman may find it easier to breathe because the baby is no longer up against her rib cage. Lightening usually indicates that labor will begin within the next 2 weeks.
- **Bloody show** is a blood-tinged vaginal discharge that may appear to be mixed with a large amount of thick mucus. A large mucus plug blocks the opening of the cervix during pregnancy. The mucus plug is expelled shortly before (or soon after) labor begins. When the plug is expelled, small capillaries break, causing bleeding and resulting in bloody show. These signs indicate that the cervix is changing, both as a result of hormone changes and from the pressure of the baby on the cervix. As the cervix changes, it becomes softer and begins to **efface** (become thinner) and dilate.
- **Braxton Hicks contractions** are irregular contractions of the uterus that occur throughout pregnancy but may occur with more frequency as labor approaches.

Table 12-1 True Versus False Labor

	TRUE LABOR	FALSE LABOR
Contractions	Become regular, longer, and more frequent as labor progresses; walking may cause the contractions to become stronger	Remain irregular and short; walking may cause the contractions to decrease or go away
Amniotic sac	May rupture	Remains intact
Cervix	Progressively dilates	Remains closed

Braxton Hicks contractions are not the same as the contractions that occur during labor. The contractions of true labor occur at regular intervals and are much more intense.

First Stage of Labor

The first stage of labor begins with the onset of the first regular contractions and ends when the cervix is fully dilated. The first stage is generally the longest stage of labor. For a **primipara** (a woman delivering her first baby), the first stage of labor lasts an average of 10 to 12 hours. For a **multipara** (a woman who has delivered a baby before), the first stage of labor lasts an average of 6 to 8 hours. The first stage of labor is divided into three phases:

- *Early latent phase.* The woman may have mild discomfort, such as a backache, and may not even really be sure that true labor has begun. (Table 12-1 compares true labor with false labor.) During the early latent phase, the woman may make final preparations to go to the health care facility, bathe, or rest. Contractions are usually regular and 5 to 8 minutes apart, lasting 20 to 35 seconds each. The cervix is dilated 0 to 3 cm. If the membranes rupture (or the woman's "water breaks"), there may be a great gush of fluid or only a small trickle.
- *Mid or active phase.* Contractions are more frequent, occurring 3 to 5 minutes apart, and each may last for 40 to 60 seconds. The cervix is dilated 4 to 7 cm. The woman's discomfort may increase, and she may request pain medication, such as an epidural anesthetic. Continuous monitoring may be used to monitor the woman's contractions and the fetal heart rate (FHR), or the nurse may perform these assessments at regular intervals (Fig. 12-7).
- *Transitional phase.* This is the most intense part of labor and may only last through a few contractions. Even if the woman did not request pain medication earlier, she may request it now! Contractions occur every 2 to 3 minutes, and each can last for as long as 80 seconds. The cervix dilates from 7 to 10 cm. At 10 cm, the cervix is considered completely dilated. The baby may start to descend quite rapidly down the birth canal, and preparations for delivery should be made. Bulging around the perineal area and **crowning** (the appearance of the baby's head at the vaginal opening) are signs that the baby is going to be born very soon (Fig. 12-8). During the transitional phase, the mother's vital signs are measured every 15 minutes. If a continuous fetal monitor is not in use, the nurse measures the FHR every 15 minutes as well.

Figure 12-7
The woman's contractions and the fetal heart rate (FHR) may be continuously monitored.

A. Bulging of the perinum

B. Crowning

Figure 12-8
Bulging of the perineum (**A**) and crowning (**B**) are signs that the baby is going to be born very soon.

Second Stage of Labor

The second stage of labor begins with the complete dilation of the cervix (10 cm) and ends with the baby's birth. This stage lasts an average of 20 to 50 minutes. If the woman has not had an epidural anesthetic, she will usually feel the urge to push with contractions. Pushing is very hard work, and the woman will need the support of her birth partner and the members of the health care team (Fig. 12-9). She will need to get into a comfortable position for pushing. For example, she may choose to lie on her back or side, assume a semi-sitting position, or squat. The doctor or certified nurse midwife may perform an episiotomy to enlarge the vaginal opening and prevent tearing as the baby's head is delivered. If the woman is unable to push effectively or if the baby starts showing signs of distress, a suction device or delivery forceps may be used to help deliver the baby.

After the baby is delivered, her airway is suctioned of fluid and mucus, and the baby takes her first breath. The umbilical cord is clamped with two clamps and then cut between the clamps. If there are no complications, the baby is shown to the mother and may be placed on her chest or in her arms for a moment of early bonding.

Figure 12-9
The woman's partner and members of the health care team support the woman during the hard work of labor.

Third Stage of Labor

During the third stage of labor, the placenta is delivered. A few minutes after the baby is delivered, the uterus starts to contract again. This causes the placenta to detach from the wall of the uterus and to be expelled from the uterus. On average, delivery of the placenta takes between 5 and 20 minutes. The longer it takes for the placenta to detach and be delivered, the higher the risk for hemorrhage. Contractions continue after the delivery of the placenta, causing the uterus to become round and firm. The contraction of the muscles in the area where the placenta was attached helps seal open blood vessels and stop the bleeding. The normal blood loss after a vaginal delivery is between 200 and 300 mL.

Hormone changes that occur immediately after delivery may cause the woman to shake, sometimes quite violently. This is normal, and the new mother should be reassured. After delivery of the placenta, the doctor or certified nurse midwife will evaluate and repair any vaginal tears. You may be responsible for cleaning the perineal area, applying an ice pack and a perineal pad, and changing soiled linens. The woman's vital signs are monitored every 15 minutes. Be observant for changes in the woman's vital signs, such as a decrease in blood pressure or an increase in pulse rate, that may indicate shock from blood loss. Chest pain, difficulty breathing, or rapid breathing (tachypnea) could be signs of amniotic fluid embolism, a rare but very serious complication, and should also be reported immediately.

Fourth Stage of Labor

The fourth stage of labor, which begins with the delivery of the placenta and ends when the woman's condition has stabilized, lasts approximately 2 to 4 hours. Depending on how long the woman's labor lasted, she may be exhausted and wish to rest. She may also be very hungry. If there are no complications, she can eat. After the baby has been examined and bathed, she will be brought to the mother. If the mother wants to attempt breastfeeding, help her into a comfortable position.

It is important to monitor the new mother's vital signs frequently during the first few hours after delivery. Vital signs are measured every 15 minutes for the first hour after the birth and then every 30 minutes for the next hour (or according to facility policy). It is always proper to measure vital signs more frequently (for example, if the patient feels faint after trying to get out of bed or complains of shortness of breath). The patient's blood pressure and respiratory rate should be normal after delivery. The pulse rate may stay a bit low (60 bpm or less) for as long as 1 week after delivery. The temperature may be as high as 100.4°F for the first 24 hours after delivery.

The risk for postpartum hemorrhage is greatest in the first hour after delivery, although it can occur at any time during the 6-week postpartum period. It is easy for hemorrhage to go unnoticed during the immediate postpartum period. The new mother and family members are usually holding and bonding with the baby, and the nursing staff may hesitate to disturb them to routinely check for bleeding. Nevertheless, it is important to check for bleeding every 15 minutes for the first 2 hours after delivery. A woman is considered to be hemorrhaging if the perineal pad is completely soaked within 1 hour (Fig. 12-10). Because blood may run toward the woman's back and pool underneath the woman's buttocks, you should check the bed protector as well as the perineal pad. If hemorrhage is detected early enough, medications that help the uterus contract and uterine massage may be used to control the bleeding. If the bleeding is the result of tears in the cervix or vagina, sutures may be necessary to control it. If the hemorrhage cannot be

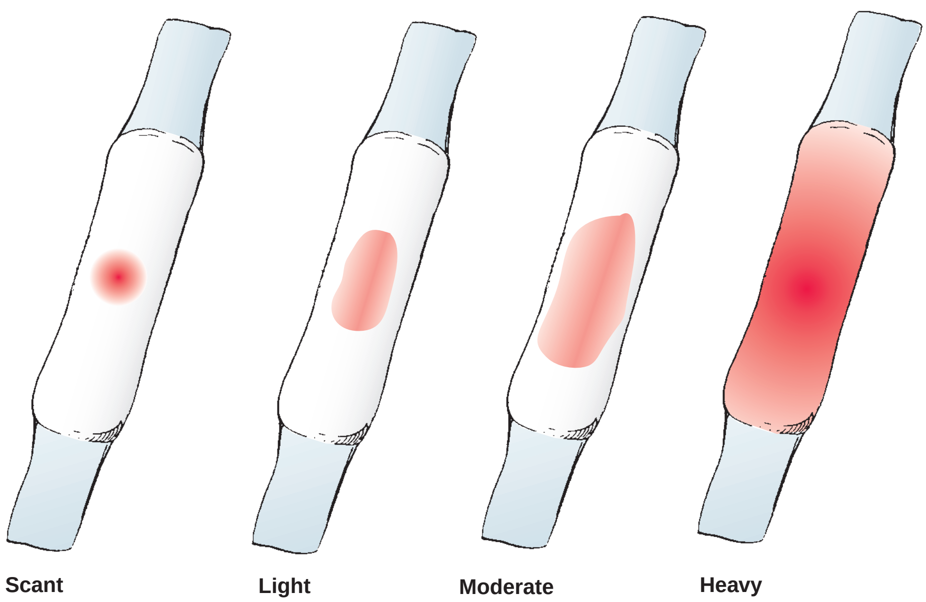


Figure 12-10
The amount of blood on the perineal pad can be described as scant, light, moderate, or heavy.

stopped, an emergency hysterectomy (removal of the uterus) may be necessary to save the woman's life.

You will need to assist the new mother with urination. Some women will be able to walk to the bathroom with your assistance. Women who had an epidural anesthetic may need to use a bedpan until sensation in the legs returns. Sometimes swelling around the urethra makes it difficult for the new mother to urinate. If you palpate the woman's abdomen, you should be able to feel the top of the uterus right around the level of her navel. The uterus should feel round and firm, and the top of the uterus should be located in the middle of the abdomen. A full bladder can cause the top of the uterus to shift toward the side of the abdomen. If the bladder is full and the woman is unable to void, she may need to be catheterized with a straight catheter to empty the bladder. It is important to empty the bladder because a full bladder can prevent the uterus from contracting firmly after delivery, increasing the woman's risk of hemorrhage. If inserting a catheter is not within your scope of practice, report this need to the nurse right away. If you have been trained to insert a catheter, make sure you are very gentle because the woman will be quite sore from the delivery. Whenever you are assisting a postpartum woman with urination, be sure to measure the urine and observe its characteristics before disposing of it.

CESAREAN DELIVERY

A cesarean delivery (cesarean section, C-section) is the delivery of the baby through a surgical incision made in the mother's abdomen. A cesarean delivery is necessary when a vaginal delivery is not possible or safe for the mother or baby. A cesarean section is major abdominal surgery. As a result, it carries many of the risks associated with any major surgical procedure (such as anesthesia-related complications, infection, and hemorrhage). In addition, the recovery time after a cesarean delivery is generally longer than the recovery time after a vaginal delivery.

Many cesarean deliveries are scheduled events. If a condition exists during pregnancy that makes cesarean delivery the preferred method of delivery, then the patient and the doctor decide on a date near the expected due date and schedule the procedure. Scheduling the procedure allows standard pre-operative practices (such as maintaining NPO status before surgery) to be followed, helping to reduce the risk of surgical complications. Examples of situations that might make a planned cesarean section necessary include:

- *Anatomical difficulties.* The size or shape of the mother's pelvis (the bony passageway through which the baby must pass to exit the mother's body) might make a vaginal delivery difficult. For example, in **cephalopelvic disproportion (CPD),** the baby's head (the largest part of the baby to be delivered) is too large to pass through the mother's pelvis. In this situation, a vaginal delivery is not possible, and a cesarean delivery is necessary.
- *Abnormal fetal presentation.* The part of the baby that first enters the pelvis and comes in contact with the cervix is considered the "presenting" part. The presenting part can be the head or face, buttocks or legs, or shoulders (Fig. 12-11). Most babies present the top (or "crown") of the head **(cephalic**

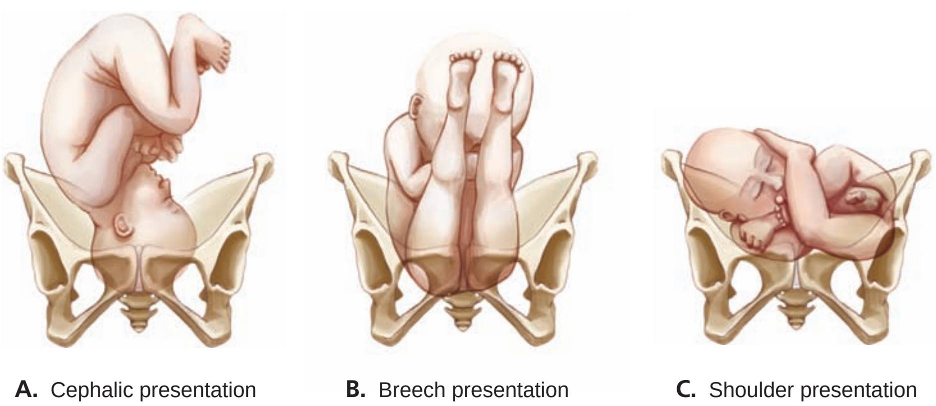


Figure 12-11 The "presenting" part of the fetus is the part that contacts the cervix first. (**A**) Cephalic presentation. (**B**) Breech presentation. (**C**) Shoulder presentation.

presentation). Because the head is the largest part of the baby, delivery of the head first usually allows the baby's body to pass through the pelvic bones without difficulty. However, if a baby presents the legs or buttocks **(breech presentation)**, the baby's body may pass through the pelvis, but the head may become wedged in the pelvic outlet. As a result, the umbilical cord may be compressed between the bones of the baby's head and the mother's pelvis, cutting off the baby's oxygen supply and possibly causing the baby to die or be born with brain damage. To avoid these complications, a cesarean delivery is performed when the baby's presentation is breech. If the baby presents the shoulder **(shoulder presentation),** a cesarean delivery will need to be performed unless the doctor can reposition the baby into a cephalic position.

- *A previous cesarean delivery.* If a woman has delivered one baby by cesarean section, she may have to deliver future babies by cesarean section as well, depending on the reason for the first cesarean section and the location of the uterine scar. A uterine scar located in the upper portion of the uterus is more likely to rupture during the woman's next labor than one that is located in the lower portion of the uterus. For many women, a **vaginal birth after cesarean (VBAC)** is possible if the next pregnancy is uncomplicated and if the uterine scar is located in the lower portion of the uterus.

Sometimes a cesarean section must be performed as an emergency procedure if a complication that threatens the life of the mother or baby develops during the pregnancy (such as a placental complication) or during labor and delivery (Table 12-2). In some cases, the baby may already be dead, and an emergency cesarean section must be performed to save the life of the mother. A situation that creates the need for an emergency

Table 12-2 Complications That Can Occur During Labor and Delivery

COMPLICATION	CAUSES AND RISK FACTORS	CARE
Dystocia: Labor that is long and difficult and does not progress normally	● Ineffective uterine contractions ● Anatomical difficulties (such as cephalopelvic disproportion) ● Abnormal fetal presentation ● Multiple gestation ● Fatigue ● Dehydration	Medications may be administered to enhance uterine contractions. Pain medications or an epidural anesthetic may be administered to allow the mother to rest. If labor does not progress, a cesarean delivery will be necessary.
Uterine rupture: The uterus rips open, often resulting in the baby's death	● Most often occurs at the site of a scar in the uterus (for example, from a previous cesarean section) ● Can also occur as a result of blunt trauma to the uterus	The mother is monitored for signs of shock, and preparations are made for an emergency cesarean delivery.
Prolapsed cord: A loop of umbilical cord slips past the presenting part of the baby, through the cervix, and into the vagina; the cord becomes compressed between the cervical opening and the presenting part of the baby, cutting off oxygen that is circulating from the placenta to the baby	● The presenting part of the baby is not pressed against the cervix when the amniotic sac ruptures ● Risk factors include pre-term labor, premature rupture of membranes, multiple gestation, and abnormal fetal presentation	Immediate cesarean delivery is necessary. The mother is positioned in a knee–chest position to help keep the baby from pressing against the umbilical cord. It may be necessary to place a gloved hand into the vagina to push the baby's head up away from the cervix until the cesarean delivery can be performed.
Nuchal cord: The umbilical cord is looped one or more times around the baby's neck	● Unknown	A single, loose loop is easily slipped over the baby's head immediately before delivery. If there are multiple loops or if the loop is too tight to be easily removed, the umbilical cord may be clamped and cut immediately after the baby's head is delivered, before the shoulders deliver.

BOX 12-1 Basic Steps of a Cesarean Delivery

1. The nurse or scrub person opens the sterile supplies and instruments onto an instrument table covered with a sterile drape. Many commercial "cesarean delivery packs" contain a sterile table cover, sterile drapes, gowns, sponges, and other supplies needed for the surgery.
2. Each "sterile" member of the obstetric team puts on a surgical mask and eye protection, performs a surgical scrub, and puts on a sterile gown and gloves.
3. The scrub person covers the Mayo stand with a sterile drape and then arranges the instruments and supplies according to use on the Mayo stand and the instrument table. (A Mayo stand is a small standing tray that can be positioned over the patient. It is used to hold the most frequently used instruments during the procedure.)
4. The circulating nurse and scrub person count the instruments, sponges, needles, and blades according to facility policy.
5. The anesthesia provider anesthetizes the patient. The team positions the patient in the supine position with a small wedge or roll under her right hip. (The wedge or roll helps relieve some of the pressure the uterus places on the large abdominal vessels.) The circulating nurse inserts a urinary catheter and preps the patient's abdomen with an antiseptic solution.
6. The scrub person applies sterile drapes, connects the suction and electrocautery tubing, and places surgical sponges near the incision site.
7. The doctor makes an incision, first passing the scalpel through the skin and then through the underlying tissue layers of the abdomen, to expose the uterus.
8. The doctor makes a horizontal incision through the wall of the uterus in the lower portion of the uterus using a scalpel. The doctor then enlarges the incision using a pair of bandage scissors, being careful not to injure the baby lying just underneath the incision site. If the amniotic sac has not already ruptured, it usually ruptures at this point. The surgical assistant or scrub person uses suction to clean the amniotic fluid from the surgical area.
9. The doctor places a hand inside the uterine incision and delivers the baby's head, followed by the baby's body. The surgical assistant or scrub person may apply gentle, firm pressure to the top of the uterus as the baby is delivered.
10. As soon as the baby is delivered, the scrub person uses a bulb syringe to remove fluid from the baby's mouth and nose. The doctor clamps the umbilical cord with two clamps and cuts the cord in between the clamps using heavy scissors. If the baby has not started to breathe and cry on her own, the baby is immediately handed to the pediatric team members so that resuscitation efforts can begin.
11. The doctor delivers the placenta through the incision in the uterus and then checks the inside of the uterus to make sure that no fragments of the placenta remain. The doctor applies clamps to the corners of the uterine incision to control bleeding. The scrub person or circulating nurse may collect a blood sample from the umbilical cord at this time.
12. The doctor sutures the uterine incision closed. The circulating nurse and scrub person perform the first closing count of instruments, sponges, needles, and blades.
13. After the uterus is closed and all bleeding is controlled, the doctor irrigates the peritoneal cavity with warm saline solution and then removes the irrigation fluid with suction.
14. The doctor begins to close the abdominal incision, first by suturing closed the peritoneal layer of tissue. The circulating nurse and scrub person perform a second closing count to make sure that nothing has been left inside the abdominal cavity.
15. The doctor next sutures closed the fascia layer and then the subcutaneous layer. The circulating nurse and scrub person perform a third and final count, and the doctor uses sutures or staples to close the skin layer. The scrub person cleans the incision site and applies a sterile dressing.

BOX 12-1 Basic Steps of a Cesarean Delivery *(Continued)*

16. The scrub person removes the drapes and cleans the skin of blood, amniotic fluid, and skin prepping solution.
17. The circulating nurse bends the patient's legs at the knees and allows the legs to fall open to create a "frog-legged" position. The circulating nurse presses the top of the patient's uterus to make sure it is round and firm and to expel any blood or clots from the vagina. The perineal area is cleaned, a perineal pad is applied, and the patient is repositioned in the supine position. The patient's gown may also be changed at this time.
18. The patient is covered with warm blankets and transferred to the recovery area.
19. The scrub person disposes of needles and scalpel blades in a sharps container, cleans re-useable instruments and returns them to the processing area according to facility policy, and places soiled linens and drapes in the laundry hamper or facility-approved waste container as appropriate.

cesarean section is very frightening for the mother and her family members. Situations like this can also be very stressful for the health care team. It is very important for the members of the health care team to remain calm so that care can be provided quickly and carefully. All team members must work together so the baby can be delivered as quickly as possible.

Some facilities teach nursing assistants how to assist during a cesarean delivery. If assisting during a cesarean delivery is part of your job description, you will be taught how to serve as the scrub person during the procedure. You will learn how to perform a surgical scrub, put on a sterile gown and gloves, and work within a sterile field. You will also learn the steps of the cesarean section procedure, the names of the instruments used, and how to properly pass the instruments and other supplies to the doctor. Box 12-1 describes the basic steps of a cesarean delivery. If you are expected to assist with a cesarean delivery, make sure that you have received the proper training and that you are comfortable and competent. Mistakes made by the health care team during a cesarean delivery can cause many post-operative complications and might even result in death of the patient.

A patient who has had a cesarean section is also a post-operative surgical patient recovering from major abdominal surgery. In addition to routine postpartum care, the patient also requires the post-operative care and monitoring that are necessary after abdominal surgery. A woman who has had a cesarean section will usually have an indwelling urinary catheter in place because the urinary catheter that was inserted before the cesarean section usually remains in place for approximately 24 hours. Pain from the abdominal incision may make holding the baby for breast feeding uncomfortable. Using a pillow for support and holding the baby in a "football" hold (with the baby's head and neck cradled in the palm of the mother's hand and the baby's body tucked under the mother's arm) may help increase comfort.

POSTPARTUM COMPLICATIONS

The postpartum period is the 6-week period of time after the birth. Although most postpartum complications occur within 24 hours of delivery, some can occur 1 to 2 weeks after delivery and may make hospitalization necessary. The most common postpartum complications include hemorrhage, infection, and thrombophlebitis.

HEMORRHAGE

As noted earlier, although the risk of hemorrhage is greatest immediately after a woman gives birth, hemorrhage can occur at any time during the 6-week postpartum period. Late postpartum hemorrhage (that is, hemorrhage that occurs 24 hours to 6 weeks after the birth) may be caused by fragments of the placenta left behind in the uterus or by an infection. If postpartum hemorrhage occurs after the woman has been discharged from the hospital after the delivery of the baby, she will need to be readmitted for treatment.

INFECTION

Puerperal infection is an infection that develops after childbirth. Most often, the uterus is affected, but other structures in the birth canal can be affected as well. Urinary tract infections, wound infections, and breast infections that develop after childbirth are also considered types of puerperal infections.

In many cases, a puerperal infection that involves the structures of the birth canal is caused by a microbe that is normally present in the woman's body that enters the vagina or uterus during the process of labor or delivery. The risk for puerperal infection is increased with cesarean delivery or if more than 24 hours pass between the rupture of the membranes and delivery of the baby.

The woman may not show signs of puerperal infection until 10 or more days after delivery. Signs of puerperal infection in a new mother include an elevated temperature lasting 24 hours, chills, and headache. The patient may be placed on contact isolation precautions. As always, following infection control procedures correctly and consistently is important to help prevent the spread of infection to your other patients. Assist the patient with good hygiene and remind her to wash her hands often.

THROMBOPHLEBITIS

Thrombophlebitis is inflammation of the lining of a blood vessel, usually a vein, caused by a blood clot (thrombus). Thrombophlebitis most often affects the veins in the legs or pelvis. Signs and symptoms of thrombophlebitis usually appear between 10 and 20 days after delivery. Superficial thrombophlebitis affects the veins near the surface of the legs, causing redness and pain. Deep vein thrombophlebitis affects the deeper veins in the legs or pelvis. Because these deeper veins carry most of the blood back to the heart, deep vein thrombophlebitis increases the risk of pulmonary embolism if a clot breaks loose and travels to the lungs. A pulmonary embolism can result in death.

Care Alert!

WHEN caring for a patient with thrombophlebitis, you should not massage the patient's calves. This could cause a clot to break loose, putting the patient at risk for pulmonary embolism or other serious complications.

Early and frequent ambulation after delivery is the best way to prevent thrombophlebitis. However, if thrombophlebitis does develop, the patient may be placed on strict bed rest. Anticoagulant medications ("blood thinners") may be administered. You will need to provide assistance with ADLs and monitor the patient's vital signs as ordered. Because anticoagulant medications increase the patient's risk of hemorrhage, you should be observant for bruising and increased vaginal bleeding. Any respiratory changes (such as an increased respiratory rate, cyanosis, dyspnea, or restlessness) must be reported to the nurse immediately because these may be a sign of pulmonary embolism.

SUMMARY

- A woman with a high-risk pregnancy may require hospitalization and constant monitoring for a period of time before the birth of her baby. Pre-existing conditions that affect the mother's health, complications that develop during pregnancy, and carrying more than one fetus at a time can make a pregnancy "high risk."
- Pre-existing conditions that affect the mother's health (such as diabetes mellitus, heart disease, and substance abuse) can cause complications during pregnancy, labor and delivery, and the postpartum period.
- Complications that might develop during pregnancy and jeopardize the lives of the mother, the baby, or both include ectopic pregnancy, spontaneous abortion (miscarriage), incompetent cervix, hyperemesis gravidarum, gestational hypertension, gestational diabetes, placental complications,

pre-term labor, and pre-term premature rupture of membranes.

  - Ectopic pregnancy occurs when a fertilized egg implants outside of the uterus.
  - A spontaneous abortion results in the loss of the fetus before the 20th week of pregnancy.
  - In incompetent cervix, the cervix dilates too early in the pregnancy, causing delivery of a baby that is not mature enough to survive outside of the uterus.
  - Hyperemesis gravidarum (excessive nausea and vomiting) can cause the mother to become dehydrated and lose weight. The baby's growth may be affected if his nutritional needs are not being met.
  - Gestational hypertension is excessively high blood pressure that develops during pregnancy.
  - Gestational diabetes is diabetes that develops during pregnancy in a woman who did not have diabetes before.
  - Placental complications occur if the placenta is attached too low in the uterus (placenta previa) or if it separates from the uterine wall before the birth of the baby (abruptio placentae).
  - Pre-term labor is the onset of labor before the fetus is developed enough to survive on its own.
  - Pre-term premature rupture of membranes (PROM) is rupture of the amniotic sac before the fetus is developed enough to survive on its own. Pre-term PROM increases the risk of infection and often leads to pre-term labor.
  - As the number of babies in a multiple gestation increases, so does the risk for complications during pregnancy, labor and delivery, and the postpartum period.

- Labor is the process during which the woman's uterus contracts and expels the baby.
  - Early signs that labor may soon begin include lightening, the presence of a bloody show, and an increase in Braxton Hicks contractions.
  - The first stage of labor begins with the onset of the first regular contractions and ends when the cervix is fully dilated. This stage of labor is divided into three phases.
    - The early latent phase continues until the cervix is dilated to 3 cm.
    - The mid or active phase continues until the cervix is dilated to 7 cm and may be more uncomfortable for the mother.
    - The transitional phase is the most intense part of labor.
  - The second stage of labor begins with the complete dilation of the cervix and ends with the birth of the baby.
  - After the baby has been delivered, the third stage of labor begins and ends with the delivery of the placenta.
  - The fourth stage of labor begins with the delivery of the placenta and ends when the mother's condition has stabilized, usually about 2 to 4 hours later. During the fourth stage of labor, the woman's vital signs must be monitored frequently, and the woman should be observed carefully for complications such as hemorrhage.
  - The most common method of delivering a baby is a vaginal delivery. A cesarean delivery may be necessary if complications develop during the pregnancy or during labor and delivery that would make a vaginal delivery unsafe for the mother, the baby, or both.
  - Postpartum complications may develop rapidly and without warning.
    - The risk of uterine hemorrhage is greatest the first hour after delivery. Early postpartum hemorrhage occurs within the first 24 hours after delivery. However, late postpartum hemorrhage can occur up to 6 weeks after delivery.
    - Puerperal infection is an infection that develops after childbirth. The structures of the reproductive tract are most often affected, although urinary tract infections, wound infections, and breast infections that develop after childbirth are also considered types of puerperal infections.
    - Thrombophlebitis is the most common cardiovascular problem that occurs during the postpartum period. Clots that form in the large, deep veins of the legs or pelvis may break loose and travel through the bloodstream to the pulmonary artery, causing pulmonary embolism.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Which of the following complications of pregnancy may make dilation and curettage (D&C) necessary?
   a. Abruptio placentae
   b. Incomplete spontaneous abortion
   c. Cervical cerclage
   d. Premature rupture of membranes (PROM)
2. Removal of the fallopian tube may be necessary as a result of which one of the following complications?
   a. Spontaneous incomplete abortion
   b. Ectopic pregnancy
   c. Hyperemesis gravidarum
   d. Incompetent cervix
3. One egg is fertilized by one sperm and then divides into two separate babies. What type of twins will result?
   a. Monozygotic twins
   b. Fraternal twins
   c. Dizygotic twins
   d. Conjoined twins
4. Which fetal presentation is the safest for a vaginal delivery?
   a. Breech presentation
   b. Cephalic presentation
   c. Transverse presentation
   d. Ventral presentation
5. A woman who is delivering her first baby is known as a:
   a. Primiplacental
   b. Multipara
   c. Multigravida
   d. Primipara
6. What is the most intense part of labor, during which the cervix dilates from 7 to 10 cm?
   a. Third stage of labor
   b. Mid or active phase of labor
   c. Transitional phase of labor
   d. Second stage of labor

Matching

Match each numbered item with its appropriate lettered description.

_____ 1. Dystocia

_____ 2. Ectopic pregnancy

_____ 3. Nuchal cord

_____ 4. Spontaneous missed abortion

_____ 5. Incompetent cervix

_____ 6. Preeclampsia

_____ 7. Placenta previa

_____ 8. Abruptio placentae

a. The placenta attaches in the lower portion of the uterus, possibly covering the opening to the cervix
b. Labor that is long and difficult and does not progress normally
c. A sudden increase in maternal blood pressure combined with the presence of protein in the urine
d. Spontaneous dilation of the cervix causing premature delivery of the baby
e. One or more loops of umbilical cord around the baby's neck
f. The fetus dies, and the products of conception remain in the uterus
g. The fertilized egg implants outside the uterus, usually in the fallopian tube
h. Separation of the placenta from the wall of the uterus before delivery

STOP and Think!

1. Mrs. Jackson has been admitted to the obstetric unit where you work. She has just returned to her room from the operating room, where she had dilation and curettage (D&C) for a spontaneous incomplete abortion. How will you monitor Mrs. Jackson's physical condition, and what will you report? What emotional difficulties might Mrs. Jackson be having, and how will you help her deal with them?
2. You are caring for Miss Clarke, who delivered a healthy baby girl vaginally about 30 minutes ago. She is currently sitting up in bed cuddling her baby. You arrive to take her vital signs and notice that she looks a bit pale, and her pulse rate is elevated. When you check her perineal pad, you find that it is totally saturated. Her uterus, although firm, is positioned over to the side of her abdomen instead of in the middle. Why might Miss Clarke's pulse be elevated? What is the significance of the position of her uterus? What should you do next?
3. Mrs. Edmonds is in labor with her third child. When the nurse last checked Mrs. Edmonds' cervix, it had dilated to 6 cm. Now Mrs. Edmonds seems to be having a lot of discomfort during her contractions and says she feels like she needs to push. What stage of labor might she have entered? What might your duties be at this time?

CHAPTER

13

Care of the Psychiatric Patient

WHAT WILL YOU LEARN?

Psychiatric patients are people who are receiving health care for a mental illness (a disorder that affects a person's mind, causing the person to act in unusual ways, experience emotional difficulties, or both). Mental illness is common. No matter where you work as a nursing assistant, you may care for patients who are mentally ill, although the mental illness may not be the main reason the person is receiving health care. However, some nursing assistants work on units or in facilities that specialize in caring for people with mental illness. In this chapter, you will learn about the nursing assistant's role in caring for patients with psychiatric disorders when the psychiatric disorder is the main reason the person is receiving health care. When you are finished with this chapter, you will be able to:

A nursing assistant practices therapeutic communication with a patient in a psychiatric care setting.

1. Describe settings where psychiatric care may be provided.
2. Describe the responsibilities a nursing assistant who works in a psychiatric care setting may have.
3. Explain the goals of therapeutic communication and name and demonstrate some common therapeutic communication techniques.
4. Explain measures you can take to ensure your own safety in the workplace, as well as the safety of your patients and co-workers.
5. Describe under what conditions restraint or seclusion may be necessary and explain the nursing assistant's role in caring for a patient who has been restrained or is in seclusion.
6. Describe the four main categories of medications used to treat psychiatric disorders.
7. State observations a nursing assistant may make that should be reported to the nurse when caring for a patient who is being treated with medication for a psychiatric disorder.
8. Describe how psychotherapy is used to help a person with a psychiatric disorder.
9. Describe the nursing assistant's role in caring for a patient who is receiving electroconvulsive therapy (ECT).
10. Describe some of the more common psychiatric disorders and the special considerations a nursing assistant should be aware of when caring for patients with these disorders.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Therapeutic environment	Extrapyramidal side effects	Psychotherapy	Flat affect
Therapeutic communication	Dystonia	Electroconvulsive therapy (ECT)	Inappropriate affect
Seclusion	Akathisia	Psychotic depression	Polydipsia
Neurotransmitters	Drug-induced parkinsonism	Suicidal ideation	Paranoid
Insomnia	Tardive dyskinesia	Affect	Personality
			Withdrawal

SETTINGS FOR PSYCHIATRIC CARE

Psychiatric care is provided in many different types of settings.

- *Outpatient mental health clinics* offer services such as counseling, medication, and support groups. Some outpatient mental health clinics also help patients obtain education, job training, or employment. Regular appointments at the clinic help the person to manage the disorder while remaining in the community.
- *Long-term psychiatric care facilities* are residential facilities for people with mental illnesses who cannot function on their own as the result of their mental illness. The residents of these facilities need assistance with activities of daily living (ADLs) and safety.
- *Acute psychiatric care facilities* and psychiatric units in hospitals provide care to people who are experiencing mental crises that may cause them to harm themselves or others. The law permits the admission of a person to an acute psychiatric care facility or unit without the person's consent if the person's mental state puts him at risk for harming himself or others. After the crisis phase has passed, the person may be able to return home and receive treatment on an outpatient basis.
- *Psychiatric rehabilitation facilities* provide ongoing support for patients with psychiatric disorders who have been discharged from a psychiatric unit or facility. The focus of psychiatric rehabilitation is to help the person manage his disorder and obtain the skills he needs to live in the community and function at his highest possible level.

THE NURSING ASSISTANT'S ROLE IN PROVIDING PSYCHIATRIC CARE

If you work in a health care setting that specializes in providing care to psychiatric patients, you will be part of a team made up of many different types of health care workers. Many jobs within the health care field have psychiatric care as their specific focus (Table 13-1). As always, the members of the health care team vary according to the patient's specific needs.

As a nursing assistant working in a psychiatric care setting, many of your responsibilities will be the same as they are in any other health care setting. For example, you will be responsible for helping your patients with grooming and hygiene, measuring vital signs, making beds, serving meals, and observing your patients and reporting your observations to the other members of the health care team.

In addition, you may have special duties that are unique to the setting where you work. One of these special duties may be to help with different group activities, such as psycho-educational groups, ADL groups, social skill–building groups, and recreational groups. The group activities help patients gain knowledge and skills they need to stay healthy and function in society.

- *Psycho-educational groups* help patients learn about their illness, how it is treated, and the importance of taking medication as ordered. As a nursing assistant, you may be responsible for helping to make sure that your patients attend group meetings and for providing supervision during the meetings.
- *ADL groups* help teach patients about self-care topics, such as handwashing and personal hygiene. Nursing assistants often play an important role in planning and leading these groups.
- *Social skill–building groups* help patients learn and practice effective ways of interacting with others. As a nursing assistant, you will

Table 13-1 Health Care Workers Who Specialize in Psychiatric Care

JOB TITLE	DESCRIPTION
Psychiatrist	• A medical doctor trained in diagnosing and treating mental illness • Serves as the leader of the psychiatric health care team • Allowed to prescribe medications
Psychiatric clinical nurse specialist or advanced practice registered nurse	• A registered nurse who has obtained a master's degree in psychiatric–mental health nursing • Plans, implements, and evaluates the patient's nursing care and establishes a therapeutic relationship with the patient • Allowed to prescribe medications
Psychiatric nurse	• A registered nurse who has obtained additional training in psychiatric–mental health nursing • Plans, implements, and evaluates the patient's nursing care and establishes a therapeutic relationship with the patient
Psychiatric aide, psychiatric nursing assistant, or mental health assistant	• An unlicensed health care worker who may or may not be certified as a nursing assistant • Assists the psychiatric care team in maintaining a therapeutic environment, providing care, and supervising patient activities
Psychologist	• A person with a doctoral degree in clinical psychology • Provides counseling services • Not allowed to prescribe medications
Psychiatric social worker	• A person with a masters degree in social work • Helps patients adapt to their environment (for example, after discharge from a psychiatric care setting)

Figure 13-1
The physical design of many psychiatric units and facilities contributes to the therapeutic environment. This public area in the psychiatric unit of Griffin Hospital in Derby, Connecticut, features a salt-water aquarium and comfortable furniture. Attractive environments that feature connections with nature and art help promote comfort and interaction with others. (*Photograph courtesy of Woodruff & Brown Architectural Photography and the S/L/A/M Collaborative, Inc.*)

be responsible for helping your patients practice the skills they have learned.

- *Recreational groups* give patients the opportunity to engage in enjoyable activities and socialize with others. Day trips may also be planned. Nursing assistants are often responsible for helping to plan activities, encouraging patients to attend, and participating in the activities.

Another special duty you will have as a nursing assistant working in a psychiatric care setting is to work with the other members of the health care team to maintain a **therapeutic environment** (that is, a safe, healing, supportive environment that helps patients learn how to interact with others in a healthy way). The physical design of many psychiatric units helps to support the therapeutic environment (Fig. 13-1). In addition, the people who work on the unit are responsible for helping to create a therapeutic environment. A therapeutic environment is one that:

- Promotes interaction between patients and staff members
- Encourages participation in group activities
- Conveys a positive, accepting attitude
- Protects patients from physical and emotional harm
- Protects patients' dignity and self-esteem

Guidelines for maintaining a therapeutic environment are given in Guidelines Box 13-1.

As part of your basic training, you learned about many qualities a person who wants to be a nursing assistant should have. For example, a nursing assistant should be friendly, respectful, honest, dependable, empathetic, nonjudgmental, and a good listener and communicator. All of these qualities are very important when working with psychiatric patients. Many people with mental illness have difficulty trusting others. When you show respect for your patients and act in a dependable manner (for example, by keeping your promises), you contribute to the therapeutic environment and help your patients learn to trust you.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

In many societies and cultures, mental illness is viewed as something to be ashamed of. A mentally ill person's behavior may be frightening to those who do not understand it. In addition, movies, television, and books have contributed to the popular image of mentally ill people as violent and out of control. Derogatory words,

Guidelines Box 13-1 Guidelines for Maintaining a Therapeutic Environment

WHAT YOU DO	WHY YOU DO IT
Treat your patients with respect and take measures to protect their dignity and self-esteem. Never behave in an abusive or demeaning manner.	All patients, no matter what condition they are being treated for, deserve to be treated with dignity and respect. Treating your patients with dignity and respect contributes to the therapeutic environment by building trust and helping patients feel accepted.
Protect your patients' right to privacy and confidentiality.	All patients, no matter what condition they are being treated for, have the legal right to privacy and confidentiality. This is especially true when a patient has a condition, such as mental illness, that could cause him to experience discrimination. In addition, protecting the patient's right to privacy and confidentiality contributes to the therapeutic environment by building trust and helping the patient feel safe.
If you have a conflict with another staff member, deal with the matter in private. Do not discuss conflicts with patients, visitors, or uninvolved staff members.	Conflicts between staff members disrupt the therapeutic environment. Conflicts need to be addressed quickly, professionally, and in private. A conflict that affects the quality of care you provide must not be allowed to continue.
Do not have personal conversations in public areas. When conversing with other staff members or patients in public areas, avoid whispering and laughing.	Paranoia (suspiciousness and distrust of others) is part of many mental illnesses. So is the tendency to be very self-centered. As a result, patients may assume that you are discussing them or laughing at them even though this is not the case. A therapeutic environment helps patients feel supported and accepted. Actions that make patients feel uncomfortable do not contribute to a therapeutic environment.
Do not share your personal problems or beliefs with patients. Do not give patients advice.	For a therapeutic environment to exist, professional boundaries must be established and maintained. It is not appropriate to develop personal relationships with your patients.
Do not be judgmental.	A judgmental attitude is not an accepting attitude. Rather, it is an attitude of superiority. Although you do not have to agree with your patients, you do need to accept and support them. Conveying an accepting, supportive attitude is very important for maintaining a therapeutic environment. In addition, a judgmental attitude blocks effective communication, which is important for maintaining a therapeutic environment.
If you become tired or frustrated, take time out, be good to yourself, and share your feelings with the nurse. Know that these emotions and thoughts are normal.	Caring for patients with psychiatric disorders is emotionally draining and physically difficult. If you do not take measures to protect your own mental health, you run the risk of "burn-out." In addition, you place the resident at risk for abuse if you lose your temper. If you behave in an abusive or demeaning way toward a patient, you could lose your job, face legal consequences, or both.

such as “cuckoo,” “loony,” “crazy,” and “nuts,” are often used in popular media to describe people with mental illness. As a result of the social stigma attached to mental illness, having a mental illness can be a very lonely experience. Sometimes after a person is diagnosed with a mental illness, friends and family start to avoid the person.

Your patients need your care, acceptance, and support. As you develop relationships with each of your patients, try to focus on *who* the patient is, not *what* disorder the person has. Try to remember that a person is defined by a lot more than just her medical condition. As always, make an effort to identify and focus on your patient’s abilities rather than her disabilities. When you provide supportive, compassionate, individualized care to your patients with psychiatric disorders, you have a significant impact on their quality of life.

Figure 13-2
Good communication and listening skills are especially important in the psychiatric care setting.

THERAPEUTIC COMMUNICATION

Therapeutic communication is communication between a health care worker and a patient that is directed at helping the patient express her concerns and resolve her problems. In therapeutic communication, the health care worker allows the patient to express her feelings, and then the health care worker acknowledges those feelings and reflects back to the person what she understood. Nurses in all care settings use therapeutic communication. However, therapeutic communication techniques are especially important in the psychiatric care setting because using them promotes a therapeutic environment.

As a nursing assistant working in a psychiatric care setting, you will be expected to use therapeutic communication techniques to help maintain the therapeutic environment (Fig. 13-2). Table 13-2

Table 13-2 Common Therapeutic Communication Techniques

TECHNIQUE	USE	EXAMPLE
Giving information	Provides the patient with facts that the patient needs	“My name is Nancy, and I will be helping you with your ADLs today.”
Broad opening	Invites the patient to talk	“Is there something you would like to talk about?”
Open-ended questioning	Invites the patient to give you more information	“Can you tell me more about how that makes you feel?”
Encouraging	Invites the patient to continue talking	“And then what happened?”
Restating	Indicates to the patient that you are following the conversation	Patient: “I feel really angry. I’m just so upset.” Nursing assistant: “You feel angry and upset.”
Redirecting	Returns the focus of the conversation to the patient	Patient: “Do you have a boyfriend?” Nursing assistant: “That’s not really relevant to the conversation we are having. Let’s focus on you instead.”
Clarifying	Helps to prevent misunderstandings	“When you say _____ do you mean ______?”
Interpreting	Helps to reveal concerns that the patient may not be stating directly	Patient: “Everyone is so busy.” Nursing assistant: “Do you feel like everyone is so busy that you can’t ask us for help?”

reviews some commonly used therapeutic communication techniques. You are probably already familiar with some of these communication techniques. With training and practice, using these techniques becomes easier.

Listening is a very important part of therapeutic communication. It may be difficult at times to understand what a patient with a psychiatric disorder is saying to you. The patient may switch from one topic to another during a conversation or may make up new words or patterns of speech. Try to pay attention to themes or repeated ideas. If you do not understand what the person is saying to you, do not agree with the person just to be polite. Instead, ask the person to clarify statements that you do not understand. Clear, honest communication is essential for maintaining a therapeutic environment.

Although it is important to have a friendly and warm attitude toward your patients, you must establish and maintain professional boundaries. A patient may interpret your interest and caring as a sign of personal friendship, but you must keep the relationship professional at all times. If a person you are caring for asks a personal question, it is appropriate to say something like, "Why do you ask?" or "Let's just focus on you right now." This allows you to redirect the conversation back to the patient and the patient's needs without seeming threatening or rude.

Patients may flatter you, for example, by saying "You're the only one who understands." This is not necessarily true. The patient may be trying to manipulate you or cause staff members to take sides against each other. In this situation, you need to use therapeutic communication techniques to redirect the patient back to the original issue.

WORKPLACE SAFETY

Many people consider psychiatric units and facilities frightening places because they believe that patients with psychiatric disorders are dangerous. In reality, very few psychiatric patients actually pose a threat to others. If you will be working in a psychiatric care facility or on a psychiatric unit, you will be taught how to avoid potentially dangerous situations and how to respond if a patient becomes violent or aggressive. The psychiatric unit or facility will have many policies in place that are designed to keep both the patients and the staff safe. For example, many psychiatric facilities and units prohibit certain items (Box 13-1). Carefully following your facility's or unit's policies is the most important thing you can do to protect yourself and others. Developing trusting relationships with the people you care for also helps to create a safer work environment.

If a patient behaves in a way that poses a risk to himself or others, the doctor may order the use of restraints or seclusion. As part of your basic training, you learned about the dangers associated with restraint use and about the nursing assistant's role in caring for a person who has been restrained. **Seclusion** involves placing a person alone in a specially equipped, locked room. The room has a window or camera that allows the staff to monitor the person. Any furniture in the room is usually bolted to the floor for safety. The

BOX 13-1 Items That Are Commonly Prohibited on Psychiatric Units

- Glass objects (for example, vases, perfume bottles, mirrors)
- Metal objects (for example, clothes hangers, paper clips, fingernail clippers)
- Sharp objects (for example, razors, scissors, knives, pins)
- Toxic substances and inhalants (for example, aerosol cans, glue, marking pens, fingernail polish and fingernail polish remover)
- Firearms and ammunition
- Lighters or matches
- Electronic devices (for example, computers, cellular phones, personal digital assistants [PDAs], hand-held video games)
- Electrical cords and devices with electrical cords (for example, radios, compact disc players)
- Compact discs (CDs) and VHS video tapes
- Plastic bags and balloons
- Hats
- Shoes
- Belts and clothing with drawstrings, yarn, or cords
- Personal medications
- Food, candy, and beverages from outside the unit or facility
- Occult material (for example, tarot cards, Ouija boards, books)
- Alcohol, illicit drugs, and incense

BOX 13-2 Important Points Regarding the Use of Restraints and Seclusion in Psychiatric Care Settings

Most injuries and deaths in psychiatric care settings involve patients who are in seclusion or restrained. For this reason, many rules govern the use of restraints and seclusion:

- Restraint or seclusion is *never* used as punishment.
- Restraint or seclusion is only used if the patient poses a threat to himself or others.
- Restraint or seclusion is ordered by the doctor.
- Restraint or seclusion is for short-term use only (for example, a few minutes to a few hours).
- Before restraint or seclusion is used, alternative methods of lessening the patient's behavior must be tried and documented.
- A restrained patient or a patient in seclusion must be monitored at least every 15 minutes, and the patient's physical needs must be met at least every 2 hours.

goal of seclusion is to limit the patient's exposure to people or situations that are overstimulating and to give the patient quiet time to regain control over her emotions. Box 13-2 summarizes important points regarding the use of seclusion and restraints in a psychiatric care setting.

TREATMENT OF PSYCHIATRIC DISORDERS

Psychiatric disorders can be treated and, in many cases, resolved. Treatment depends on the type and the cause of the mental illness, as well as the level of dysfunction the person is experiencing. In some cases, long-term treatment is needed to control the disorder and allow the person to function at her highest level. Many people with psychiatric disorders require a combination of treatments. Treatment methods include medication, psychotherapy, and electroconvulsive therapy.

MEDICATION

Medication is frequently used (often in combination with other treatment methods) to treat psychiatric illnesses. Four main categories of medications used to treat psychiatric disorders are antidepressants, anxiolytics, mood stabilizers, and antipsychotics.

Antidepressants

Antidepressants are medications used to treat patients with clinical depression. As you remember from your basic training, a person with clinical depression has intense feelings of sadness or hopelessness that do not go away. The person loses interest in activities, may cry frequently, and may sleep too much or not enough. The person may struggle with thoughts of suicide.

Antidepressants work by affecting certain neurotransmitters in the brain. **Neurotransmitters** are chemicals that carry nerve impulses across the synapse (that is, the gap between the axon of one neuron and the dendrites of the next) (Fig. 13-3). Neurotransmitters are either *excitatory* (they cause an action to happen) or *inhibitory* (they stop an action from happening). After a neurotransmitter is released and causes its action, it is either returned to the axon to be stored for later use (a process called *reuptake*), or it is inactivated by an enzyme (such as monoamine oxidase, MAO) (see Fig. 13-3). Scientists have found that imbalances of some neurotransmitters can play a role in causing depression.

Antidepressants fall into several main categories:

- *Tricyclic antidepressants (TCAs)* slow the reuptake of two key neurotransmitters, serotonin and norepinephrine. This increases the amount of these neurotransmitters that are available for the brain to use. Common side effects of TCAs include dry mouth, urinary retention, constipation, dizziness, blurred vision, and sedation. Examples of TCAs include amitriptyline (Elavil), amoxapine (Asendin), doxepin (Sinequan), imipramine (Tofranil), desipramine (Norpramine), and nortriptyline (Pamelor).
- *Selective serotonin reuptake inhibitors (SSRIs)* slow the reuptake of serotonin. Because SSRIs have fewer side effects than TCAs, they are often used to treat depression in elderly patients. Examples of SSRIs include

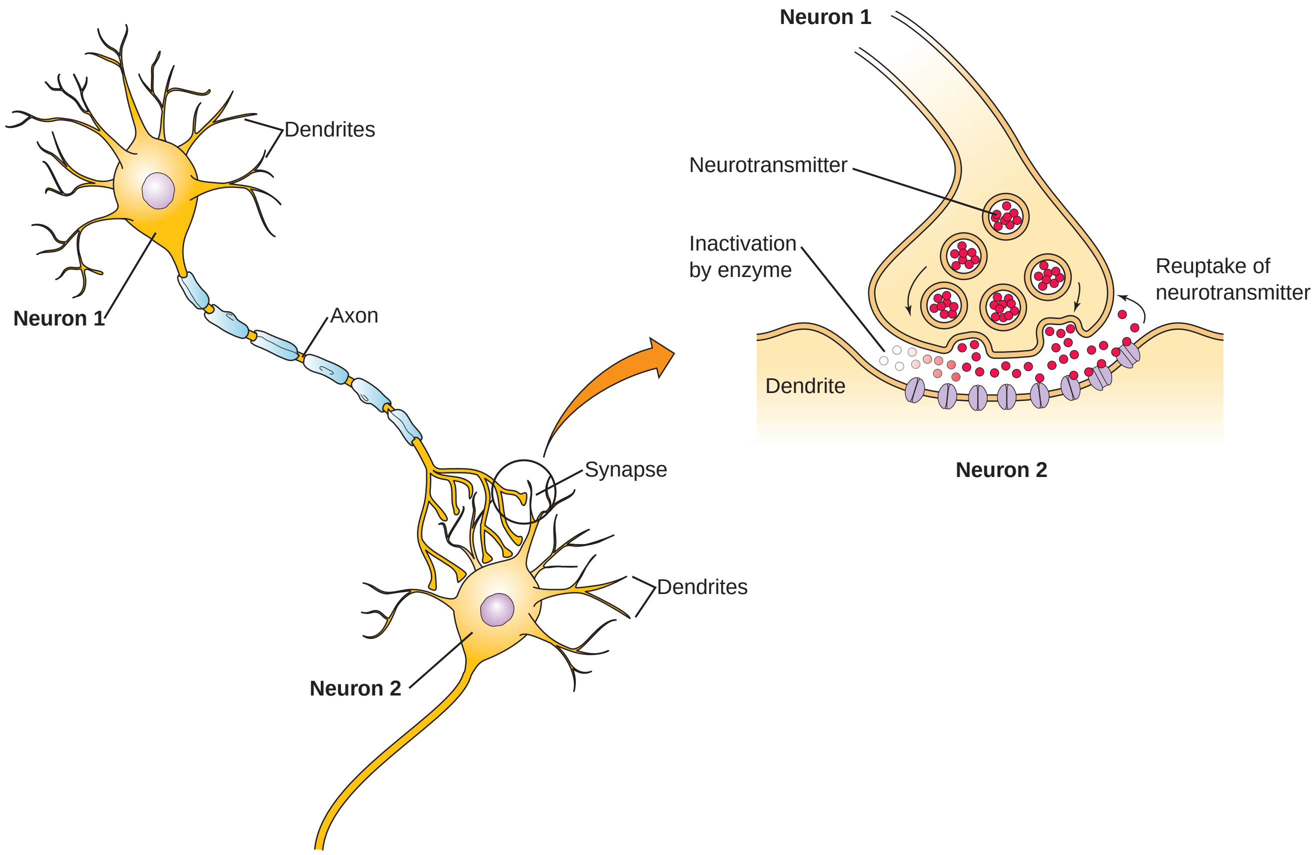


Figure 13-3
Many medications used to treat patients with psychiatric disorders work by affecting neurotransmitter levels in the brain. Neurotransmitters are chemicals that carry impulses across the synapse (the gap between the axon of one neuron and the dendrites of the next). After the neurotransmitter does its job, it is either returned to the axon, where it is stored for future use (a process called reuptake), or it is inactivated by an enzyme.

fluoxetine (Prozac), sertraline (Zoloft), paroxetine (Paxil), citalopram (Celexa), and escitalopram oxalate (Lexapro).

- *Monoamine oxidase inhibitors (MAOIs)* prevent the enzyme MAO from inactivating serotonin and norepinephrine. MAOIs are not used often because they have potentially fatal side effects. In addition, they can interact with many other common medications and foods. Examples of MAOIs include isocarboxazid (Marplan), phenelzine (Nardil), and tranylcypromine (Parnate).
- *Other antidepressants* that work by affecting norepinephrine and epinephrine levels include venlafaxine (Effexor), duloxetine (Cymbalta), bupropion (Wellbutrin, Zyban), nefazodone (Serzone), and mirtazapine (Remeron).

A person who is just starting therapy with an antidepressant may experience sleepiness or **insomnia** (an inability to go to sleep or remain asleep). If you notice that this is the case with one of your patients, please report this to the nurse. Changing the time the medication is given may improve the person's quality of life. For example, if the antidepressant is making the person very sleepy, it might be better for the person to receive the medication at night instead of in the morning. After beginning therapy, it can take 2 to 4 weeks for an antidepressant to start to work.

Care Alert!

THERAPY with antidepressants should not be stopped suddenly. To prevent problems with withdrawal, the doctor will wean the person from the medication by slowly decreasing the dose over time. It is important for the patient to take her medication as ordered.

Anxiolytics

Anxiolytics are used to treat patients with anxiety disorders (such as obsessive-compulsive disorder, panic attacks, phobias, and post-traumatic stress disorder). A person with an anxiety disorder has overwhelming feelings of uneasiness, dread, apprehension, or worry that affect his ability to function. Anxiolytics are also used in the treatment of alcohol withdrawal and insomnia.

Benzodiazepines are the most commonly used anxiolytic medications. Benzodiazepines are minor sedatives. They slow down the activity of key neurotransmitters in the brain to cause a calming effect. One of the side effects of benzodiazepines is drowsiness. In addition, benzodiazepines can lead to physical dependence (addiction). Examples of benzodiazepines include lorazepam (Ativan), alprazolam (Xanax), clonazepam (Klonopin), chlordiazepoxide (Librium), temazepam (Restoril), and diazepam (Valium).

Care Alert!

SUDDENLY stopping therapy with benzodiazepines can be fatal! It is important for patients to take their medications as ordered.

Buspirone (BuSpar) is another commonly used anxiolytic medication. As with benzodiazepines, drowsiness is a side effect of buspirone. However, unlike benzodiazepines, buspirone does not carry the risk of physical dependence.

Mood Stabilizers

Mood stabilizers are used in the treatment of bipolar disorder (manic depression). A person with bipolar disorder has mood swings, which are periods of excessive happiness and excitement that may cause the person to engage in impulsive or reckless behavior (mania), followed by periods of excessive sadness and hopelessness (depression).

Lithium (Eskalith, Lithane) is the most common mood stabilizer. Lithium, a trace element found in nature, helps to normalize the person's mood by affecting neurotransmitter levels. It decreases the release of some neurotransmitters and affects the reuptake of others.

Antipsychotics

Antipsychotics are medications used to treat patients with psychotic disorders, such as schizophrenia. A person with a psychotic disorder has trouble determining what is real and what is imaginary. The person may have delusions (false ideas) and hallucinations (episodes where he sees, feels, hears, smells, or tastes something that does not exist). Antipsychotics may also be used to treat the manic phase of bipolar disorder.

Antipsychotics work in the brain by blocking the neurotransmitter dopamine. Examples of antipsychotics include chlorpromazine (Thorazine), thioridazine (Mellaril), haloperidol (Haldol), clozapine (Clozaril), risperidone (Risperdal), olanzapine (Zyprexa), quetiapine fumarate (Seroquel), ziprasidone (Geodon), and aripiprazole (Abilify).

Antipsychotics can cause several unpleasant side effects, such as dry mouth, constipation, urinary retention, and weight gain. In addition, antipsychotics can cause very serious and potentially life-threatening neurologic side effects, called **extrapyramidal side effects**. The extrapyramidal side effects include dystonia, akathisia, drug-induced parkinsonism, and tardive dyskinesia:

- **Dystonia** is acute muscle spasms or stiffness in the neck, back, or body that may affect the person's ability to breathe and swallow.
- **Akathisia** is an intense feeling of restlessness. The person cannot sit still and must get up and move.
- **Drug-induced parkinsonism** is the development of signs and symptoms similar to those of Parkinson's disease. The person develops a shuffling gait, a stooped posture, drooling, and tremors.
- **Tardive dyskinesia** is involuntary movement of the muscles of the head, neck, and extremities. The person is unable to control behaviors such as tongue thrusting, lip smacking, blinking, and grimacing. Once it develops, tardive dyskinesia is permanent.

When a patient is taking antipsychotic medications, monitoring for side effects is important. Changing the person's medication or dose (or both) as soon as side effects are detected may reverse the side effects or at least stop them from getting worse. However, the doctor will not know to take action if the side effects are not reported. As a nursing assistant, you may be the member of the health care team who is in the best position to detect medication side effects. You are the member of the health care team who will spend the most time with your patients. You will work

A B

Figure 13-4
Psychotherapy (counseling) helps patients gain understanding by exploring their feelings, attitudes, thinking, and behavior. Psychotherapy can be done on an individual basis (**A**) or in a group (**B**). (*Part B, Will & Deni McIntyre/Photo Researchers, Inc.*)

closely with your patients and get to know how they normally behave and look. Be sure to notify the nurse immediately if one of your patients who is taking antipsychotic medications develops any new movements, jerks, twitches, or tremors.

PSYCHOTHERAPY

Psychotherapy (counseling or "talk therapy") is part of the treatment regimen for many patients with psychiatric disorders. In psychotherapy, a licensed therapist (such as a psychologist) helps the person explore his feelings, attitudes, thinking, and behavior. This process helps the patient to gain a better understanding of himself and to make positive changes in his life. Psychotherapy may be done on a one-on-one basis or in a group (Fig. 13-4). The therapist's methods and the length of time the person attends therapy vary according to the needs of the person.

ELECTROCONVULSIVE THERAPY

In **electroconvulsive therapy (ECT),** an electrical shock is delivered to the patient's brain through electrodes applied to the scalp (Fig. 13-5). Scientists do not know exactly how ECT works, but one theory is that the electrical shock affects neurotransmitter levels. ECT is used to treat severe depression that does not respond to other types of treatment.

In the past, ECT was administered without anesthetic. Patients experienced a great deal of pain, as well as injuries ranging from tongue bites to broken bones (as a result of the grand mal seizure caused by the electric shock). Today, patients are given an anesthetic and a muscle relaxant so they do not experience pain or injury during the treatment.

Many of the preparations that are taken for a patient before the ECT procedure are similar to those taken for a patient who will be having surgery. For example, you will be responsible for maintaining the patient's NPO status starting at

Figure 13-5
Doctors prepare a patient for electroconvulsive therapy (ECT). (*Will & Deni McIntyre/Photo Researchers, Inc.*)

midnight the night before the procedure is scheduled, making sure that any nail polish has been removed, and helping the person to meet her elimination needs immediately before the procedure. The nurse will insert a peripheral line before the procedure.

During the procedure, the person is given oxygen and may be assisted with breathing if necessary. Electroencephalography is used to monitor the electrical activity of the brain as the electric shock is administered and immediately afterward. The person's vital signs are monitored. The person usually begins to wake up a few minutes after the procedure.

After the procedure, the person will be tired and possibly disoriented. She may have a headache and some short-term memory loss. The person can eat after she is fully awake and after the nurse determines that the person's gag reflex has returned.

CARING FOR PATIENTS WITH SPECIFIC PSYCHIATRIC DISORDERS

In the sections that follow, we will review some of the more common psychiatric disorders and special considerations you should be aware of when caring for patients with these disorders. When caring for patients with psychiatric disorders, be aware that two patients with the same diagnosis may have very different symptoms and very different methods of coping with their illnesses. Do not make the mistake of assuming that every patient with the same diagnosis will behave in the same way. Also, as you care for patients with psychiatric disorders, make an effort to learn more about their conditions. The information in this book provides good basic information, but there is so much more to learn! Increasing your knowledge about your patients' specific conditions allows you to better understand and care for them.

ANXIETY DISORDERS

Anxiety disorders are the most common form of mental illness. In addition, many patients have an anxiety disorder in addition to another type of mental illness, such as depression. A person with an anxiety disorder experiences feelings of intense fear, dread, or worry that leave him unable to function. Some common types of anxiety disorders are panic disorder, obsessive-compulsive disorder, phobias, and post-traumatic stress disorder.

- In *panic disorder*, the person has "panic attacks," during which he experiences sudden increases in anxiety; feelings of intense fear; and physical signs and symptoms, such as chest or abdominal pain, a rapid heart beat, shortness of breath, and dizziness. A person who is having a panic attack may feel the need to run away. He will have trouble focusing and as a result will not understand what you may be trying to tell him. The person may not be able to speak.
- In *obsessive-compulsive disorder*, the person has recurrent unwanted thoughts (*obsessions*) that are associated with rituals that the person cannot control (*compulsions*). Not performing the rituals increases the person's anxiety.
- A person with a *phobia* has an excessive, abnormal fear of an object or situation.
- In *post-traumatic stress disorder*, the person develops extreme anxiety after an emotionally devastating experience. The person has recurrent thoughts about the experience and has trouble trusting others. The person may experience sleep disturbances, emotional detachment, depression, and unpredictable rage.

Anxiety disorders are usually treated with medication and psychotherapy. Benzodiazepines are a class of anxiolytic drugs commonly used to treat patients with anxiety disorders. Because suddenly stopping therapy with a benzodiazepine can be fatal, it is important for patients taking these medications to take them as ordered. If a patient tells you that he plans to stop taking his medication, you should report this to the nurse right away. Psychotherapy focuses on helping the person to learn new ways of coping by teaching him to rethink his response to a situation.

When speaking to a person with anxiety, keep your voice low and calm. Ask the person to take a deep breath and encourage her to focus on you. Reassure the person that she is safe and that you will help her. Remaining calm and speaking in a reassuring manner helps to lower the person's anxiety level.

DEPRESSION

Clinical depression (a disorder characterized by intense feelings of sadness and hopelessness that do not go away, even with time) affects more than 19 million Americans each year. **Psychotic depression** is very severe clinical depression that causes the person to lose contact with reality. A person with psychotic depression may have delusions and hallucinations. Psychotic depression is a medical emergency.

A person with depression may have difficulty thinking or making decisions, feelings of guilt and worthlessness, and **suicidal ideation** (thoughts of taking one's own life). More than 90% of people who commit suicide have a diagnosable mental disorder, most commonly depression or a substance abuse disorder. When caring for a person who may be at risk for committing suicide, it is important to be alert and to ask questions. Listen to what the person is telling you. If the person indicates that he has thought of killing himself, ask if he has a plan. Asking the person to tell you about his plan will not give him ideas or cause him to become more suicidal. You should share any information you obtain with the nurse immediately so steps can be taken to keep the person safe.

Treatment for depression focuses on keeping the person safe and reducing or eliminating the symptoms of depression. Many people require a combination of treatment methods, such as medication and psychotherapy, to achieve the best results. ECT may be used for some patients with severe clinical depression or psychotic depression if other therapies are not effective.

BIPOLAR DISORDER (MANIC DEPRESSION)

Bipolar disorder (manic depression) is a mental health disorder that causes the person to have mood swings. The person experiences periods of depression, which can be severe, followed by periods of excessive excitement (mania). The time it takes to cycle between the two extremes depends on the person. Some people respond well to treatment and can maintain a normal mood for months or years, and other people may cycle on a daily basis.

During the manic phase of the disorder, the person may engage in impulsive or reckless behavior. The person's speech tends to be rapid, loud, and disorganized. The person may choose clothing that is very attention-getting, and women may wear excessive amounts of make-up. The person may not sleep much. Some people also experience hallucinations and delusions during the manic period.

Lithium is most commonly used to keep the person's mood somewhere in between the two extremes. Lithium affects sodium levels in the body, so the person's sodium and fluid levels must be monitored carefully. A decreased fluid level can increase the person's blood lithium level to toxic levels, so you should report conditions that can lead to dehydration (such as nausea or vomiting, diarrhea, or excessive perspiration) to the nurse immediately. The person's blood lithium levels will also have to be monitored frequently to make sure that the person is receiving an appropriate dose.

TELL THE NURSE !

Although lithium is found in nature, when taken in the dose necessary to treat bipolar disorder, it can be toxic. Report any of the following signs or symptoms of lithium toxicity to the nurse right away:

- The person has diarrhea or vomiting.
- The person is having trouble moving in a coordinated way.
- The person complains of ringing in the ears.
- The person has urinary frequency.

Medications used to prevent seizures, such as carbamazepine (Tegretol) and valproic acid (Depakote), may also be used in the treatment of patients with bipolar disorder. It is unclear how or why these medications work.

SCHIZOPHRENIA

Schizophrenia is a very disabling form of mental illness. It tends to run in families and may have a genetic basis. Scientists have discovered that schizophrenia produces changes in the brain. For example, people with schizophrenia have less brain tissue and cerebrospinal fluid (CSF) than people without schizophrenia. In addition, people with schizophrenia have neurotransmitter imbalances.

A person with schizophrenia has trouble determining what is real and what is imaginary. The person may have delusions or hallucinations. Delusions and hallucinations are what can make people with severe, untreated schizophrenia dangerous to themselves or others. The person may believe that others are talking about him or want to harm him. The person may hear voices that tell him to harm himself or others.

Thinking and speech may be disordered in a person with schizophrenia. For example, the person may switch from one topic to another during a conversation or make up new words or patterns of speech. Some people with schizophrenia become unresponsive to others. They may refuse to move, or they may make excessive movements that have no purpose.

Affect is a person's facial expression. We use our facial expressions to convey our emotional state to others. A person with schizophrenia may have **flat affect,** which means that he shows no emotion through his facial expressions. A person with schizophrenia may also have **inappropriate affect,** which means that the person's facial expression does not match the situation.

People with schizophrenia often ignore their personal needs because they are focusing on the symptoms of their illness. They may not be able to sit still long enough to eat, or they may fear that their food or drink has been poisoned. As a nursing assistant, you will need to encourage your patients with schizophrenia to participate in self-care. In addition, building trust is important. Your patients may be more willing to allow you to help them (for example, with eating) if they trust you.

Some people with schizophrenia develop **polydipsia** (excessive water drinking). Drinking too much water can affect the sodium levels in the blood, leading to seizures, and may even be fatal. A patient with polydipsia will have fluid restrictions, which you will be responsible for helping to enforce.

Many people with schizophrenia are **paranoid** (suspicious and distrustful of others). As a result, a patient with schizophrenia may feel very threatened. A patient with schizophrenia who is feeling threatened and upset may harm himself or others. When caring for a patient with schizophrenia, try to be as non-threatening as possible. Give the person enough personal space when you are talking with him. This helps the person to feel more secure. Also, avoid using a bossy or demanding tone of voice. For example, instead of telling the person that he *must* do something *right now*, tell the person that it is *time* to do something and ask him for his help doing it.

Schizophrenia can usually be controlled with antipsychotic medication. The best control is achieved when the patient takes the medication as ordered. Even if you are not responsible for administering medication, you will play an important role in making sure that the patient takes his medication as ordered. For example, you can encourage the person to take his medication as ordered, and you should be observant for signs that the person is not taking his medication (for example, pills that have been spit out and concealed). When caring for a patient who is taking an antipsychotic medication, it is also important to watch the person carefully for neurologic side effects, such as dystonia, akathisia, drug-induced parkinsonism, and tardive dyskinesia.

PERSONALITY DISORDERS

A person's **personality** is the group of traits, attitudes, and behaviors that define the person. A person's personality is determined by genetics and early life experiences and is established by the time the person reaches adulthood. A person with a personality disorder has personality traits that cause her to act in ways that are not socially acceptable.

There are many different types of personality disorders. Doctors usually group personality disorders into three main categories:

- Cluster A personality disorders are defined by odd or eccentric behavior.
- Cluster B personality disorders are defined by dramatic, unpredictable, and emotional behavior.
- Cluster C personality disorders are defined by fearful or shy behavior.

Despite the many different specific types of personality disorders, there are some traits that most people with personality disorders share. For example:

- They engage in socially unacceptable behaviors.
- They tend to be very self-centered.
- They tend to manipulate or exploit others.
- They do not handle stress well.
- They tend to blame others for their problems.
- They often lack insight (in other words, they do not recognize that they have a problem).

People with personality disorders are at increased risk of developing other psychiatric disorders, such as eating disorders, substance abuse disorders, anxiety disorders, and depression. Certain types of personality disorders put the person at risk for harming herself or others. For example, the person may cut herself to relieve stress and anxiety. Some types of personality disorders cause the person to act outside of the law, sometimes in violent ways.

Patients with personality disorders are treated with group psychotherapy and medications (mood stabilizers, antidepressants, and anxiolytics). People with personality disorders need consistent boundaries and rules because they often tend to manipulate or exploit others. Maintaining a therapeutic environment and using therapeutic communication are very important when caring for patients with personality disorders.

SUBSTANCE ABUSE DISORDERS

Substance abuse disorders involve the excessive or inappropriate use of drugs (legal or illegal), alcohol, or inhalants. Some people abuse more than one substance. A person with a substance abuse disorder develops a physical and emotional dependence on the substance. The person must have the substance in order to function. If she cannot get the substance, she experiences physical symptoms (such as tremors and delirium) and emotional symptoms (such as anxiety).

Some people with substance abuse disorders decide to seek help on their own. Others are forced to seek help when they experience the social consequences of their addiction, such as prison time (for example, after a drunk driving arrest), loss of a job, or loss of relationships with family members and friends. A person who is admitted to a health care facility for treatment of a substance abuse disorder may experience **withdrawal,** an emotional and physical reaction that occurs when use of the substance is discontinued.

People going through withdrawal can experience tremors, an elevated heart rate and blood pressure, nausea and vomiting, insomnia, and anxiety. If the person's withdrawal symptoms are not treated, the person may begin to experience hallucinations, seizures, and delirium. Withdrawal can be life threatening. You should alert the nurse immediately if a person you are caring for suddenly develops tremors or has a marked change in behavior (for example, the person seems more tired, irritable, or anxious). Immediate treatment of the withdrawal symptoms can help prevent complications (such as seizures) from developing. A benzodiazepine, such as lorazepam (Ativan), chlordiazepoxide (Librium), or diazepam (Valium), is usually given to reduce the symptoms of withdrawal.

EATING DISORDERS

Examples of common eating disorders include anorexia nervosa and bulimia nervosa. A person with an eating disorder is extremely focused on her body weight and shape and believes that she is excessively overweight. Eating disorders involve serious (and potentially fatal) changes in eating behavior, such as reducing the amount of food eaten to almost nothing or eating and then purging (taking measures to rid the body of the food that was eaten before it is digested).

As a nursing assistant caring for a patient with an eating disorder, you may be responsible for weighing the patient, monitoring the patient's food intake, observing for unhealthy behaviors (such as purging), helping the patient develop a positive self-image, and assisting the person to therapy. Eating disorders can be difficult to treat. As a caregiver, you must be patient and persistent.

SUMMARY

- Psychiatric care can be provided on an inpatient or outpatient basis. The patient may require acute or long-term care.
- Nursing assistants who work in psychiatric care settings help patients with their activities of daily living (ADLs), play a role in planning and carrying out group activities, and assist in maintaining a therapeutic environment.
- Good communication skills are essential in the psychiatric care setting. Nursing assistants who work in psychiatric care settings use therapeutic communication techniques

with their patients to help patients express concerns and resolve problems.

- Psychiatric units and facilities have many policies that are designed to keep both the patients and staff safe. Following these policies carefully is the most important thing you can do to protect yourself and others.
- Occasionally, the use of restraints or seclusion is necessary to prevent a patient from harming himself or others. These methods are *never* used as punishment and are *only* used as a last resort.
  - A doctor's order is required to apply a restraint or place a patient in seclusion.
  - Nursing assistants may be responsible for checking on a patient who is restrained or in seclusion and ensuring that the patient's basic physical needs are met.
- Methods used to treat psychiatric disorders include medication, psychotherapy, and electroconvulsive therapy (ECT). Often, a combination of these methods is used.
  - Major categories of medications used to treat psychiatric disorders include antidepressants (for treating depression), anxiolytics (for treating anxiety), mood stabilizers (for treating bipolar disorder), and antipsychotics (for treating psychotic disorders, such as schizophrenia).
  - Psychotherapy (counseling) is led by a therapist, psychologist, or psychiatrist and may be done on an individual or group basis.
  - Electroconvulsive therapy (ECT) involves sending an electric shock through the brain. Many of the patient care measures that are done before and after ECT are similar to those done before and after a surgical procedure.
- Common psychiatric disorders include anxiety disorders, depression, bipolar disorder (manic depression), schizophrenia, personality disorders, substance abuse disorders, and eating disorders.
  - Some of the medications used to treat anxiety disorders must not be stopped suddenly. When caring for a patient with an anxiety disorder, it is important to keep your voice low and calm and to speak in a reassuring manner.
- People with depression are at higher-than-normal risk for committing suicide. If a patient makes a remark that makes you believe he is thinking about suicide, you should share your concerns with the nurse right away.
- Patients with bipolar disorder are often treated with lithium. Because lithium toxicity can occur if fluid levels in the body are decreased, it is important to be observant for situations that could cause dehydration.
- A person with schizophrenia has trouble separating the real from the imaginary.
  - A person with schizophrenia may need help meeting his basic needs.
  - A patient with schizophrenia who is feeling threatened or upset may harm himself or others. It is important to give the person enough personal space and to avoid using a bossy or demanding tone of voice.
  - Patients with schizophrenia may be treated with antipsychotic medications. When caring for a patient who is taking an antipsychotic medication, it is important to watch the person carefully for neurologic side effects, such as dystonia, akathisia, drug-induced parkinsonism, and tardive dyskinesia.
- There are many different types of personality disorders. Maintaining a therapeutic environment and using therapeutic communication are very important when caring for a patient with a personality disorder.
- A person with a substance abuse disorder may go through withdrawal when use of the substance is discontinued.
- Eating disorders, such as anorexia nervosa and bulimia nervosa, are characterized by serious changes in eating behavior. Nursing assistants who care for patients with eating disorders may be responsible for weighing patients, monitoring food intake, observing for unhealthy behaviors, and helping patients improve their self-image.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Which one of the following is an example of therapeutic communication?
   a. I wouldn't do that if I were you.
   b. If you do not stop behaving this way, I am going to have to restrain you.
   c. How did it make you feel when she said that?
   d. What did you have for breakfast this morning?
2. Which of the following best describes a therapeutic environment?
   a. A place where patients feel accepted and safe
   b. A place where patients know the staff is in charge
   c. A place where patients can get medication
   d. A place with very few furnishings and decorations
3. Why can people with severe, untreated schizophrenia be dangerous?
   a. They do not know right from wrong
   b. They may have hallucinations or delusions
   c. The medications they take can make them behave in unpredictable ways
   d. People with schizophrenia are not dangerous
4. When might the doctor order seclusion?
   a. When the patient has a contagious disease
   b. When there is not enough staff to keep an eye on the person and make sure he is safe
   c. When restraints fail to control the person's behavior
   d. When the patient has become excessively agitated or upset, is at risk for harming himself or others, and needs to spend time in a quiet environment to regain control over his emotions
5. How do antidepressant medications work?
   a. By sending an electric shock through the brain
   b. By affecting neurotransmitter levels in the brain
   c. By making the person drowsy
   d. By making the person forget her problems
6. Mrs. Wilkins is taking a benzodiazepine to treat an anxiety disorder. Which of the following observations should you report to the nurse immediately?
   a. Mrs. Wilkins has developed tremors
   b. Mrs. Wilkins has urinary frequency
   c. Mrs. Wilkins has been hiding her pills and not taking them
   d. Mrs. Wilkins has flat affect
7. Mr. Darcy has schizophrenia and is being treated with an antipsychotic medication. Which of the following observations should you report to the nurse immediately?
   a. Mr. Darcy thinks that aliens are communicating with him through the television set
   b. Mr. Darcy thinks that other people are talking about him
   c. Mr. Darcy tells you he is having trouble breathing and swallowing
   d. Mr. Darcy attended an ADL group
8. Mrs. Simmons has bipolar disorder and is being treated with lithium. Which of the following is a sign of lithium toxicity and should be reported to the nurse immediately?
   a. Mrs. Simmons has diarrhea
   b. Mrs. Simmons has a fever
   c. Mrs. Simmons complains of thirst
   d. Mrs. Simmons' vision is blurry

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** Mania

_____ **2.** Delusion

_____ **3.** Polydipsia

_____ **4.** Extrapyramidal side effect

_____ **5.** Tardive dyskinesia

_____ **6.** Electroconvulsive therapy (ECT)

a. Excessive water drinking
b. Periods of excessive happiness and excitement that may cause the person to engage in impulsive or reckless behavior
c. Used to treat severe depression that does not respond to other types of treatment
d. Involuntary movement of the muscles of the head, neck, and extremities
e. False idea
f. Serious and potentially life-threatening neurologic side effects caused by antipsychotic medications

STOP and Think!

1. You work on an inpatient psychiatric unit. While you are changing Ms. Maroney's linens, she says to you, "You are the only good aide here. None of the other aides understand what I'm going through." Even though you agree that you are a good aide, you are not sure that you agree that you are the *only* good aide on the unit. What are some of the reasons Ms. Maroney may have made this comment? How would you respond to Ms. Maroney's comment?

2. Your patient, Mr. Rex, has schizophrenia. Mr. Rex hears voices coming from the television and radio telling him that the government is hunting him and plans to kill him. He fears poison in his food and is refusing to eat. How will you establish trust with Mr. Rex, and why is it important for you to do this?

3. Jim is a nursing assistant on the psychiatric unit of a hospital. Recently, Jim's older brother committed suicide. Mr. Tompkins, a patient with severe depression and suicidal ideation, was just admitted to the psychiatric unit where Jim works. Mr. Tompkins is about the same age as Jim's brother. How will Jim handle his emotions when caring for Mr. Tompkins? Is it appropriate for Jim to share with Mr. Tompkins his experience with his brother?

4. You have worked as a psychiatric aide in a psychiatric care facility for many years. The facility where you work admits many patients for treatment of eating disorders, such as anorexia. Today, in the break room, Anita, a recently hired aide, says to you, "I just don't get it. Why won't these people *eat*? I mean, how hard is it to just eat something? I look at all of the pain these people are causing their families, and it really frustrates me that they won't just do the one thing that would make them better." How would you respond to Anita? Why is it important for you to take this opportunity to help Anita better understand the patients in her care?

Nursing Assistants Make a Difference!

My name is Laura, and I'm 21 years old. Two years ago, I was in a car accident that crushed the bones in my right leg and left me with lots of deep cuts and bruises all over my body. The pain was so bad, I can still remember it. As soon as my medical condition had stabilized, the nurse told me that we were going to begin rehab. Was she kidding? It hurt just to breathe. Looking back, I know I had a bad attitude, but at the time, I just didn't care. I didn't even want to eat or get dressed, much less do the rehab exercises. I could tell that the health care team was becoming frustrated with me, and I certainly wasn't going to get better if I didn't try, but I just couldn't bring myself to try.

After a few days of this, one of the nursing assistants, Amy, sat me down and gave me a talking to. I liked Amy; she was always very kind but not a pushover. You could just tell that she didn't suffer fools lightly. Amy looked me right in the eye and said, "Laura, you need a little 'Camp MeMe.' Do you know what 'Camp MeMe' is? Camp MeMe is an attitude adjustment! Do you want your life back? Because if you do, you've got to make this effort. I'll be here to help you and so will the rest of the health care team, but ultimately, your recovery is up to you."

At that moment, something in my head just clicked. I guess it took Amy's words to make me realize that the only person who stood to gain or lose anything at all was me. Sure, my family and friends certainly cared about what happened to me. And the health care team wants to see all of their patients succeed. But ultimately, I was the one who was going to have to live with the consequences of that accident, and I could either take the help and support everyone was offering and make an effort, or I could continue to feel sorry for myself. I could feel my cheeks getting hot and red with shame. I'd been such a jerk!

That was two years ago, like I said. Today, I'm completely recovered and about to graduate from college. Sometimes, when the weather is damp, my leg hurts, but that's about it. I'll always be grateful to Amy for her "tough love," and I'll never forget Camp MeMe.

UNIT

4

Assisting With Medications

In some states and facilities, nursing assistants who have received advanced training are allowed to administer certain types of medications under the supervision of a registered nurse (RN) or licensed practical nurse (LPN). This unit provides an overview of the basic principles of medication administration and reviews some of the more commonly administered medications.

A nursing assistant who has received advanced training in medication administration hands a patient his medicine. Be aware that you should never administer medications unless this task is part of your job description and you have received the appropriate training.

CHAPTER 14

Introduction to Medication Administration

WHAT WILL YOU LEARN?

Depending on where you work, you may be allowed to assist with medication administration. Medication administration is much more than simply pouring a pill out of a bottle and handing it to a person to swallow. Special care must be taken when administering medications, especially when the people you are administering them to have serious illnesses or are taking multiple medications that may interact with each other. Medications can save lives and improve a person's quality of life. They can also have side effects that may cause serious illness and

One of the six rights of medication administration is "right person." Here, a nursing assistant checks a patient's identification band before administering her medication.

death. In this chapter, you will learn the basic principles of safe medication administration.

When you are finished with this chapter, you will be able to:

1. Describe when assisting with some types of medication administration is within a nursing assistant's scope of practice.
2. Discuss the different routes for medication administration.
3. List the six rights of medication administration.
4. Discuss how medication administration is documented and explain why documentation is important.
5. Discuss what is considered an error when administering medications.
6. Discuss the appropriate way to handle a medication error.
7. Describe the different types of medication supply systems.
8. Demonstrate the proper way to prepare and administer an oral medication.
9. Demonstrate the proper way to administer a transdermal patch.
10. Demonstrate the proper way to administer eye drops.
11. Demonstrate the proper way to administer ear drops.
12. Demonstrate the proper way to insert a rectal suppository.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Route	Small-volume nebulizer	Brand name	Enteric coating
Oral (PO) route	Parenteral route	Dose	Sustained-release preparations
Tablets	Intradermal injection	Medication administration record (MAR)	Pill splitter
Capsules	Subcutaneous injection	Toxicity	Medication-crushing device
Sublingual (SL) route	Intramuscular (IM) injection	Controlled substances	Spacer
Topical route	Chemical name	Medication cup	
Respiratory route	Generic name		
Inhaler			

SCOPE OF PRACTICE

Only certain health care workers (such as doctors, nurse practitioners, physician assistants, and dentists) can write orders to administer medications. Nurses are responsible for checking medication orders, writing orders that have been given verbally, making sure that orders are correct, obtaining medications from the pharmacy or storage area, and administering medications.

In some facilities, nursing assistants are permitted to assist with some types of medication administration. You should not administer any medications unless this task is part of your formal job description, you have received specialized training in medication administration, and you have appropriate support and guidance available to you. It is your responsibility to make sure you know how to perform all the skills you are asked to perform. It is also your responsibility to learn about the medications you are administering.

MEDICATION ADMINISTRATION ROUTES

The **route** is the way the person receives the medication.

ORAL ROUTE

Medications given by the **oral (PO) route** are given by mouth and swallowed. These medications may take the form of liquids, **tablets** (medication pressed into a solid form), or **capsules** (medication enclosed in a gelatin shell). The medication passes through the digestive tract and is absorbed into the bloodstream through the walls of the intestine.

SUBLINGUAL ROUTE

Medications given by the **sublingual (SL) route** are placed under the tongue and allowed to dissolve. Sublingual medications are usually liquids or small, rapidly dissolving tablets. The medication is absorbed into the bloodstream through the mucous membrane of the mouth. The sublingual route is used when rapid absorption is needed. For example, nitroglycerin (used to relieve chest pain) is often given by the sublingual route.

TOPICAL ROUTE

Medications given by the **topical route** are applied to the skin or mucous membranes, where the medication is absorbed into the tissues or bloodstream, depending on the medication. Topical preparations include creams, ointments, patches, eye and ear drops, nasal sprays, suppositories (such as those placed in the rectum or vagina), and enemas that contain medication.

RESPIRATORY ROUTE

Medications given by the **respiratory route** are inhaled into the lungs. These medications take the form of an aerosol mist (fine particles of a liquid or powder medication suspended in gas). An **inhaler** or a **small-volume nebulizer** is used to administer medications by the respiratory route (Fig. 14-1).

PARENTERAL ROUTE

Medications given by the **parenteral route** are given by injection with a syringe. The medication is injected into the skin, subcutaneous (fatty) tissue, or muscle, and from there it is absorbed into the bloodstream.

- Medications given by **intradermal injection** are injected under the skin.
- Medications given by **subcutaneous injection** are injected into the fatty tissue.
- Medications given by **intramuscular (IM) injection** are injected into the muscle. It is usually not within the nursing assistant's scope of practice to administer IM medications.

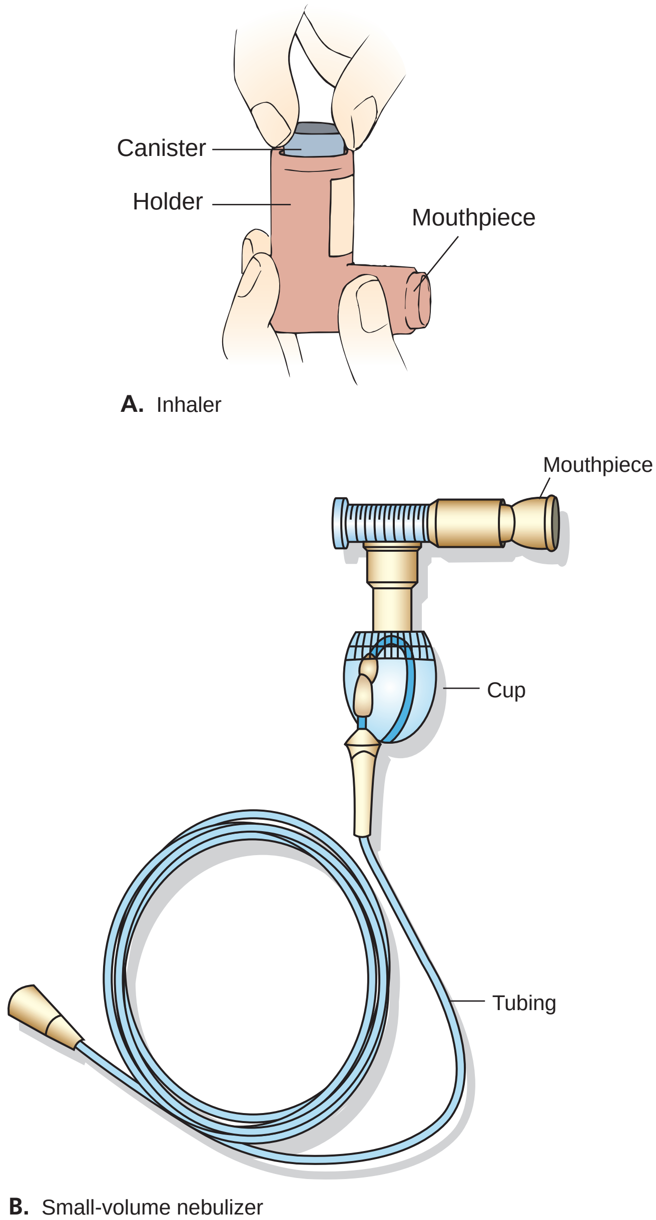


Figure 14-1
Devices used to administer medications via the respiratory route. (**A**) An inhaler consists of a canister of medication and a holder with a mouthpiece. The person places the mouthpiece in the mouth and presses down on the canister to release a dose of medication. (**B**) A small-volume nebulizer consists of a cup, tubing, and mouthpiece. The liquid medication is placed in the cup, and the tubing is attached to an air compressor or oxygen source. Forcing air or oxygen through the medication creates a fine mist, which the person inhales through the mouthpiece. It takes several minutes for all of the medication to be administered through the small-volume nebulizer.

Medications given by the parenteral route can also be given through an intravenous (IV) catheter. In this case, the medication is placed directly into the bloodstream. It is usually not within the nursing assistant's scope of practice to administer IV medications.

SAFE MEDICATION ADMINISTRATION

Medication administration errors include:

- Giving a person the wrong medication
- Giving a person too much medication
- Skipping a dose of medication
- Administering the medication at the wrong time
- Giving a person a medication by the wrong route

Errors in medication administration can cause a person to become ill or even die. Every effort must be made to prevent errors. If an error is made, it is essential to follow the proper procedure for reporting and documenting the error.

Watch & Learn THE SIX RIGHTS OF MEDICATION ADMINISTRATION

Following the six rights of medication administration helps prevent medication administration errors. You must give the *right medication* to the *right person* in the *right dose* through the *right route* at the *right time*, and you must provide the *right documentation* (Fig 14-2). As a nursing assistant, you can be held liable for errors that result from not following the six rights of medication administration.

The Right Medication

The first step is making sure that the medication you are preparing is the medication the person is supposed to receive. Mistakes can happen as a result of carelessness. Many medications look similar to each other or have similar names or packaging. To help prevent errors, pay close attention and get into the habit of checking the information on the medication label to make sure that it matches the medication order. Check three times:

- Check the label when you pick up the medication.
- Check the label as you are preparing the medication to be given.
- Check the label when you are putting the medication away.

Be aware that one medication can have many different names. In fact, all medications have at least three names.

- The **chemical name** describes the medication's molecular structure. The chemical name is used mostly by researchers. It is never used in clinical practice.
- The **generic name** is the medication's official name. No single drug manufacturer owns the rights to the generic name. The generic name is often based on the chemical name, but it is much simpler.
- The **brand name** is the name given to the medication by the manufacturer for marketing purposes. The brand name is usually catchy and easy to pronounce and remember. A single medication may have multiple brand names if more than one company manufactures it.

In this book, you will see medications referred to by their generic name, followed by their brand name or names in parentheses: cimetidine (Tagamet), acetaminophen (Tylenol), furosemide (Lasix), and so on. Many health care facilities also list medications using both the generic and brand names to help avoid confusion.

The Right Person

The next step is to make sure that you are giving the medication to the correct person. Before administering medication to a person, always check the person's identification band. Then ask the person to tell you his name ("Could you please tell me your name?"). This is safer than calling the person by name and then asking the person to confirm that the name you have used is the correct name. A person who is hearing impaired, who is confused or who has dementia, or who is not familiar with the language may respond to an incorrect name.

The Right Dose

The **dose** is the amount of medication that the person is supposed to receive. The dose is listed on the medication order. The unit of measure

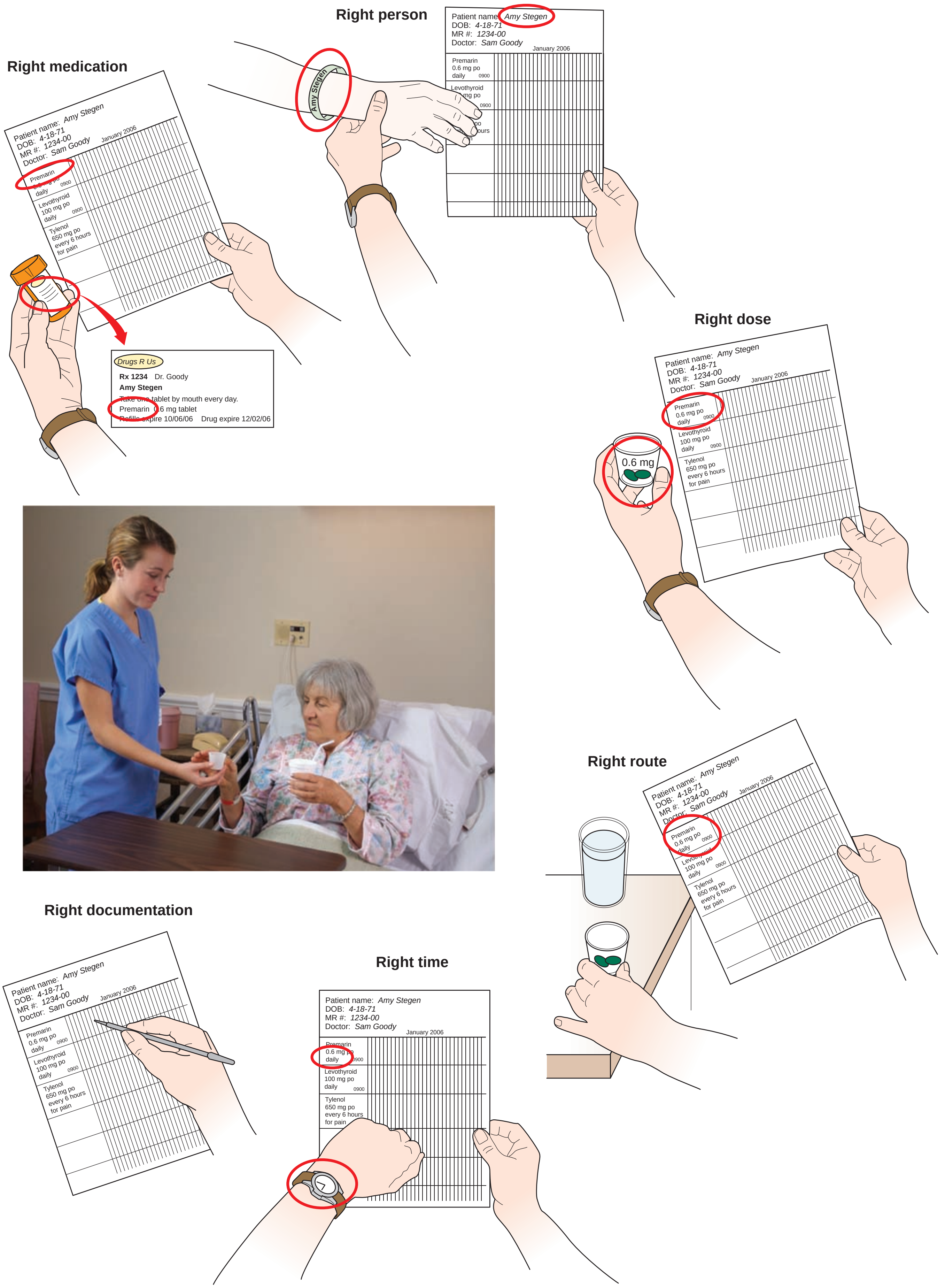


Figure 14-2

Following the six rights of medication administration helps prevent medication errors.

Table 14-1 Common Units of Measure for Medications

ABBREVIATION	MEANING	EQUIVALENTS
mcg	Micrograms	—
mg	Milligram	1 mg = 1000 mcg
mEq	Milliequivalent	—
gtts	Drops	—
gr	Grains	1 gr = 60 mg
mL	Milliliter	30 mL = 1 oz 1 mL = 100 U
L	liter	1 L = 1000 mL

used to express the dose varies, depending on the medication. Common units of measure for drug doses are given in Table 14-1.

You may need to use basic math skills to calculate how much medication to give to meet the dose requirement specified in the medication order. For example, if 50 mg of a medication is ordered but the medication is only supplied as 25-mg tablets, you would need to give the person two tablets (2 × 25 mg = 50 mg) to meet the required dose. On the other hand, if 25 mg of a medication is ordered, but the medication is only supplied as 50-mg tablets, you would need to give the person one-half tablet (1/2 × 50 mg = 25 mg) to provide the correct dose.

The Right Route

Medications must be given by the ordered route. The route of administration affects the rate at which the body absorbs and uses the medication. The person who orders the medication bases the dose on the administration route. Giving a medication by a route other than that specified in the medication order can harm the person.

The Right Time

Many medications work for a certain number of hours. Giving a person a medication too soon can cause the person to receive more medication than she should, leading to **toxicity** (adverse effects caused by too much medication in the person's system). Not giving a person a medication soon enough can decrease the medication's effectiveness. When organizing your tasks for the day, be sure to write down the times that you need to administer any medications so you do not forget.

Table 14-2 Common Abbreviations Related to Medication Administration

Note: Abbreviations in red are no longer approved for use by The Joint Commission. These abbreviations should be avoided and the instruction written out in full.

ABBREVIATION	MEANING
Ac	Before meals
Pc	After meals
HS	At bedtime (hour of sleep)
QD	Daily
QOD	Every other day
BID	Twice daily
TID	Three times per day
QID	Four times per day
PR	Rectally
PO	Orally
IM	Intramuscularly
subQ, SQ, SC	Subcutaneously

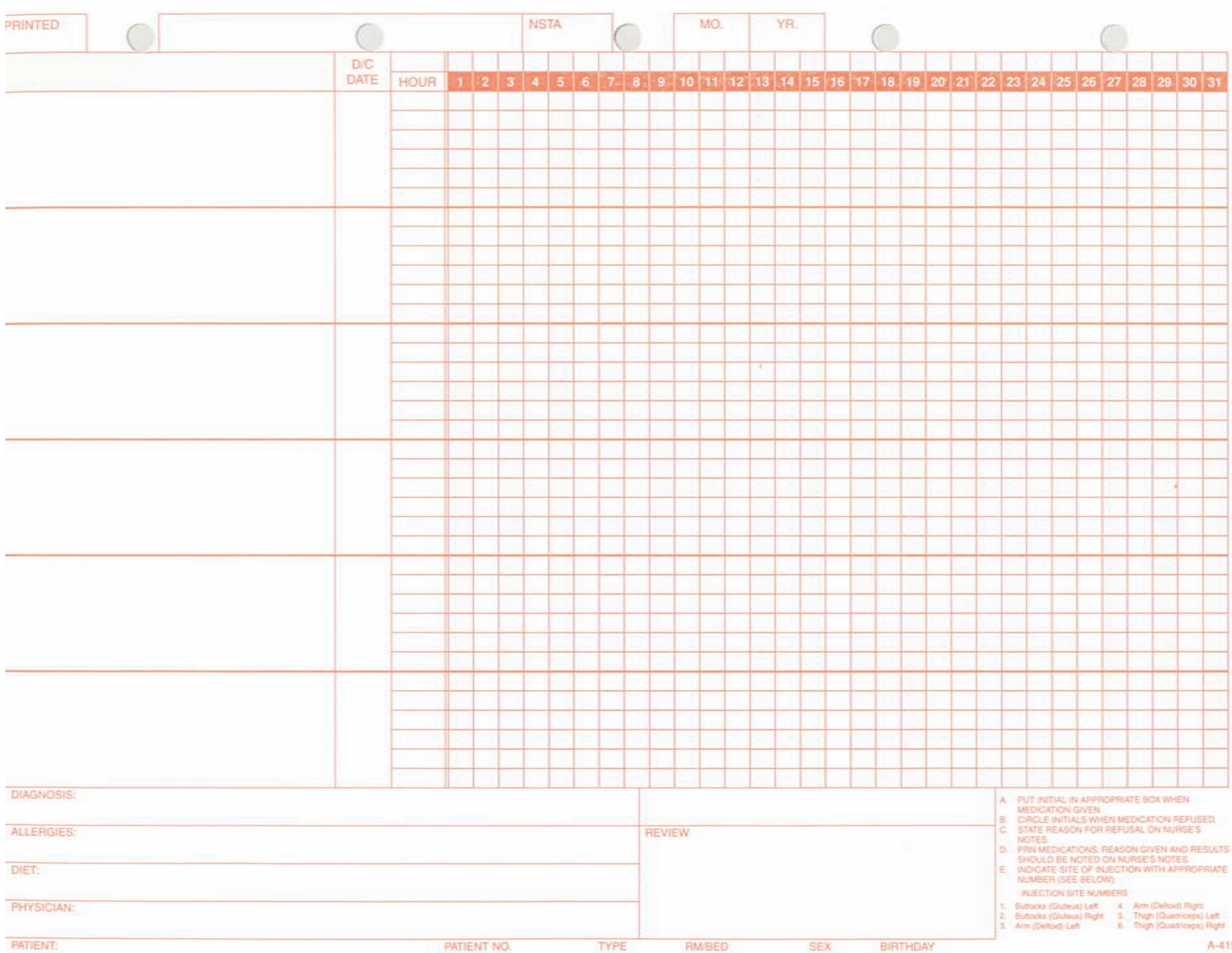
The Right Documentation

The final step in safe medication administration is proper documentation. Failure to document properly can lead to errors such as overdosing. Medication administration is documented in the **medication administration record (MAR)** (Fig. 14-3). Each medication ordered for the person is listed in the MAR, along with the dose, route, and time at which the medication is to be administered. Common abbreviations you may see used in the MAR are summarized in Table 14-2. The MAR is also used to record when medications are given and by whom. After you administer a medication, you initial the MAR next to the medication you administered and note the time (see Fig. 14-3).

Care Alert!

When administering medication PRN (as needed), it is important to clearly document the time the PRN dose was given. Otherwise, the person could receive too much medication.

As always, follow the proper procedure for documenting the care that you give (Guidelines Box 14-1). Remember that if a medication is not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DIAGNOSIS:
ALLERGIES:
DIET:
PHYSICIAN:
REVIEW
A. PUT INITIAL IN APPROPRIATE BOX WHEN MEDICATION GIVEN.
B. CIRCLE INITIALS WHEN MEDICATION REFUSED.
C. STATE REASON FOR REFUSAL ON NURSE'S NOTES.
D. PRN MEDICATIONS: REASON GIVEN AND RESULTS SHOULD BE NOTED ON NURSE'S NOTES.
E. INDICATE SITE OF INJECTION WITH APPROPRIATE NUMBER (SEE BELOW):
INJECTION SITE NUMBERS
1. Buttocks (Gluteus) Left 4. Arm (Deltoid) Right
2. Buttocks (Gluteus) Right 5. Thigh (Quadriceps) Left
3. Arm (Deltoid) Left 6. Thigh (Quadriceps) Right
PATIENT: PATIENT NO. TYPE RM/BED SEX BIRTHDAY
A-415

Figure 14-3
The medication administration record (MAR) lists each medication ordered for a person, along with the dose, the route, and the time at which the medication is administered. In addition, the MAR is used to document medication administration. After you administer a medication, you initial the box with the corresponding date and time next to the medication.

Guidelines Box 14-1 Guidelines for Recording Medication Administration

WHAT YOU DO	*WHY YOU DO IT*
Write legibly, using blue or black ink. Your facility may have specific policies regarding the color of ink used.	It is important to write legibly to avoid miscommunication. A pen is used instead of a pencil because pencil can be erased, enabling someone to change the person's medication administration record (MAR). Blue and black ink reproduce best when a document is photocopied.
Always sign or initial your entry, according to facility policy.	By signing or initialing your entry, you indicate that you are the person who needs to be consulted if further clarification of the information you have entered is necessary. Additionally, signing or initialing your entry indicates that you accept legal responsibility for what you have written.
Only record medications that you have administered. Do not make entries for another person.	By making an entry on the MAR, you accept legal responsibility for that entry. Therefore, it is best to record only information that you, personally, can vouch for.
Date and time your entries correctly.	The date and time that medications were administered are extremely important elements of the MAR, which is a legal account of care provided.
Check the patient's or resident's name on the MAR.	By verifying the patient's or resident's identification information, you will ensure that you are recording the person's information on the correct MAR.
Use facility-approved abbreviations when recording.	Using facility-approved abbreviations helps to ensure that your meaning is clear to others.
Do not record a medication as administered before you have administered the medication. Only document after the fact.	You may become distracted or involved in another situation that prevents you from administering the medication you have already charted. If you record medication as "administered" in the MAR, but then do not actually administer this medication, the person may develop medical complications from not receiving his medication.
Record medication administration in a timely manner. If you must wait to record medication administration, keep notes so that the information you record on the MAR will be accurate.	If you wait until the end of your shift to record, you may forget important information.
If you make an error, do not erase, use correction fluid to cover, or scribble through the mistaken entry. Simply draw a line through the mistake and initial it according to facility policy.	Striking through an error is the only legal way to indicate a change on the MAR. Erasing or using correction fluid to correct an error could be seen as an attempt to hide or change existing information.
Remember that in a liability situation, care not recorded was care not provided.	Proper and conscientious recording of patient or resident information protects the person, your employer, and you.

documented, then it is assumed that it has not been given. If a patient or resident refuses a medication or is unable to take the medication, then you should report this to the nurse and follow your facility's policy for documenting the missed dose in the person's MAR.

REPORTING MEDICATION ADMINISTRATION ERRORS

Medication administration errors sometimes happen despite the precautions taken by even the most conscientious of health care workers. When an error does occur, you must know exactly how to report the error at your particular facility or organization. All errors are to be reported verbally to the nurse as soon as the error is noticed or suspected. In addition, most facilities require a written report of the error as well. The written report is called an incident (occurrence) report, and it generally takes the form of a preprinted document that must be completed. Follow your facility's policy for completing incident reports.

Some health care workers hesitate to report errors because they feel responsible for the error or are afraid they will be blamed for the error. Other times, they know that a coworker will be blamed for carelessness and they do not want to report the coworker's error to a supervisor. However, you have a legal and ethical responsibility to report all errors. Reporting errors promptly helps protect your patients or residents, your facility, and you, and it can lead to improved practices that help prevent errors from occurring in the future.

MEDICATION ADMINISTRATION SKILLS

An individual patient's or resident's medications may be contained in a pill box, medicine bottle, or bubble pack (Fig. 14-4).

- A *pill box* has compartments for each day of the week, each time of day, or both. The nurse fills the pill box at the beginning of the week. You will just be responsible for delivering the dose at the correct time.
- A *medicine bottle* contains the patient's or resident's medication for a given amount of time (for example, a month). The medicine is dispensed from the bottle as ordered.
- A *bubble pack* is a flat card containing 15 to 30 doses of a medication for a single patient or resident. Bubble packs are similar to medicine bottles in that they contain multiple doses of a single medication, but they take up less room.

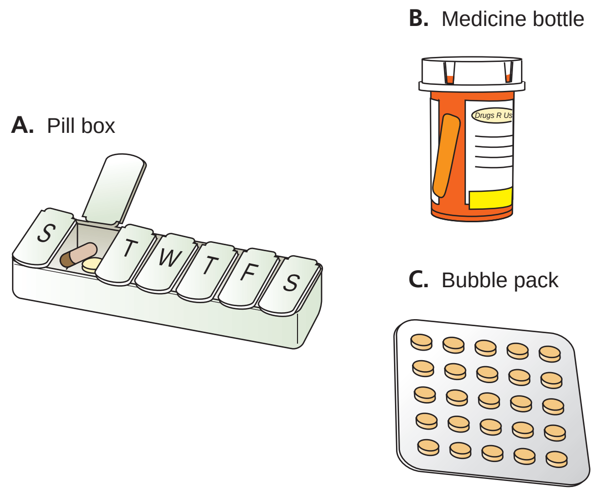


Figure 14-4
Common containers for medications include pill boxes (**A**), medicine bottles (**B**), and bubble packs (**C**).

Medications are generally kept in a central area or medication room. Medication rooms usually have a door that locks. They usually contain an area for preparing medications for administration. There may be a medication cart with drawers full of medications, or medications for all of the patients or residents on the unit may be stored in a computer-operated automated drawer system (Fig. 14-5). To access a computer-operated automated drawer system, you enter your name and password, select the patient or resident, and then select the medications you need to administer.

Computer-operated automated drawer systems are often used to store **controlled substances** (medications with a high potential for abuse, such as narcotics). By law, controlled substances must be stored in a locked container and accounted for at the end of each shift. The controlled substances are counted, both by the person arriving for the shift and the person leaving. Both people must sign the narcotic record. It is not acceptable to leave before the count is correct. Missing controlled substances must be

A

B

Figure 14-5
Medications for all of the patients or residents on a unit may be stored in a medication cart (**A**) or a computer-operated automated drawer system (**B**).

reported to management, as defined in your facility's policy. Management must report missing controlled substances to law enforcement officials and to the Drug Enforcement Administration (DEA). If medications are stolen, the law enforcement and DEA officials will investigate and arrest the person believed responsible for the theft. If the person is found guilty in a court of law, he or she will be fined and could serve jail time, depending on the type and amount of medication stolen.

In the following sections, you will learn some very basic information about administering certain types of medications. General guidelines for safe medication administration are given in Guidelines Box 14-2.

TELL THE NURSE !

When administering medications, tell the nurse immediately if:

- The person is experiencing problems that make you question whether you should administer the medication.
- The person refuses to take the medication.
- The person experiences any problems during medication administration, such as difficulty swallowing, choking, or vomiting.

Helping Hands and a Caring Heart

Focus on Humanistic Health Care

Many people do not like to take medications. They may worry that you are giving them the wrong medication or that they have not received a medication that they need. Being knowledgeable about what medications you are administering and why you are administering them and sharing this information with the person can help to build trust. For example, simply saying something like: "The blue one is for your blood pressure, and the pink one is your vitamin" demonstrates that you are knowledgeable and aware, which may help the person to feel more comfortable about taking the medication.

Remember that patients and residents have the right to refuse treatment, including treatment with medications. If a person refuses a medication, even after you have tried explaining what the medication is and why it is being administered, document the refusal and alert the nurse.

ADMINISTERING ORAL MEDICATIONS

A **medication cup** is a small paper or plastic cup used for dispensing oral medications. Tablets and capsules are counted out into the medication

Guidelines Box 14-2 Guidelines for Safe Medication Administration

WHAT YOU DO	WHY YOU DO IT
Before administering any medication, ask the nurse for clarification if you are unsure what the medication is or does, what the correct dose is, or when the medication should be given.	This helps catch errors that may have occurred when a verbal medication order was originally written down or when the medication order was copied onto the medication administration record (MAR).
Wash your hands before and after dispensing medications.	Washing your hands prevents the spread of infection.
Prepare only one patient's or resident's medications at a time.	Preparing only one patient's or resident's medications at a time helps prevent a patient or resident from receiving medications meant for another patient or resident.
Wear gloves when administering topical medications.	Topical medications are absorbed through the skin. Gloves protect you from getting medication on your skin, where it can be absorbed into your body. Gloves also protect you from contact with blood and other body fluids when you are administering the medication.
Wear gloves when splitting or crushing tablets.	Gloves prevent contamination of the medication by your hands. Gloves also protect you from getting medication on your skin, where it can be absorbed into the body.

cup. Bubble-packed tablets or capsules can be singly dispensed directly into the medication cup. Liquid medications are poured into the medication cup to ensure the correct dose.

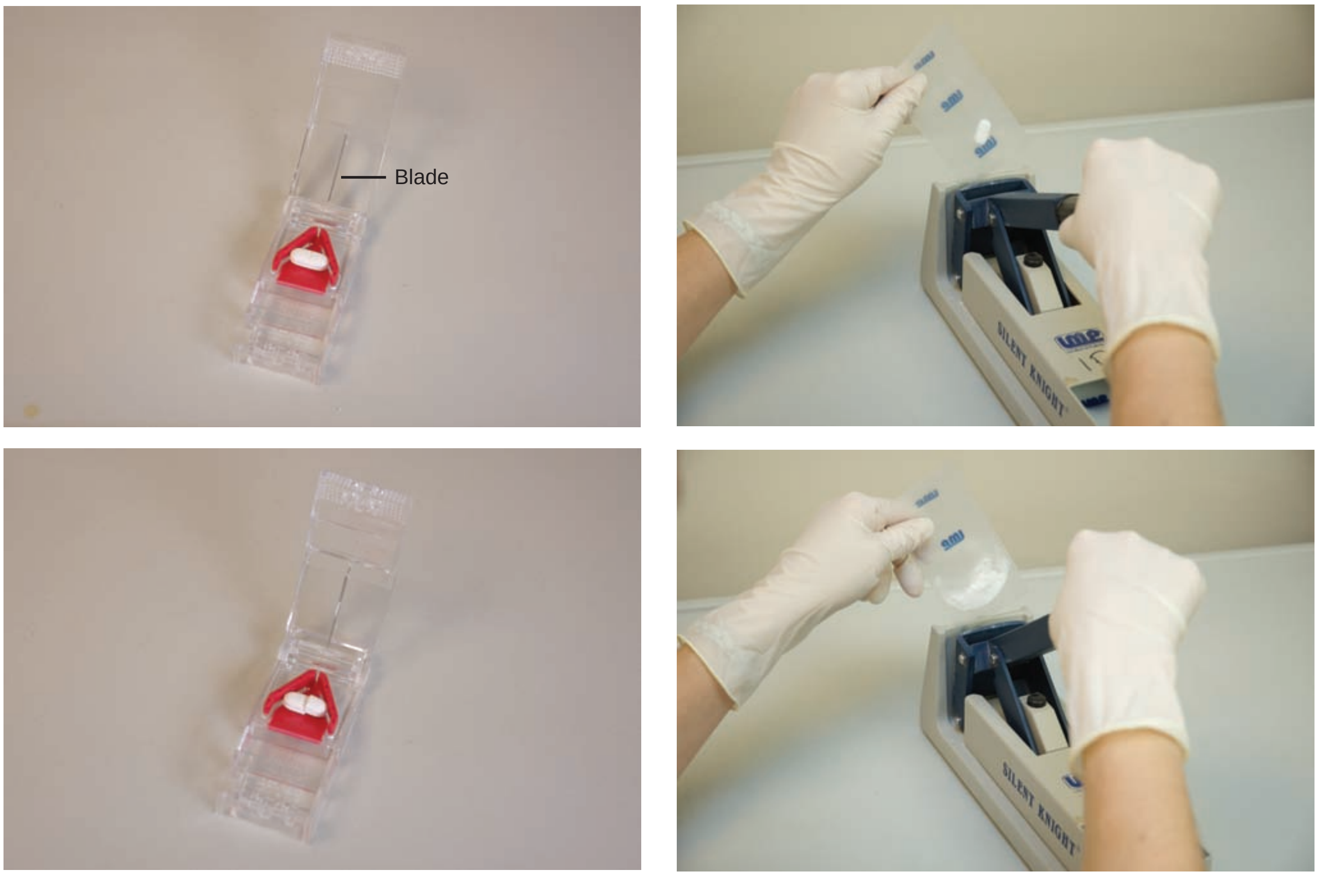
Tablets and capsules are usually swallowed whole. In some cases, they may be chewed or crushed. A tablet or capsule that has an **enteric coating** (a waxy layer that causes the medication to dissolve more slowly in the digestive tract) should never be chewed or crushed. Enteric coatings are used for **sustained-release preparations**, which are designed to release the medication slowly over an extended period of time. Crushing or chewing a sustained-release preparation can cause the person to receive a sudden, large dose of medication, instead of a slow, controlled dose of medication. This can be life threatening.

In some cases, a tablet may need to be split (cut evenly in half) to achieve the ordered dose of medication. In other cases, the doctor may order a tablet to be crushed (ground into a powder) before administration. A **pill splitter** is used to split a tablet evenly (Fig. 14-6A). A **medication-crushing device** is used to crush a tablet into a fine powder (see Fig. 14-6B).

When administering oral medications, always check to make sure the person actually swallows the tablet or capsule. A confused person may hold the tablet or capsule in his mouth and spit it out later. A person who is mentally ill may "save" medications in this way so he can take a large dose all at once (as a means of committing suicide). Procedure 14-1 describes how to administer oral medications.

ADMINISTERING TOPICAL MEDICATIONS

Topical medications are applied to the skin or mucous membranes.



A. Pill splitter

B. Medication-crushing device

Figure 14-6
Tools are available for splitting and crushing tablets. (**A**) A pill splitter. (**B**) A medication-crushing device. Never split or crush tablets or capsules with an enteric coating or a sustained-release formula. Doing so can cause the person to receive too much medication at once.

Creams and Ointments

Creams and ointments, often used to treat rashes and other skin conditions, are applied as ordered to the affected area. Make sure to wear gloves when applying creams or ointments. Gloves help prevent the spread of contagious rashes and prevent the medication from being absorbed through your skin. Follow the instructions for applying the cream or ointment. For example, you may need to apply the cream or ointment in a thin, even layer or cover the area with a dressing after application. If a rash worsens or does not show signs of improvement with the treatment, please tell the nurse.

Transdermal Patches

A transdermal patch is a small piece of adhesive material that contains a medication. The transdermal patch is applied to the skin, and the medication is absorbed from the transdermal patch into the bloodstream through the skin. Some types of pain medications and hormones are given in this way. Nitroglycerin, which is used to treat angina (chest pain), is another type of medication that is commonly administered through a transdermal patch.

The transdermal patch is applied as ordered to specific sites, such as the chest, back, or upper arm. Many transdermal patches must be removed after a certain amount of time. Before applying a patch, label it with the time, date, and your initials. Labeling the patch with this information verifies that the patch was changed on time and lets other members of the health care team know when it is time to remove the patch. Procedure 14-2 describes how to apply a transdermal patch.

BOX 14-1 Conditions That Are Commonly Treated with Eye Drops

Glaucoma
Glaucoma is a disorder of the eye that occurs when the pressure within the eye is increased to dangerous levels. If the pressure in the eye gets too high, the person is at risk for blindness. Medicated eye drops are commonly prescribed for people with glaucoma, and they must be administered as ordered for them to be effective. Some people may have multiple medicated eye drops that are to be administered at the same time. Check with the nurse to find out the order in which the medications should be administered and how much time you should let go by between each medication (usually from 1 to 15 minutes). When caring for a person with glaucoma, notify the nurse right away if the person complains of pain in the eye or decreased vision.

Conjunctivitis
Conjunctivitis is a bacterial or viral infection of the conjunctiva of the eye (the clear membrane that lines the inside of the eyelids and covers most of the surface of the eye). The white of the eye appears red. The eye may itch or burn, and it tears excessively. There may be a sticky white or yellow discharge. Conjunctivitis is highly contagious, so make sure that you wear gloves and wash your hands well when caring for a person with the condition. You should also assist the person in washing her hands and remind her not to touch or rub the affected eye. Eye drops or ointments used to treat conjunctivitis need to be administered as ordered. The infection should start to clear in a day or two with appropriate treatment. Notify the nurse if the person's symptoms worsen or stay the same or if the person complains of eye pain or vision problems.

Eye and Ear Drops

Eye drops are administered to treat conditions such as glaucoma, eye dryness or irritation, and infection (Box 14-1). When administering eye drops, never touch the eye with the tip of the dropper. The dropper must be kept sterile or microbes can be introduced into the eye, causing infection. If the dropper becomes contaminated, a new bottle of eye drops must be obtained. Procedure 14-3 describes how to administer eye drops.

Ear drops are typically administered to remove cerumen (ear wax) or treat infection. The ear drops are placed in the external auditory canal. As with the administration of eye drops, it is important to avoid contaminating the dropper. Procedure 14-4 describes how to administer ear drops.

Suppositories

A suppository is a small, wax-like cone or oval that is inserted into the body. The wax-like substance dissolves at body temperature, releasing the medication. Vaginal suppositories are inserted into the vagina. Rectal suppositories are inserted into the rectum through the anus. Procedure 14-5 describes how to administer a rectal suppository.

Enemas

An enema is the introduction of fluid into the large intestine by way of the anus for the purpose of removing feces from the rectum. Enemas are used to relieve constipation and fecal impactions and to empty the intestine of fecal material before surgery or certain diagnostic tests. Sometimes medications are placed in enemas to treat certain conditions. It is usually not within the nursing assistant's scope of practice to administer enemas that contain medications.

Care Alert!

Administering an enema or inserting a rectal suppository can lead to stimulation of the vagus nerve, an important nerve that begins in the brain and sends branches to the heart, lungs, stomach, and rectum. Stimulation of the vagus nerve may temporarily decrease the person's heart rate and blood pressure, which can be dangerous. If a person complains of dizziness or weakness when you are administering an enema or inserting a rectal suppository, stop immediately, place the person in the supine position, alert the nurse, and take the person's vital signs.

ADMINISTERING INHALED MEDICATIONS

Inhaled medications that help to make breathing easier are often administered to people with respiratory conditions, such as asthma or chronic obstructive pulmonary disease (COPD). You may need to assist a person with using an inhaler. Proper use of the inhaler helps ensure that the person inhales the medication instead of swallowing it.

Before using the inhaler, the person should first take a deep breath and then let all of the air out. Next, the person holds the mouthpiece of the inhaler 1 to 2 inches away from his mouth (or places the mouthpiece in his mouth and closes his lips tightly around it) and presses down on the canister to release the dose of medication (Fig. 14-7). As the medication is released, the person breathes in deeply through the mouth, holding the breath for about 10 seconds. Then the person exhales through the mouth. This breathing technique helps ensure that the medication goes into the lungs, where it is needed most.

Some people have trouble breathing in as the medication is released. These people may use a **spacer**, a plastic tube that attaches to the mouthpiece of the inhaler (see Fig. 14-7B). The medication is dispensed into the spacer, and then the person breathes it in from there. The person does not have to worry about dispensing the medication and breathing in at the same time.

ADMINISTERING INJECTIONS

Some facilities train nursing assistants to administer injections under the skin (intradermal injections) or into the fatty layer beneath the skin (subcutaneous injections). Nursing assistants are usually not permitted to administer injections into the muscle (IM injections). If administering any type of injection is in your job description, you will need more training than is provided here to learn how to safely perform this skill.

Injections are given using a needle and a syringe. The medication is drawn into the syringe, the needle is inserted into the person's body, and then the plunger of the syringe is pushed in to administer the medication. The syringe has measurement markings on it. The markings may be in milliliters (mL) or units (U). A syringe marked in milliliters is required to administer some medications, and a syringe marked in units is required to administer others. As you learned in Chapter 7, needles are classified according to length and diameter (gauge). Needles used for injections usually vary in length from ¼ inch to about 2 inches and in diameter from 14-gauge (very large) to 30-gauge (very small). After use, dispose of the needle in a facility-approved sharps container without recapping it. This helps protect you and others from accidental needlesticks and exposure to bloodborne pathogens.

Intradermal Injections

Intradermal injections are often used for tuberculosis skin tests and allergy tests. Only a very

A. Inhaler without a spacer

B. Inhaler with spacer

Figure 14-7
Using an inhaler without a spacer (**A**) and with a spacer (**B**).

small amount of fluid (less than 0.1 mL) is administered, and the fluid is absorbed into the bloodstream slowly. Usually, a syringe called a tuberculin syringe is used to administer an intradermal injection. The tuberculin syringe is measured in tenths of a milliliter. A short needle (¼ to ⅝ inch) with a small diameter (25 to 27 gauge) is also used. The needle is inserted into the skin at a 10- to 15-degree angle.

Subcutaneous Injections

Subcutaneous injections are used to administer insulin, as well as many other types of medications. Because the subcutaneous tissue does not have a lot of blood vessels, the medication is absorbed into the body very slowly. The amount of medication administered in a subcutaneous injection is usually less than 1 mL. An insulin syringe is measured in units. One hundred units equals 1 mL. As with an intradermal injection, a short needle with a small diameter is used.

Subcutaneous injections are administered into fatty areas, such as the back of the upper arms, the abdomen, the front of the thighs, and the upper part of the buttocks. If the person receives subcutaneous injections on a routine basis, the needle insertion site should be varied each time. The needle is inserted into the skin at a 45- to 90-degree angle, depending on the length of the needle and the amount of subcutaneous tissue the person has. If the person is very thin, the skin and subcutaneous tissue can be "pinched" to lift the subcutaneous tissue away from the muscle underneath. This helps ensure that the medication goes into the subcutaneous tissue, not into the underlying muscle.

Intramuscular Injections

Intramuscular injections are used to administer certain types of vaccines and medications directly into the muscles of the upper arm, upper or outer buttocks, or thigh. The fluid or medication that is administered is rapidly absorbed from the muscle. IM injections are used for fluid volumes of up to 3 mL. A 21- to 23-gauge needle that is 1 to 2 inches long (depending on the size of the person receiving the injection and the type of fluid being administered) is used.

If not properly administered, IM injections can cause a great deal of harm. If the medication is administered into the subcutaneous tissue instead of the muscle, infection and tissue necrosis (death) can result. If a nerve is damaged when inserting the needle, the person could be permanently disabled. If the medication is injected directly into a vein instead of the muscle, the person could die. Because of these risks, administering IM injections is usually not within the scope of practice for a nursing assistant.

SUMMARY

- In some facilities, nursing assistants are permitted to assist with some types of medication administration.
  - You should not administer any medication unless this task is part of your formal job description and you have received specialized training in medication administration.
  - Only certain health care workers, such as doctors, can write medication orders. If anything about the order is unclear, you must check with the nurse before proceeding. The nurse is responsible for clarifying the medication order and for making any changes ordered by the person who originally wrote the medication order.
- There are several different routes for administering medications.
  - Medication given by the oral (PO) route is swallowed. Oral medications may be supplied as liquids, capsules, or tablets.
  - Medication given by the sublingual (SL) route is placed under the tongue and allowed to dissolve.
  - Medication given by the topical route is applied to the skin or mucous membranes.
  - Medication given by the respiratory route is inhaled into the lungs.
  - Medication given by the parenteral route is placed directly into the bloodstream using either a syringe or an intravenous (IV) catheter. Injections can be intradermal (under the skin), subcutaneous (in the fatty tissue), or intramuscular (IM, in the muscle).

- Medication administration is a potentially dangerous task. Following the six rights of medication administration can help prevent errors in medication administration.
  - The six rights of medication administration are right medication, right person, right dose, right route, right time, and right documentation.
  - Documentation of medication administration is a legal requirement. As always, follow standard guidelines and your facility's policy to ensure proper documentation of the care that you provide.
    - The medication admission record (MAR) is used to document medication administration.
    - Medication not documented is assumed to be medication not given. Follow facility policy for documenting medications that are not given.
  - If a medication error occurs, the error must be reported and documented as soon as the error is caught or is suspected. Proper handling of errors can lead to improved practices.
- Medication can be packaged in several different ways. Controlled substances, regardless of how they are packaged, are kept under locked conditions.
- As with any skill that is performed, handwashing is a priority before starting. It is important to wear gloves if there is a chance of coming into contact with medication or blood or bodily fluids. Medications should not be handled with ungloved hands because medication can be absorbed through the skin.

CHAPTER

14 PROCEDURES

PROCEDURE 14-1

Administering Oral Medications

WHY YOU DO IT Following the correct procedure for administering oral medications helps prevent medication errors.

Getting Ready

1. Wash your hands.
2. Gather your supplies:
   - Non-sterile gloves (if splitting or crushing tablets)
   - Medication administration record (MAR) or medication order
   - Medication cup (paper for tablets or capsules; plastic for liquids)
   - Pill splitter or medication-crushing device, if needed
   - Paper cup

Procedure

3. In the medication room, select the ordered medication from the medication cart or computer-operated drawer system. Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR or medication order.

Step 3 Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR.

4. Check the route of administration and the dose on the MAR or medication order.
5. Measure the amount of medication you need.

   a. **Tablets:** Dispense the number of tablets you need into the medication cup.

Step 5a Dispense the number of tablets you need into the medication cup.

   - **To split a tablet:** If you must split a tablet to achieve the proper dose, use a pill splitter. Put on the gloves and place the tablet in the pill splitter. After splitting the pill, place half of the tablet in the medication cup and return the other half to the medicine bottle or discard it, according to facility policy. Remove your gloves.
   - **To crush a tablet:** If the MAR or medication order states that the tablet is to be crushed, put on the gloves and place the tablet in the medication-crushing device. Crush the tablet into a fine powder. Place the powder in the medication cup. Remove your gloves.

(continued)

b. **Capsules:** Dispense the number of capsules that you need into the medication cup.

c. **Liquids:** Place the medication cup at eye level on a level surface. Pour the liquid into the medication cup until the liquid reaches the measurement marking on the side of the cup that corresponds with the ordered dose.

Step 5c Pour the liquid into the medication cup.

6. Repeat steps 3 through 5 for each of the medications ordered for the person on the MAR or medication order.
7. Compare the medications you have prepared to the MAR or medication order to make sure you have the correct medications in the correct doses. Recheck the patient's or resident's name on the MAR or medication order.
8. Take the medications to the person.
9. Identify the person by having him state his name while you check his identification band.
10. Explain the procedure.
11. Fill the paper cup with water from the bedside pitcher.
12. Administer the medication.
    a. Hand the cup of water and the medication cup containing the medication to the person.
    b. Stay with the person while he takes the medication. It is important to make sure that the person swallows the medication, and to be available to assist in case the person chokes. If the person drops a tablet or capsule, it must be discarded and replaced.
13. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the storage area.

Finishing Up CLSOWR

14. Complete the "Finishing Up" steps.

What You Document

- The medications that were administered
- The time that they were administered
- Failure of the person to take the medications as ordered (for example, refusal of medication)
- Any problems during administration of the medication

PROCEDURE 14-2

Administering a Transdermal Patch

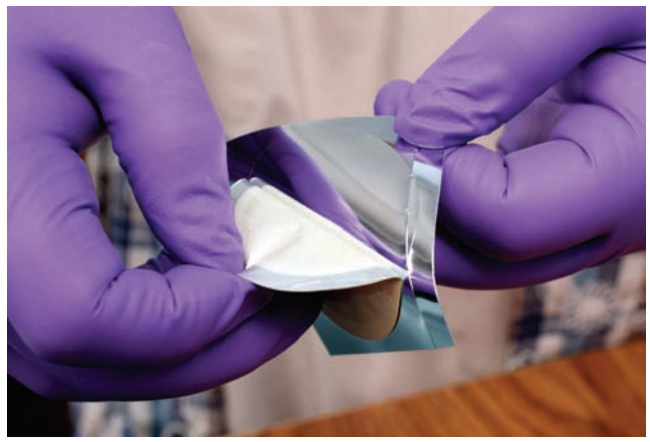
WHY YOU DO IT Following the correct procedure for administering a transdermal patch helps prevent medication errors.

Getting Ready

1. Wash your hands.
2. Gather your supplies:
   - Gloves
   - Paper towels
   - Medication administration record (MAR) or medication order
   - Wash basin
   - Soap
   - Washcloth
   - Towel

Procedure

3. In the medication room, select the ordered medication from the medication cart or computer-operated drawer system. Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR or medication order.
4. Check the route of administration and the dose on the MAR or medication order. Recheck the patient's or resident's name on the MAR or medication order.
5. Take the medications to the person.
6. Identify the person by having her state her name while you check her identification band.
7. Explain the procedure.
8. Cover the over-bed table with paper towels. Place the supplies on the over-bed table.
9. Make sure the bed is positioned at a comfortable working height (to promote good body mechanics) and that the wheels are locked.
10. Fill the wash basin with warm water (110°F [43.3°C] to 115°F [46.1°C] on the bath thermometer). Place the basin on the over-bed table.
11. Put on the gloves.
12. Expose the area where the old transdermal patch is located. Gently remove the old transdermal patch and dispose of it in a facility-approved waste container.
13. Wash, rinse, and dry the area where the old patch was located.
14. Cover the area where the old transdermal patch was located and expose the area where the new transdermal patch is to be placed.
15. Write your initials, the date, and the time on the transdermal patch.
16. Remove the backing from the new transdermal patch, being careful not to touch the adhesive side.



Step 16 Remove the backing from the new patch.

17. Place the transdermal patch on the person's skin, pressing firmly.

Step 17 Apply the patch to the person's skin.

(*continued*)

18. Remove your gloves and dispose of them in a facility-approved waste container.
19. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the storage area.

Finishing Up

20. Complete the "Finishing Up" steps.

What You Document

- The medications that were administered
- The time the medications were administered
- Failure of the person to take the medications as ordered (for example, refusal of medication)
- Any problems during administration of the medication
- Signs of skin irritation where the old transdermal patch was applied

Procedure 14-3

Administering Eye Drops

WHY YOU DO IT Following the correct procedure for administering eye drops helps prevent medication errors.

Getting Ready

1. Wash your hands.
2. Gather your supplies:
   - Gloves
   - Medication administration record (MAR) or medication order
   - Washcloth
   - Saline solution
   - Tissues

Procedure

3. In the medication room, select the ordered medication from the medication cart or computer-operated drawer system. Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR or medication order.
4. Check the route of administration and the dose on the MAR or medication order. Recheck the patient's or resident's name on the MAR or medication order.
5. Take the medications to the person.
6. Identify the person by having her state her name while you check her identification band.
7. Explain the procedure.
8. Put on the gloves.
9. Moisten the washcloth with the saline solution and wash the person's eye, moving from the inside corner to the outside corner. Use a different part of the washcloth for each eye.

Step 9 Wash the person's eye.

10. Help the person tilt her head back.

Step 10 Tilt the person's head back.

11. Remove the cap from the medication bottle.
12. Place two fingers or your thumb below the person's eye and gently pull the skin down to expose the lower conjunctival sac.

Step 12 Expose the lower conjunctival sac.

13. Ask the person to look upward. Turn the medication bottle upside down and squeeze the required number of drops into the lower conjunctival sac. Avoid touching the tip of the dropper to the person's eye.

Step 13 Squeeze the ordered number of drops into the lower conjunctival sac.

14. Release the skin to allow the lower eyelid to return to its normal position. Ask the person to close her eyes. Offer the person a tissue to blot drainage but remind her not to rub the eye.
15. Replace the cap on the medication bottle.
16. Remove your gloves and dispose of them in a facility-approved waste container.
17. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the storage area.

Finishing Up

18. Complete the "Finishing Up" steps.

What You Document

- The medications that were administered
- The time the medications were administered
- Failure of the person to take the medications as ordered (for example, refusal of medication)
- Any problems during administration of the medication
- Complaints of burning or pain in the eye, excessive eye redness, or excessive drainage from the eye

PROCEDURE 14-4

Administering Ear Drops

WHY YOU DO IT Following the correct procedure for administering ear drops helps prevent medication errors.

Getting Ready

1. Wash your hands.
2. Gather your supplies:
   - Medication administration record (MAR) or medication order
   - Washcloth
   - Saline solution
   - Tissues
   - Cotton ball (if ordered)

Procedure

3. In the medication room, select the ordered medication from the medication cart or computer-operated drawer system. Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR or medication order.
4. Check the route of administration and the dose on the MAR or medication order. Recheck the patient's or resident's name on the MAR or medication order.
5. Take the medications to the person.
6. Identify the person by having him state his name while you check his identification band.
7. Explain the procedure.
8. Position the person:
   a. If the person cannot sit up, help him into the lateral position so the affected ear is facing up.
   b. If the person can sit up, help him tilt his head to the side so the affected ear is facing up.
9. Moisten the washcloth with the saline solution and wash the person's outer ear.
10. Remove the cap from the medication bottle.
11. To straighten the ear canal, grasp the top portion of the person's ear and gently pull:
    a. Up and back (in an adult)

Step 11a Pull the ear up and back in an adult.

    b. Straight back (in a child)

Step 11b Pull the ear straight back in a child.

12. Turn the medication bottle upside down and squeeze the required number of drops into the ear canal. Avoid touching the tip of the dropper to the person's ear.

Step 12 Squeeze the ordered number of drops into the ear canal.

13. Release the ear. Ask the person to remain in the lateral position or with the head turned to the side for several minutes to prevent the medication from running out of the ear. Gently rubbing the area where the ear meets the cheek bone may help move the medication to where it is needed.
14. If ordered, place a cotton ball in the opening of the ear to catch any drainage.
15. Replace the cap on the medication bottle.
16. Dispose of disposable items in a facility-approved waste container. Clean the equipment and return it to the storage area.

Finishing Up CLSOWR

17. Complete the "Finishing Up" steps.

What You Document

- The medications that were administered
- The time that the medications administered
- Failure of the person to take the medications as ordered (for example, refusal of medication)
- Any problems during administration of the medication

PROCEDURE 14-5

Administering a Rectal Suppository

WHY YOU DO IT Following the correct procedure for administering a rectal suppository helps prevent medication errors and protects the person's safety and privacy during the procedure.

Getting Ready WCKIEPS

1. Wash your hands.
2. Gather your supplies:
   - Medication administration record (MAR) or medication order
   - Non-sterile gloves
   - Lubricant jelly
   - Tissues
   - Bath blanket

Procedure

3. In the medication room, select the ordered medication from the medication cart or computer-operated drawer system. Make sure the name of the medication on the medication label is the same as the name of the medication on the MAR or medication order.
4. Check the route of administration and the dose on the MAR or medication order. Recheck the patient's or resident's name on the MAR or medication order.
5. Take the medications to the person.
6. Identify the person by having him state his name while you check his identification band.
7. Explain the procedure.
8. Make sure that the bed is positioned at a comfortable working height (to promote good

(*continued*)

body mechanics) and that the wheels are locked.

9. If the side rails are in use, lower the side rail on the working side of the bed. The side rail on the opposite side of the bed should remain up. Lower the head of the bed so that the bed is flat (as tolerated).

10. Spread the bath blanket over the top linens and the person. If the person is able, have him hold a bath blanket. If not, tuck the corners under his shoulders. Fanfold the top linens to the foot of the bed.

11. Ask the person to lie on his left side, facing away from you, in Sims' position. Help him into this position if necessary.

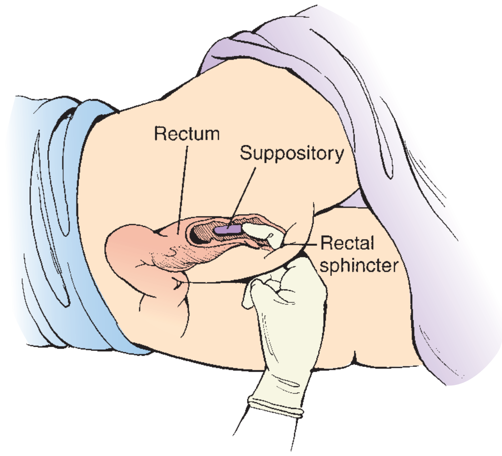
12. Put on the gloves.

13. Adjust the bath blanket and the person's hospital gown or pajama bottoms as necessary to expose the person's buttocks.

14. Remove the suppository from its package. Open the lubricant package and apply a small amount of lubricant to the rounded end of the suppository.

Step 14 Apply lubricant to the rounded end of the suppository.

15. With one hand, raise the person's upper buttock to expose the anus. Using your other hand, gently and carefully insert the suppository into the person's rectum (not more than 3 to 4 inches for adults). Never force the suppository into the rectum. If you are unable to insert the suppository, stop and call the nurse.



Step 15 Insert the suppository 3 to 4 inches in an adult.

16. Wipe the person's anal area with a tissue to remove the lubricant and adjust the person's hospital gown or pajama bottoms as necessary to cover the buttocks.

17. Remove your gloves and dispose of them according to facility policy. Wash your hands.

18. Help the person back into a comfortable position, straighten the bottom linens, and draw the top linens over the person. Raise the head of the bed as the person requests.

19. Make sure the bed is lowered to its lowest position and the wheels are locked. If the side rails are in use, return them to the raised position.

20. Gather the soiled linens and place them in the linen hamper. Dispose of disposable items in a facility-approved waste container.

Finishing Up

21. Complete the "Finishing Up" steps.

What You Document

- The medications that were administered
- The time the medications were administered
- Failure of the person to take the medications as ordered (for example, refusal of medication)
- Any problems during administration of the medication
- The presence of stool in the rectum or the presence and amount of rectal bleeding
- If given to relieve constipation, whether or not the person had a bowel movement (one should occur within 1 hour of administering the suppository)

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. Who may write orders for medications?
  a. Dentists, doctors, nurses, and physician assistants
  b. Dentists, doctors, clerks, and physician assistants
  c. Dentists, doctors, nurses, and nurse practitioners
  d. Dentists, doctors, nurse practitioners, and physician assistants

2. How do you know what the expectations and limitations of your job are legally?
  a. Your supervisor will tell you
  b. You will ask your supervisor
  c. You will read your job description
  d. You will read the Nurse Practice Act

3. Mrs. Katz requests acetaminophen (Tylenol) because she has a headache. You give it to her. Why is it important to document that you gave a medication to Mrs. Katz?
  a. So the rest of the health care team will know when Mrs. Katz was given this medication
  b. So there is a legal account of the care that you provided to Mrs. Katz
  c. It is not necessary to document medications, such as acetaminophen, that can be administered on a PRN (as-needed) basis
  d. Both a and b are correct

4. Where are controlled substances required by law to be stored in a health care facility?
  a. In the medication room with the other medications
  b. In a locked container or drawer
  c. In a drawer where they are easy to get to for PRN (as-needed) administration
  d. In the supervisor's office where they can be guarded

5. What are the six rights of medication administration?
  a. Right person, right medication, right time, right place, right documentation, right drug
  b. Right person, right medication, right dose, right route, right time, right documentation
  c. Right person, right medication, right dose, right time, right documentation, right diagnosis
  d. Right person, right diagnosis, right medication, right route, right time, right documentation

6. When administering a medication to Mrs. Smith, what is the correct way to identify right person?
  a. Ask another employee who Mrs. Smith is
  b. Check the room number on Mrs. Smith's medical chart
  c. Check Mrs. Smith's identification band and ask her to state her name
  d. Enter Mrs. Smith's room and ask, "Are you Mrs. Smith?"

7. You are administering a high blood pressure medication to Mr. Lewis. He has 25-mg tablets, but recently the doctor increased his dose to 75 mg/day PO. How many tablets will you give Mr. Lewis?
  a. 1
  b. ½
  c. 2
  d. 3

8. What should you do if you make an error when administering a medication?
  a. Report the error immediately to the nurse and follow your facility's policy
  b. Nothing; the patient or resident will probably be alright
  c. Tell the patient or resident, apologize, and promise to never do it again
  d. Report the error to the nurse only if the patient or resident starts having problems

9. If narcotics or other controlled substances are found to be missing, which agencies will become involved?
  a. Law enforcement and the Food and Drug Administration (FDA)
  b. Law enforcement and the Drug Enforcement Agency (DEA)
  c. Law enforcement and the Federal Bureau of Investigation (FBI)

d. Law enforcement and the Internal Revenue Service (IRS)

10. A medication is ordered to be given by the sublingual (SL) route. How will you administer the medication to the person?
    a. Place the medication under the person's tongue
    b. Apply the medication to the skin
    c. Have the person swallow the medication with a full glass of water
    d. Have the person inhale the medication
11. Mrs. Chang has an infection. The doctor has ordered an antibiotic for her, to be administered at 9 AM. You administer the antibiotic at 11 AM. Have you made a medication error? Why or why not?
    a. No. Mrs. Chang received the medication that was ordered
    b. Yes. Mrs. Chang did not receive the medication at the correct time
    c. Yes. Mrs. Chang received the wrong dose of the medication
    d. No. Mrs. Chang received the medication before noon, as ordered

STOP and Think!

1. You are a nursing assistant who has been trained to administer medications. Today has been a very busy day on the unit, and you are rushing to make sure all of the residents on the unit receive their medications on time. It's time for you to administer Mrs. Henry's blood pressure medication. Because Mrs. Henry takes this medication daily and there is never a problem, you decide to chart Mrs. Henry's medication as "given" when you take the pill out of the drawer, before you go to Mrs. Henry's room to administer it, because you know this will save you some time. But when you get to Mrs. Henry's room, you discover that Mrs. Henry has been vomiting and decide to withhold the medication. You make a mental note to correct Mrs. Henry's medication administration record (MAR), but then you get caught up in another situation and forget to do it. Later on in the day, another nursing assistant takes Mrs. Henry's vital signs and reports to the nurse that Mrs. Henry's blood pressure is higher than normal. The nurse is concerned because according to the MAR, Mrs. Henry received her blood pressure medication that morning as scheduled. Did you really save time by recording Mrs. Henry's medication as administered before actually administering it? What consequences could this mistake have for Mrs. Henry? For the health care team?
2. You work in a long-term care facility. One of your responsibilities is to administer Mr. Grant's medications, and you are bringing them to him while he has breakfast in the dining room. When you arrive at the breakfast table, Mr. Grant tells you that he is not going to take his pills. You sit down next to him and go through the pills one by one, explaining what each one is and why it is important for Mr. Grant to take them as ordered. After you are finished talking, Mr. Grant says, "Okay. I'll take this one and that one but not the rest." What should you do? If Mr. Grant keeps refusing to take his medications, do you think it would be appropriate to hide them in his food to ensure that he receives the medications as prescribed?
3. You are a nursing assistant who has been trained to administer medications. One of your coworkers hands you a cup with a pill in it and asks you to give it to Mr. DeMaria, one of the residents on the unit. What should you do?

CHAPTER

15

Common Medications

WHAT WILL YOU LEARN?

Many of your patients or residents will be taking medications. All medications affect the body in some way. Every medication has one or more intended effects (for example, relieving symptoms or curing a disorder). The intended effect of a medication is called its **therapeutic effect**. Most medications also have the potential to cause additional, unwanted effects on the body. These are called **side effects**. As a nursing assistant, one very important responsibility you have is to observe your patients or residents for changes in their condition. Increasing your knowledge about the medications your patients or residents are taking and how they work can help you

Nursing assistants play an important role as the eyes and ears of the health care team. Increasing your knowledge about how the medications your patients or residents are taking can affect the body helps you to recognize both desired and unwanted effects of medications. Here, a nursing assistant reports to the nurse.

recognize both wanted and unwanted effects of the medications. When you are finished with this chapter, you will be able to:

1. Describe the two main types of pain medications and safety precautions related to their use.
2. Explain why a person might be treated with corticosteroids and describe side effects that a nursing assistant should be observant for when caring for a person taking these medications.
3. Explain why a person might be treated with antibiotics and describe considerations that should be taken into account when caring for a person who is receiving antibiotics.
4. Explain why a person might be treated with a bronchodilator and describe side effects that a nursing assistant should be observant for when caring for a person taking a bronchodilator.
5. Explain why a person might be treated with an antihypertensive and safety precautions related to the use of antihypertensives.
6. Explain why a person might be treated with nitroglycerin and safety precautions related to the use of nitroglycerin.
7. Explain why a person might be treated with a cardiotonic and safety precautions related to the use of cardiotonics.
8. Explain why a person might be treated with an anticoagulant and safety precautions related to the use of anticoagulants.
9. Explain why a person might be treated with a diuretic and safety precautions related to the use of diuretics.
10. Explain why a person might be treated with an antispasmodic and safety precautions related to the use of antispasmodics.
11. Explain safety considerations related to the administration of medications used to treat diarrhea and constipation.
12. State observations a nursing assistant may make that should be reported to the nurse when caring for a person who is being treated with medication for hypothyroidism.
13. State observations a nursing assistant may make that should be reported to the nurse when caring for a person who is being treated with medication for diabetes.

Vocabulary Listen & Learn Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence:

Therapeutic effect	Mechanism of action	Antibiotic	Digitalis toxicity
Side effects	Non-steroidal anti-inflammatory drugs (NSAIDs)	Bronchodilators	Anticoagulants
Analgesics	Corticosteroids	Antihypertensive	Diuretics
Patient-controlled analgesia (PCA) unit		Nitroglycerin	Antispasmodics
		Cardiotonics	Peak

Some medications are commonly used in many different health care settings. This chapter provides a very general introduction to certain categories of medications, along with basic safety considerations that you should be aware of when caring for a person who is taking one of these medications. However, there are hundreds of medications on the market today, and even medications that belong to the same general category are often slightly different from each other. As a result, it is impossible for us to review all of the specific medications your patients or residents may be taking.

We encourage you to protect the people you care for by taking every opportunity to increase your knowledge. The nurse can give you basic information about the specific medications your patients or residents are taking and tell you about observations related to the medications that should be reported. In addition, the nurse can show you how to look up medications in a drug reference guide. Drug reference guides are a source of up-to-date, basic information about medications. Learning more about the specific medications your patients or residents are taking allows you to provide better care because you will be able to recognize and report potential problems. Also, if you have received advanced training and are responsible for administering medications, it is especially important for you to know the basic facts about the specific medications you are administering.

MEDICATIONS USED TO RELIEVE PAIN

Many of the people in your care will have some type of pain. Pain can be acute or chronic. Acute pain lasts a short period of time and decreases as the body heals. Chronic pain is a lasting pain.

Medications used to treat pain are often called **analgesics** (*an-* means "without," and *algesia* means "sense of pain"). There are many different analgesics available. Analgesics can be grouped into two main categories, narcotic analgesics and non-narcotic analgesics.

NARCOTIC ANALGESICS

Narcotic analgesics are used to treat severe acute pain (for example, post-operative pain) and some types of chronic pain (for example, cancer pain). The word *narcotic* comes from the Greek word *narkē*, which means "numbness." Narcotic analgesics work by acting on special receptors called *opioid receptors* in the brain, spinal cord, and gastrointestinal tract. In this way, they reduce and alter the person's perception of the pain. Because the long-term use of narcotic analgesics can lead to physical dependence on them (addiction), these medications are considered controlled substances, and many laws are in place regarding how these medications are dispensed and accounted for.

Narcotic analgesics have been used for centuries to treat pain. The original narcotic analgesics were made from the seeds of the opium poppy plant, which is why narcotic analgesics are also sometimes called *opiates* or *opioids*. (This is also why the receptors that narcotic analgesics act on in the central nervous system and gastrointestinal tract are called *opioid receptors*.)

Figure 15-1
This person is receiving a narcotic analgesic through a patient-controlled analgesia (PCA) unit. When he pushes the button on the control in his hand, the unit delivers a small dose of the narcotic analgesic intravenously. PCA units are commonly used because they allow the person to receive pain medication before the pain becomes too severe. This results in better pain management for the person, and it also often results in the use of less pain medication overall.

Today, many of the narcotic analgesics in use are synthetic (that is, they are artificial).

Examples of narcotic analgesics include morphine, codeine, oxycodone (OxyContin, Percocet), hydrocodone (Lortab, Vicodin), and fentanyl (Duragesic). Depending on the specific medication and the needs of the person, narcotic analgesics may be given orally, by intramuscular injection, intravenously, or topically (for example, by rectal suppository or transdermal patch). A **patient-controlled analgesia (PCA) unit** delivers a small amount of medication intravenously to the person when the person pushes a button (Fig. 15-1).

Common side effects caused by narcotic analgesics include drowsiness, nausea, vomiting, anorexia, constipation, and a decreased respiratory rate.

TELL THE NURSE !

When caring for a person who is receiving narcotic analgesics, monitor the person's respiratory rate closely, and be sure to report any of the following signs or symptoms to the nurse right away:

- The person's respiratory rate is less than 10 breaths/min.

- The pulse oximetry reading is less than 90%.
- The person has nausea or vomiting.
- The person is constipated.
- The person's appetite is decreased.

Care Alert!

IF you have been trained to administer medications and you are administering a narcotic analgesic, measure the person's respiratory rate before administering the medication. If the person's respiratory rate is less than 10 breaths/min, do not administer the medication and report the person's respiratory rate to the nurse right away.

NON-NARCOTIC ANALGESICS

Non-narcotic analgesics are used to treat mild to moderate acute pain (such as headaches and muscle aches) and chronic pain (such as that caused by arthritis). In addition, non-narcotic analgesics are often used to reduce inflammation and lower a fever. Non-narcotic analgesics have a different **mechanism of action** (way of producing their effects) than narcotic analgesics. A person cannot become addicted to non-narcotic analgesics. There are two main types of non-narcotic analgesics: non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen (Tylenol).

Non-steroidal Anti-inflammatory Drugs (NSAIDs)

Non-steroidal anti-inflammatory drugs (NSAIDs) is a general term for a group of medications that includes aspirin, ibuprofen (Advil), and naproxen sodium (Aleve). NSAIDs relieve pain, inflammation, and fever by reducing the level of prostaglandins in the body. *Prostaglandins* are hormone-like substances that act on different cells in the body to produce many different effects. For example, prostaglandins play a role in causing inflammation (which can lead to pain), and they also play a role in increasing body temperature in response to an infection.

NSAIDs can irritate the lining of the stomach, leading to problems ranging from stomach upset to ulcers and bleeding. To help prevent these problems from occurring, NSAIDs should be taken with food. Because NSAIDs also affect the blood's ability to clot, they should not be used in people with bleeding disorders.

TELL THE NURSE !

When caring for a person who is receiving NSAIDs, be sure to report any of the following signs or symptoms to the nurse right away:

- The person complains of stomach pain.
- The person vomits blood.
- The person's stools have a black, "tarry" appearance (caused by digested blood in the stool).
- The person bruises easily.

Acetaminophen

Acetaminophen is commonly used to relieve pain and reduce a fever. Unlike the NSAIDs, however, acetaminophen does not reduce inflammation. For many people, acetaminophen is the pain reliever of choice because it is less likely than an NSAID to upset the stomach, and it does not affect the blood's ability to clot.

However, too much acetaminophen can damage the liver. If you are responsible for administering medication and you are caring for a patient or resident who is taking acetaminophen, closely monitor how much acetaminophen the person takes. The person should not take more than 4000 mg of acetaminophen over a 24-hour period. It is easy for a person to reach this maximum quickly. Acetaminophen is supplied as 325-mg or 500-mg tablets, and most people take two tablets at a time every 4 to 6 hours. In addition, acetaminophen is often one of the medications in multi-ingredient prescription and over-the-counter medications. For example, Percocet is the brand name for oxycodone plus acetaminophen, and Vicodin is the brand name for hydrocodone plus acetaminophen. Be aware of the acetaminophen content of any medications your patient or resident is taking in addition to acetaminophen and be sure to include this amount when you are keeping track of the person's total daily intake.

MEDICATIONS USED TO SUPPRESS THE IMMUNE RESPONSE

Corticosteroids are medications that mimic the effect of glucocorticoids on the body. As you remember from your basic training, glucocorticoids are hormones produced by the cortex of the adrenal glands, the two glands that sit on top of the kidneys (Fig. 15-2). The glucocorticoids play a role in the metabolism of fat and proteins and help the body maintain a reserve of glucose that can be used in times of stress. They are also able to suppress the body's immune response.

Because they act in the same way that glucocorticoids do to suppress the body's immune response and reduce inflammation, corticosteroids are used to treat severe inflammatory disorders (such as rheumatoid arthritis, asthma, and allergic reactions), and they are used to prevent rejection of a new organ after an organ transplant. Corticosteroids are also used to treat Addison's disease, which develops when the body does not naturally produce enough glucocorticoids.

Corticosteroids are often administered orally. However, depending on the person's condition, other administration routes may be used. For example, corticosteroids may be given by inhaler for asthma or applied topically to treat a skin disorder. Corticosteroids can also be injected directly into an inflamed joint as part of the treatment for arthritis.

Corticosteroids are powerful medications that can cause serious side effects if they are used in high doses for an extended period of time, especially when they are given orally. With long-term use of oral corticosteroids, the skin becomes thin, and the person bruises easily. Wound healing is delayed. Because corticosteroids suppress the functioning of the immune system, the person is at higher risk for infection. Corticosteroids also elevate the blood glucose level. Frequent monitoring of the person's blood glucose level is necessary (Fig. 15-3). The person may need to follow a diabetic diet during treatment. In addition, the person may need to take insulin to help keep the blood glucose level within the normal range.

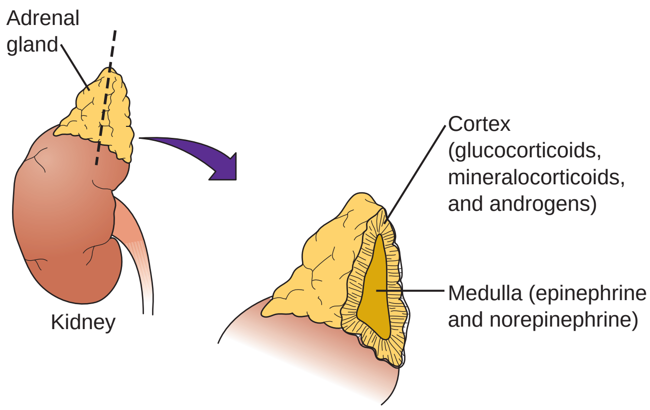


Figure 15-2
Corticosteroids mimic the effect of the glucocorticoids, hormones produced by the cortex of the adrenal glands.

Figure 15-3
A person who is being treated with corticosteroids needs to have her blood glucose level closely monitored.

Care Alert!

THERAPY with oral corticosteroids should not be stopped suddenly. Suddenly stopping therapy with oral corticosteroids can cause shock, coma, and death. To stop therapy, the doctor will gradually taper (decrease) the person's dose over a period of time.

MEDICATIONS USED TO TREAT BACTERIAL INFECTIONS

An **antibiotic** is a medication that is used to treat infections caused by bacteria. The antibiotic kills the bacteria or makes it difficult for them to reproduce and grow. There are many different types of antibiotics. Some are more effective against some types of bacteria, and others are more effective against others. The doctor decides which antibiotic to use based on the type of bacteria that are causing the infection, as well as on the person's individual needs (for example, if the person is allergic to one type of antibiotic, the doctor will select another one). Depending on the antibiotic and the condition being treated, the antibiotic may be administered orally, intravenously, or topically (for example, in an ointment or in eye drops).

When you are caring for a person who is receiving antibiotic therapy, be sure to carefully monitor the person's vital signs (especially temperature) (Fig. 15-4). Within 24 to 48 hours of starting therapy with the antibiotic, the person should start to show signs of improvement. The person should not have a fever, and other signs and symptoms of the infection should be decreasing as well. If the person is still running a fever or experiencing signs or symptoms of the infection, you should report this to the nurse immediately.

If you have been trained in medication administration and are responsible for administering an antibiotic to a patient or resident, be aware that antibiotics must be given at regular intervals to be most effective. If the doses are given too far apart, the level of the antibiotic in the person's blood will decrease, allowing the bacteria to survive. If the doses are given too close together, the level of the antibiotic in the person's blood can become too high, leading to kidney or liver damage. So, if the antibiotic is ordered daily, then give it at the same time each day. If it is ordered to be given twice daily, three times daily, or four times daily, divide 24 by the number of times each day the dose is to be given to find out how many hours should pass between each dose. For example, if an antibiotic is ordered to be given four times daily, the doses would need to be given every 6 hours (24/4 = 6).

Figure 15-4
Within 24 to 48 hours of starting therapy with an antibiotic, the person should start to show improvement. A return of the person's temperature to the normal range is a positive sign that the antibiotic is working.

Care Alert!

IF you are responsible for administering an antibiotic to a patient or resident, be sure to check the person's medical record and ask the person about allergies before administering the medication. Many people have severe allergies to certain types of antibiotics.

TELL THE NURSE !

The following signs and symptoms could indicate that the person is having an allergic reaction to an antibiotic and should be reported immediately:

- The person has difficulty breathing or shortness of breath.
- The person develops a skin rash or complains of itching.
- The person has stomach pain, nausea, diarrhea, or vomiting.

MEDICATIONS USED TO TREAT RESPIRATORY DISORDERS

Bronchodilators are medications used to open the airways. Bronchodilators work by causing the smooth muscle in the walls of the bronchi and bronchioles to relax. When the smooth muscle relaxes, the airways dilate (become wider), making it easier for air to move through them. Bronchodilators are commonly used in the treatment of asthma, as well as other respiratory conditions, such as chronic obstructive pulmonary disease (COPD) and pneumonia.

Bronchodilators are most often administered through inhalers. However, they can also be administered orally or by injection. Bronchodilators may be long acting or short acting. Long-acting bronchodilators are taken on a regular basis to help keep the airways open. Long-acting bronchodilators often combine a bronchodilator with a corticosteroid to reduce inflammation. Short-acting bronchodilators, often found in "rescue" inhalers, are used on an as-needed basis when it is necessary to open the airways quickly (for example, during an asthma attack).

Examples of bronchodilators include albuterol (Proventil, Ventolin) and epinephrine. Side effects of albuterol and epinephrine include flushing, anxiety, insomnia, increased blood pressure, increased heart rate, and cardiac dysrhythmias.

TELL THE NURSE !

When caring for a person who is taking bronchodilators, carefully monitor the person's respirations, blood pressure, and pulse. The following signs or symptoms could mean that the person is experiencing side effects from the medication or that the person is developing a respiratory tract infection (very common in people with respiratory disorders, such as COPD or asthma):

- The person is having increased difficulty breathing.
- The person reports increased shortness of breath.
- The person is using the rescue inhaler more often than usual.
- The person's blood pressure is increased.
- The person's heart rate is increased.
- The person's pulse is irregular.
- The person is anxious.
- The person is not able to sleep.

MEDICATIONS USED TO TREAT CARDIOVASCULAR DISORDERS

MEDICATIONS USED TO TREAT HYPERTENSION

Hypertension (high blood pressure) is a blood pressure that is consistently higher than 140 mm Hg (systolic) or 90 mm Hg (diastolic). Hypertension is often called the "silent killer" because the person does not feel ill yet is at great risk for complications (and possibly even death) as a result of the hypertension. Lifestyle changes (such as following a low-sodium diet and getting more exercise) can do a lot to lower high blood pressure. In addition, many people with hypertension take an **antihypertensive** to help control their blood pressure and keep it within the normal range.

There are many different types of antihypertensives on the market today. Terms such as *beta-blocker, calcium channel blocker, and angiotensin-converting enzyme (ACE) inhibitor* are used to describe general categories of antihypertensives. These terms refer to how the medications in each of these categories work to lower blood pressure.

Antihypertensives must be taken as ordered. If the person stops taking the medication or does not take it according to the prescribed schedule, the person's hypertension will return. When a person is just beginning therapy with an antihypertensive or the dose or type of antihypertensive has been changed, the person's blood pressure should be checked before administering the medication (Fig. 15-5). Otherwise, the person's blood pressure just needs to be checked at regular intervals to make sure the medication is controlling the hypertension.

Figure 15-5
The person's blood pressure should be measured before an antihypertensive is administered. If the person's blood pressure is lower than 110/60 mm Hg, check with the nurse before administering the medication.

TELL THE NURSE !

When caring for a person who is taking an antihypertensive, be sure to report any of the following observations to the nurse right away:

- The person's blood pressure is higher than what is normal for that person.
- The person's blood pressure is lower than 100/60 mm Hg.
- The person complains of dizziness or fatigue.
- You have reason to believe the person has stopped taking his medication.

Care Alert!

IF you have received advanced training in medication administration and are responsible for administering an antihypertensive to a person, check with the nurse before administering the medication if the person's blood pressure is lower than 110/60 mm Hg.

MEDICATIONS USED TO TREAT ANGINA PECTORIS

Angina pectoris is chest pain that occurs when the heart muscle is deprived of oxygen. Many people with coronary artery disease experience angina quite frequently because the blocked arteries affect the amount of blood that reaches the heart muscle. **Nitroglycerin** is a medication that relaxes the arteries, increasing the flow of blood to the heart and relieving the chest pain.

Nitroglycerin can be administered in many different ways:

- *Sublingual:* A pill is placed under the tongue and allowed to dissolve or a spray is sprayed under the tongue.
- *Buccal:* A pill is placed between the cheek and gum and allowed to dissolve.
- *Oral:* A pill is swallowed.
- *Transdermal:* An ointment or patch is applied to the skin.
- *Intravenous:* The medication is administered into the bloodstream.

Because nitroglycerin dilates the blood vessels, it can cause hypotension and dizziness. When you are caring for a person who takes nitroglycerin, it is especially important to allow the person to "dangle" before getting out of bed to prevent falls (Fig. 15-6).

Figure 15-6
Medications that cause vasodilation, such as nitroglycerin, can cause hypotension and dizziness. Allowing the person to "dangle" before standing up can help prevent falls.

TELL THE NURSE !

When caring for a person who is taking nitroglycerin, be sure to report the following signs or symptoms to the nurse right away:

- The person is taking the medication more frequently than normal.
- The person tells you that the medication does not relieve the chest pain.
- The person's blood pressure is low and the pulse rate is high.

If you have received advanced training in medication administration and are administering nitroglycerin to a patient or resident, be sure to wear gloves when handling the pills or patches. If you do not wear gloves, the nitroglycerin can be absorbed through your skin, causing a decrease in your blood pressure and a pounding headache.

MEDICATIONS USED TO INCREASE CARDIAC OUTPUT AND DECREASE HEART RATE

Cardiotonics are medications that slow the heart rate and increase the force of each heart beat, allowing the heart to pump more blood with each beat. Cardiotonics are frequently used in the treatment of atrial fibrillation (a dysrhythmia that occurs when the atria send too many impulses through the atrioventricular [AV] node, resulting in very fast and very irregular contraction of the ventricles; see Chapter 8). Cardiotonics are also used in the treatment of heart failure (a condition that occurs when the heart is not able to pump enough blood to meet the body's needs).

Digoxin (Lanoxin, Digitek, Lanoxicaps) is a very commonly used cardiotonic medication. You may also hear digoxin referred to as "digitalis." This is because digoxin is made from the digitalis (foxglove) plant. Digitalis (foxglove) is a toxic plant. Therefore, digoxin has the potential to cause toxicity as well. There is not that much of a difference between the therapeutic level (that is, the level of digoxin in the blood that will produce the desired effects) and the toxic level (that is, the level of digoxin in the blood that will cause harm). In addition, the level of digoxin builds up in the blood over time. The health care team closely monitors a person who is taking digoxin for signs of **digitalis toxicity** (adverse effects caused by digoxin).

Because digoxin affects the heart rate, accurately monitoring the person's heart rate is important. This is done by measuring the person's apical pulse by listening over the apex of the heart with a stethoscope (Fig. 15-7). The apical pulse is the preferred method of measuring a person's heart rate when the person has heart disease because a weak or irregular pulse may be difficult to feel in the radial artery.

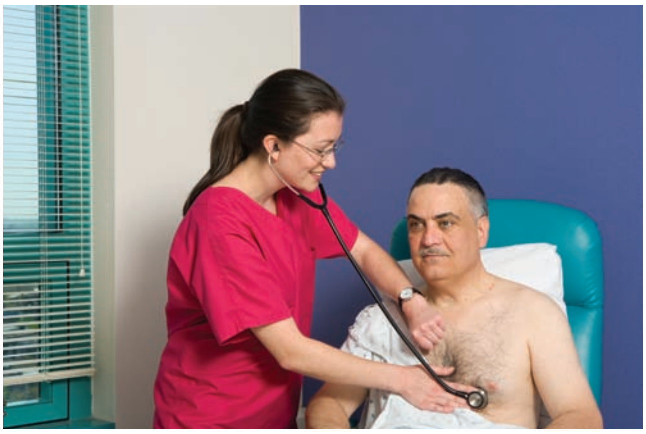


Figure 15-7
Before administering digoxin (Lanoxin), it is important to measure the person's apical pulse.

TELL THE NURSE !

When caring for a person who is taking digoxin, report any of the following signs or symptoms to the nurse right away. They may be a sign of digitalis toxicity.

- The person's apical pulse rate is less than 60 beats/min.
- The person has nausea or vomiting.
- The person complains of visual disturbances, such as seeing a "halo" around lights.
- The person is very weak or fatigued.

Care Alert!

IF you have received advanced training in medication administration and are responsible for administering digoxin, be sure to take the person's apical pulse before administering the medication. If the person's apical pulse is less than 60 beats/min, do not give the medication and be sure to notify the nurse right away.

MEDICATIONS USED TO PREVENT BLOOD CLOTS

Anticoagulants (also known as "blood thinners") are medications that are given to prevent the blood from clotting. Examples of anticoagulants include warfarin (Coumadin) and heparin. Warfarin is administered orally. Heparin is administered parenterally. Daily low doses of aspirin may also be administered to prevent clot formation.

Anticoagulants are given when a person has a condition that puts her at risk for forming blood clots (or thrombi) in the cardiovascular system. Examples of conditions that put a person at risk for thrombus formation include surgery, stroke, and certain dysrhythmias, such as atrial fibrillation. Remember from your basic training that if a thrombus breaks loose, travels through the bloodstream, and then becomes stuck in an artery in another part of the body, the person is at risk for stroke, pulmonary embolism, and other life-threatening conditions.

When a person is taking an anticoagulant, she needs to have blood tests performed regularly to make sure the dosage is correct and the amount of the medication in her blood is not too high or too low. Many medications and foods can interact with warfarin, leading to adverse effects. The interaction may affect the warfarin's ability to work, putting the person at risk for clot formation. Or, it may increase the amount of warfarin in the blood, putting the person at risk for internal bleeding.

TELL THE NURSE !

When caring for a person who is taking an anticoagulant, report the following signs or symptoms to the nurse right away:

- The person bruises easily.
- There is blood in the urine.
- The person's stools have a black, "tarry" appearance (caused by digested blood in the stool) or there is bright red blood in the stool.

MEDICATIONS USED TO TREAT URINARY DISORDERS

MEDICATIONS USED TO INCREASE URINE OUTPUT

Diuretics (or "water pills") are medications that help the kidneys remove extra water from the body. Kidney disease and certain types of heart disease (such as heart failure) can make it hard for the body to get rid of extra water, resulting in edema. In these situations, the doctor may order the use of a diuretic to help the body rid itself of the excess fluid. Diuretics are also often used as part of the treatment for hypertension.

There are many different types of diuretics in use. Examples of commonly used diuretics include furosemide (Lasix) and chlorothiazide (Diuril). Some diuretics remove potassium as well as water from the body. Potassium is necessary for the heart to function properly. To make up for the potassium loss, the doctor may order a potassium supplement to be taken along with the diuretic. Other diuretics are *potassium-sparing diuretics*, which means they do not affect potassium levels in the body. People who are taking a potassium-sparing diuretic do not need to take a potassium supplement.

TELL THE NURSE !

When caring for a person who is taking a diuretic, report the following signs or symptoms to the nurse immediately. They might indicate that the person's potassium level is too low:

- The person's pulse is irregular.
- The person complains of muscle weakness or muscle cramps.
- The person is dehydrated.

When you are caring for a person who is taking a diuretic, you may be asked to monitor the person's intake and output carefully. In addition, you may be asked to weigh the person at the same time each day. Daily weights help the health care team to confirm that the diuretic is working. If the person's weight increases, he may still be retaining fluid. Because the person will need to urinate more frequently, be sure the call light control is within reach if the person should not get out of bed unassisted, or if the person needs to use a urinal, bedpan, or bedside commode for elimination. Because some diuretics cause orthostatic hypotension, be sure to give the person time to "dangle" before getting out of bed.

TELL THE NURSE !

The following signs and symptoms may indicate that the diuretic is not working properly and should be reported to the nurse right away:

- The person's arms, legs, or abdomen is swollen.
- The person has gained weight.
- The person complains of shortness of breath.
- The person's blood pressure is increased.
- The person's urine output is decreased.

MEDICATIONS USED TO TREAT BLADDER SPASMS

Bladder spasms are involuntary contractions of the smooth muscle in the walls of the bladder. When the muscular walls of the bladder suddenly contract (or spasm), urine is expelled from the body with little warning, resulting in urge incontinence. Bladder spasms can be caused by conditions such as cystitis (infection of the bladder), or their cause may be unknown. **Antispasmodics** are medications used to suppress contraction of the smooth muscle in the walls of hollow muscular organs (such as the bladder and the intestines). Examples of antispasmodics used to treat bladder spasms include oxybutynin chloride (Ditropan) and tolterodine tartrate (Detrol).

TELL THE NURSE !

When caring for a person who is taking an antispasmodic, report the following signs or symptoms to the nurse immediately:

- The person's pulse rate is increased.
- The person is having difficulty urinating.
- The person complains of a headache or blurred vision.
- The person is still experiencing bladder spasms and urge incontinence.

MEDICATIONS USED TO TREAT GASTROINTESTINAL DISORDERS

MEDICATIONS USED TO TREAT DIARRHEA

Medications commonly used to treat diarrhea include diphenoxylate (Lomotil) and loperamide (Imodium). Diphenoxylate is chemically related to the narcotic analgesics, and like the narcotic analgesics, it is considered a controlled substance. Loperamide is not related to the narcotic analgesics and is not considered a controlled substance. Both of these medications work to treat diarrhea by slowing peristalsis (the wave-like contractions of the muscular walls of the intestine that help to move material through the intestines). If a person regularly requires antidiarrheal medications, please notify the nurse. The person should be evaluated by a doctor to find out what is causing the frequent bouts of diarrhea.

Care Alert!

If you have received advanced training in medication administration and are responsible for administering antidiarrheal medication to a person, take note of the person's bowel elimination habits and the quality of previously passed stools. If the person has not had a bowel movement of normal consistency and amount in a few days but is passing small amounts of liquid stool, the person may have a fecal impaction. Administering antidiarrheal medications to a person with a fecal impaction can cause a bowel obstruction that could require surgery. If you are concerned that the person may have a fecal impaction, ask the nurse to evaluate the person before administering any medication to stop diarrhea.

MEDICATIONS USED TO TREAT CONSTIPATION

Laxatives, stool softeners, and fiber supplements are used to promote bowel elimination. Laxatives chemically stimulate the large intestine to contract, helping to move material through the intestine at a faster pace. Senna (Senokot) and magnesium hydroxide (Milk of Magnesia) are examples of stimulant laxatives. Stool softeners (such as docusate sodium [Colace] and docusate calcium [Surfak]) and fiber supplements (such as psyllium [Metamucil] and polycarbophil [FiberCon]) help keep fluid in the feces, making it softer and easier to pass. Some medications used to promote bowel elimination are a combination of a stimulant laxative and a stool softener, such as docusate sodium and casanthranol (Peri-Colace).

All of these medications are administered orally. When caring for a person who is taking a laxative, stool softener, or fiber supplement, encouraging fluid intake and exercise can help these medications work better. If oral medications do not work, a rectal suppository or an enema may be ordered.

Care Alert!

If you have been trained in medication administration and are responsible for administering a laxative, stool softener, or fiber supplement, do not give these medications if the person is experiencing diarrhea or abdominal pain. Make sure to report either symptom to the nurse.

MEDICATIONS USED TO TREAT ENDOCRINE DISORDERS

MEDICATIONS USED TO TREAT HYPOTHYROIDISM

Hypothyroidism results when the body does not produce enough thyroxine, a hormone that affects the rate of metabolism in the body's tissues. A person with hypothyroidism experiences signs and symptoms such as fatigue, weakness, depression, anorexia, weight gain, constipation, and intolerance to cold. Hypothyroidism is treated by administering replacement thyroid hormone, such as levothyroxine sodium (Levothroid, Synthroid), daily in the form of a pill.

TELL THE NURSE !

When caring for a person who is taking medication for hypothyroidism, be sure to report any of the following signs or symptoms to the nurse. If the person's dose is not high enough, the person will still have signs and symptoms of hypothyroidism. If the person's dose is too high, the person will start having signs and symptoms of hyperthyroidism. Your observations are necessary so that the doctor can adjust the person's dose if necessary.

- The person experiences weight loss or gain without a change in diet.
- The person continues to have cold intolerance.
- The person is sleepy a lot during the day.
- The person is unable to sleep at night.
- The person's pulse rate is increased or irregular.

MEDICATIONS USED TO TREAT DIABETES

Diabetes mellitus is a condition in which the person's blood glucose levels are elevated because the body is not able to produce or respond to insulin, a hormone that helps to move glucose from the bloodstream into the cells of the body. In type 1 diabetes mellitus, the insulin-producing cells of the pancreas are completely destroyed and no insulin is produced. In type 2 diabetes mellitus, the insulin-producing cells of the pancreas still produce some insulin, but the cells of the body are not able to respond to the insulin.

Insulin

Insulin is usually given as a subcutaneous injection. There are many different types of insulin, and some people may take more than one type of insulin. The doctor determines the type and dose of insulin according to the person's individual needs.

- *Short-acting insulins* (such as Humulin) start working within 30 to 60 minutes, **peak** (reach maximum effectiveness) within 1 to 4 hours, and last 5 to 8 hours.
- *Intermediate-acting insulins* (such as NPH and Lente) start working within 1 to 2 hours, peak within 6 to 12 hours, and last 16 to 24 hours.
- *Long-acting insulins* (such as Ultralente) start working within 4 to 6 hours, peak within 10 to 18 hours, and last 24 or more hours. Another type of long-acting insulin is glargine (Lantus). It starts working within 1 to 2 hours, does not peak and lasts 24 hours.

If you are responsible for administering insulin, you will need more training than is provided here to safely perform this task.

When caring for a person who is taking insulin, you may be asked to assist by monitoring the person's blood glucose level if you have been trained in this skill (see Chapter 5). The person's insulin dose is often determined by the person's blood glucose level.

TELL THE NURSE !

How much insulin a person needs at any given time can be affected by many different factors, including diet, exercise, and state of health (for example, if the person has an acute illness). As a result, it is easy for a person to receive an underdose of insulin (resulting in hyperglycemia) or an *overdose of insulin (resulting in hypoglycemia). Signs and symptoms of hyperglycemia and hypoglycemia are often very similar and should be reported to the nurse immediately. These signs and symptoms include:*

- Excessive hunger or thirst
- Weakness, dizziness, or both
- Drowsiness and confusion
- Shaking and increased perspiration
- Rapid pulse and low blood pressure
- Headache
- Nausea and vomiting
- Slow, labored respirations with sweet-smelling breath
- Frequent urination
- Convulsions
- Loss of consciousness

Oral Medications for Treating Diabetes

Although some people with type 2 diabetes require insulin injections, many of them can manage their disorder through diet, exercise, and the use of oral medications such as metformin (Glucophage), tolbutamide (Orinase), glipizide (Glucotrol), and rosiglitazone (Avandia). These medications stimulate the insulin-producing cells of the pancreas to produce more insulin. They may also make the cells of the body more receptive to the insulin that is produced. Oral medications for treating diabetes are not effective for treating type 1 diabetes.

Care Alert!

If you have received advanced training in medication administration and are responsible for administering oral medications for treating diabetes, make sure to talk to the nurse before administering these medications if the person is vomiting, not eating, or has a blood glucose level lower than 70 mg/dL.

MEDICATIONS USED TO TREAT PSYCHIATRIC DISORDERS

Many of the people in assisted living and long-term care facilities have psychiatric disorders (such as anxiety disorders, depression, or schizophrenia). Anti-anxiety medications (anxiolytics), antidepressant medications, and antipsychotic medications (used to treat schizophrenia) are discussed in Chapter 13.

You may also care for many people with dementia. Antipsychotic medications are often used in the treatment of dementia to reduce dementia-related behaviors. These medications are described in Chapter 13.

SUMMARY

- Increasing your knowledge about the medications your patients or residents are taking can help you provide better care because you will be better able to recognize and report potential problems. You can ask the nurse about specific medications, how they work, their potential side effects, and safety considerations related to their use. You can also look medications up in a drug reference guide.
- Pain medications can be grouped into two main categories, narcotic analgesics and non-narcotic analgesics.
- Narcotic analgesics are used to treat severe pain. They are controlled substances. They can slow the respiratory rate and should not be administered if the person's respiratory rate is less than 10 breaths/min.
- Non-narcotic analgesics include acetaminophen (Tylenol) and the non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin, ibuprofen (Advil), and naproxen sodium (Aleve).
  - It is necessary to closely monitor the amount of acetaminophen a person

takes in a 24-hour period. The amount should not exceed 4000 mg.
    - NSAIDs can irritate the stomach lining, resulting in stomach upset, ulcers, and bleeding.
- Corticosteroids are used to suppress the immune system, which is useful in people with severe inflammatory disorders. A person who is taking corticosteroids (especially when administered orally) is at risk for infection, delayed wound healing, and an elevated blood glucose level.
- Antibiotics are used to treat bacterial infections. Antibiotics must be given as ordered in order to be effective. Many people are allergic to certain types of antibiotics.
- Bronchodilators are medications that open the airways. Bronchodilators are used in the treatment of respiratory disorders such as asthma, chronic obstructive pulmonary disease (COPD), and pneumonia. Potentially dangerous side effects of bronchodilators include increased blood pressure, increased heart rate, and cardiac dysrhythmias.
- Medications commonly used in the treatment of cardiovascular disorders include antihypertensives (to lower the blood pressure), nitroglycerin (to increase the flow of blood to the heart and relieve chest pain), cardiotonics (to slow the heart rate and increase the force of each heart beat, increasing cardiac output), and anticoagulants (to prevent blood clots from forming in the cardiovascular system).
    - Types of antihypertensives include beta-blockers, calcium channel blockers, and angiotensin-converting enzyme (ACE) inhibitors. The blood pressure of a person who is taking antihypertensive medications should be monitored regularly, and before administering the medication if the person is just beginning antihypertensive therapy or if the dose or type of antihypertensive has recently been changed.
    - Always wear gloves when handling nitroglycerin. The medication can be absorbed through your skin, causing hypotension and a pounding headache.
    - Digoxin (Lanoxin) is a commonly used cardiotonic. The difference between a therapeutic blood level of digoxin and a toxic blood level of digoxin is slight, and the person must be monitored carefully. Digoxin should not be administered if the person's heart rate is less than 60 beats/min.
    - Anticoagulants can increase the person's risk for bruising and bleeding if the blood level is too high.
- Medications that affect urinary function include diuretics and antispasmodics.
    - Diuretics (medications used to increase urine output) are often used in the treatment of kidney disease, heart failure, and hypertension. Some diuretics remove potassium along with water from the body. Signs and symptoms of a low potassium level include an irregular pulse, muscle weakness, and muscle cramps and should be reported to the nurse right away.
    - Antispasmodics, such as oxybutynin chloride (Ditropan) and tolterodine tartrate (Detrol), help to stop bladder spasms, which occur when the smooth muscle in the bladder walls suddenly contracts. Bladder spasms can result in urge incontinence. Potential side effects of these medications include an increased heart rate and difficulty urinating.
- Medications that affect the function of the gastrointestinal system include medications used to treat diarrhea and constipation.
    - Medications used to treat diarrhea include diphenoxylate (Lomotil) and loperamide (Imodium). These medications work by slowing peristalsis. These medications are for short-term use only. A person who experiences frequent bouts of diarrhea should be evaluated by a doctor.
    - Constipation can be treated with laxatives, stool softeners, fiber supplements, or a combination of these. Oral medications are tried first. If oral medications do not work, a rectal suppository or an enema may be ordered.
- Medications that affect the function of the endocrine system include medications used to treat hypothyroidism and medications used to treat diabetes.
    - Hypothyroidism is treated with the daily administration of levothyroxine sodium (Levothroid, Synthroid). Signs and

symptoms of either hypothyroidism or hyperthyroidism in a person who is being treated with levothyroxine sodium should be reported because they indicate that the person's dose of the medication may need to be adjusted.

- Medications used to treat diabetes include insulin and oral medications such as metformin (Glucophage), tolbutamide (Orinase), glipizide (Glucotrol), and rosiglitazone (Avandia). When caring for a person with diabetes, it is important to monitor the person's blood glucose levels closely and alert the nurse if the person develops signs or symptoms of hypoglycemia or hyperglycemia.
- Medications used to treat psychiatric disorders include anti-anxiety medications (anxiolytics), antidepressant medications, and antipsychotic medications. Antipsychotic medications may also be used to reduce dementia-related behaviors in people with dementia. All of these medications are discussed in detail in Chapter 13.

WHAT DID YOU LEARN?

Multiple Choice

Select the single best answer for each of the following questions.

1. What is the maximum amount of acetaminophen (Tylenol) that a person can take over a 24-hour period?
a. 6 tablets
b. 4 tablets
c. 4000 mg
d. 6000 mg

2. Mrs. Smith is taking warfarin (Coumadin) daily. Which of the following side effects might be caused by her medication?
a. Bruising
b. High blood pressure and headaches
c. Nausea and stomach upset
d. Sleepiness and difficulty concentrating

3. Mr. Covey takes digoxin (Lanoxin) for his heart condition. You have been trained in medication administration and are responsible for helping Mr. Covey with his medications. What should you do before administering Mr. Covey's digoxin?
a. Measure Mr. Covey's radial pulse
b. Measure Mr. Covey's blood pressure
c. Measure Mr. Covey's respiratory rate
d. Measure Mr. Covey's apical pulse

4. Mrs. Bradley has been started on an oral antibiotic twice a day for a respiratory tract infection. You have been trained in medication administration and are responsible for administering Mrs. Bradley's antibiotic. What are appropriate times for it to be given?
a. 7 AM and 7 PM
b. 7 AM and 2 PM
c. 9 AM and 5 PM
d. With breakfast and dinner

5. Mrs. Cann takes naproxen sodium (Aleve) to treat the pain of osteoarthritis. Which one of the following side effects is Mrs. Cann at risk for developing?
a. Constipation
b. Stomach problems, such as stomach upset, ulcers, or bleeding
c. Inflammation
d. Delayed wound healing

6. Mr. Pyne is being treated with oral corticosteroids. What is the effect of corticosteroids?
a. To enhance the immune system's ability to function
b. To relieve pain
c. To suppress the immune system's ability to function
d. To reduce high blood pressure

Matching

Match each numbered item with its appropriate lettered description.

_____ **1.** metformin (Glucophage)
_____ **2.** tolterodine tartrate (Detrol)
_____ **3.** levothyroxine sodium (Levothroid, Synthroid)
_____ **4.** furosemide (Lasix)
_____ **5.** albuterol (Proventil, Ventolin)
_____ **6.** oxycodone (OxyContin, Percocet)
_____ **7.** ibuprofen (Advil)

a. A bronchodilator used to open the airways
b. A non-narcotic analgesic that belongs to the non-steroidal anti-inflammatory drug (NSAID) group
c. A narcotic analgesic used to relieve pain
d. An antispasmodic used to treat bladder spasms
e. An oral medication used to treat type 2 diabetes
f. A diuretic used to increase urine output
g. A medication used to treat hypothyroidism

STOP and Think!

1. Mr. Rodriguez had surgery yesterday and is receiving narcotics for pain. When you go in to check on him, he is very drowsy and slow to respond to you, and his vital signs are as follows: blood pressure, 124/64 mm Hg; pulse, 68 beats/min; respiratory rate, 10 breaths/min; and temperature, 98.4°F. In addition, you note that Mr. Rodriquez's pulse oximetry reading is 86%. Do any of these measurements concern you? If so, which ones, and why?
2. You work in a hospital and are caring for Mrs. Linkins, who has been prescribed a diuretic to help treat her heart failure. What special considerations will you keep in mind when you are caring for Mrs. Linkins?
3. You work in an assisted living facility and have received advanced training that allows you to administer medications. One of your residents, Mr. Smithfield, takes an antihypertensive medication daily to help control his blood pressure. Today while you are helping Mr. Smithfield with his medications, he says to you, "I don't think I'm going to take this blood pressure medicine anymore. I feel just fine. In fact, I felt better before I started taking it. Ever since I started taking these pills, I've had trouble moving my bowels." How would you respond to Mr. Smithfield?

Nursing Assistants Make a Difference!

I hate having to take pills for every little thing, always have. When I was younger, I rarely even took an aspirin for a headache. Now it seems like I've got a different pill for every part of my body. There's one for my blood pressure, one to prevent blood clots, one that makes my heart beat stronger, and one for my arthritis. I guess that's what I get for living to be over 80! Still, I feel pretty good for an old-timer.

While my wife was alive, she helped me keep track of my pills, and made sure that I took them the way I was supposed to. After she passed away, I got my pills mixed up a couple of times. The last time, the mix-up was bad enough to put me in the hospital. After that, my son and daughter and I decided it was time for me to move somewhere where I could have some help keeping my pills straight. That's when I came here to Pleasant Grove Assisted Living. I like it here. I've got my own apartment with my own stuff in it, I've made some new friends, and the people who work here are really nice too.

One young fellow who helps me out is named Steve. Steve is a nursing assistant who got extra training so he could help people with their medications. Every day, Steve comes by my apartment. We chat for awhile, usually about sports or the crazy things going on in the news, and then Steve takes my heart rate and blood pressure and gives me my pills. One day, Steve found that my heart rate was slower than normal, so he called the nurse. The nurse said we should have the doctor check me out, so Steve helped me make an appointment with Dr. Burgess. It turned out that the dose of my heart medication needed to be adjusted. I'll tell you what, I'm glad Steve is keeping such a close eye on me!

I really think this is the year our team is going to make it into the Super Bowl, and I want to be around to see it!

APPENDIX

A

Answers to the *What Did You Learn?* Exercises

Chapter 1: Working in an Advanced Care Setting
Multiple choice: 1-d, 2-a, 3-a, 4-d, 5-b, 6-d

Chapter 2: Sterile Technique
Multiple choice: 1-d, 2-c, 3-a, 4-d, 5-b, 6-c, 7-d

Chapter 3: Advanced Wound Care Skills
Multiple choice: 1-c, 2-b, 3-d, 4-b, 5-b, 6-a, 7-c, 8-d
Matching: 1-c, 2-e, 3-d, 4-b, 5-f, 6-a

Chapter 4: Advanced Urinary Care Skills
Multiple choice: 1-d, 2-b, 3-a, 4-d, 5-b, 6-a, 7-b, 8-d, 9-a

Chapter 5: Advanced Nutrition Skills
Multiple choice: 1-a, 2-b, 3-d, 4-b, 5-d, 6-a, 7-a
Matching: 1-b, 2-c, 3-d, 4-a

Chapter 6: Advanced Respiratory Care Skills
Multiple choice: 1-c, 2-a, 3-c, 4-c, 5-a
Matching: 1-e, 2-h, 3-b, 4-c, 5-g, 6-a, 7-f, 8-d

Chapter 7: Advanced Vascular Access Skills
Multiple choice: 1-c, 2-c, 3-a, 4-a, 5-c
Matching: 1-c, 2-b, 3-e, 4-f, 5-a, 6-d

Chapter 8: Advanced Cardiovascular Monitoring Skills
Multiple choice: 1-b, 2-a, 3-c, 4-b, 5-c, 6-d, 7-b, 8-c
Matching: 1-b, 2-g, 3-a, 4-e, 5-f, 6-d, 7-c

Chapter 9: Care of the Rehabilitation Patient
Multiple choice: 1-c, 2-d, 3-c, 4-b, 5-b, 6-d, 7-a, 8-c, 9-c, 10-d, 11-b

Chapter 10: Care of the Surgical Patient
Multiple choice: 1-c, 2-b, 3-c, 4-d, 5-b, 6-b, 7-a, 8-d, 9-c, 10-b
Matching: 1-d, 2-b, 3-f, 4-c, 5-a, 6-e

Chapter 11: Care of the Pediatric Patient
Multiple choice: 1-c, 2-b, 3-b, 4-d, 5-a, 6-c, 7-d
Matching: 1-d, 2-b, 3-a, 4-e, 5-c

Chapter 12: Care of the Obstetric Patient
Multiple choice: 1-b, 2-b, 3-a, 4-b, 5-d, 6-c
Matching: 1-b, 2-g, 3-e, 4-f, 5-d, 6-c, 7-a, 8-h

Chapter 13: Care of the Psychiatric Patient
Multiple choice: 1-c, 2-a, 3-b, 4-d, 5-b, 6-c, 7-c, 8-a
Matching: 1-b, 2-e, 3-a, 4-f, 5-d, 6-c

Chapter 14: Introduction to Medication Administration
Multiple choice: 1-d, 2-c, 3-d, 4-b, 5-b, 6-c, 7-d, 8-a, 9-b, 10-a, 11-b

Chapter 15: Common Medications
Multiple choice: 1-c, 2-a, 3-d, 4-a, 5-b, 6-c
Matching: 1-e, 2-d, 3-g, 4-f, 5-a, 6-c, 7-b

APPENDIX

B

Caring for Organ and Tissue Donors and Recipients

Transplantation, or the ability to save lives and cure disease by replacing failing organs or tissue with new organs or tissue, is one of the great advances of modern medicine. Each year in the United States, thousands of people receive the gift of a changed life when they receive a donated organ or tissue. Organs that can be transplanted from one person to another include the heart, lungs, kidneys, liver, pancreas, and intestines. Tissues that can be transplanted from one person to another include skin (to cover burns); bone marrow (to help cure certain cancers); heart valves (to replace damaged heart valves); bone, tendons, and ligaments (to reconstruct limbs); and corneas (to restore sight).

As a nursing assistant working in an advanced care setting, you may have the opportunity to care for people who are donating organs or tissues. You may also care for many people who are waiting to have an organ or tissue transplant or who are recovering from the procedure. In many cases, the physical care you will provide for these patients will not be much different from the physical care you would provide to any patient. However, the emotional care these patients and their families require is very special.

CARING FOR DONORS AND THEIR FAMILIES

Depending on the situation and the organ or tissue being donated, the donor may be living or recently deceased. For example, living donors may donate bone marrow, a kidney or a lung, a portion of the liver or pancreas, or a segment of intestine. Some organs and tissues, such as the heart or the corneas from the eyes, can only be donated by recently deceased donors.

CARING FOR LIVING DONORS AND THEIR FAMILIES

As noted earlier, it is possible for a person to donate certain organs or tissues while still alive. For example, a healthy person can live with only one functioning kidney or lung. Similarly, if a portion of a healthy person's liver is removed, the liver will grow more tissue to take over the function of the portion that was removed. Bone marrow is always donated by living donors. Often, a living donor is a relative or friend of the person in need of the transplant, but in many cases, the donor is a complete stranger.

After the procedure to remove the organ or tissue that is being donated, the donor will need the same type of physical care any post-operative patient would need. Additionally, the donor may be anxious and concerned about the recipient's condition and whether the organ or tissue is functioning properly. When the news is positive, there is definitely occasion for celebration. However, if the transplanted organ or tissue does not function properly, the recipient's body rejects the organ or tissue, or other complications related to the transplant occur, the donor may experience feelings of responsibility, guilt, and depression. The donor may feel that it is somehow his fault that the transplant failed. Be especially observant for any signs of depression and make sure to report these signs to the nurse immediately.

CARING FOR DECEASED DONORS AND THEIR FAMILIES

Many deceased organ and tissue donors are people who have died as a result of traumatic brain injury (TBI) or injury to the upper spinal cord. The person's injuries are so severe that the brain and brainstem have ceased to function. This is a condition called "brain death." Brain death is declared by the doctor after extensive tests are performed in accordance with the law and the person is shown to meet the strict criteria necessary to declare brain death. A patient who has been declared brain dead but who still has a beating heart is a candidate for donating vital organs (such as the heart, kidneys, liver, pancreas, lungs, and intestines) as well as tissues to others. However, not all deceased donors are people who have been declared brain dead. A person who has died from another cause and whose heart has stopped beating can still donate certain types of tissue (such as skin, corneas, or connective tissue) for up to several hours after the heart has stopped beating.

Federal and state laws mandate that a donor coordinator (a person who serves as a link between the transplant program and the health care facility) approach the family members of a person who is a candidate for organ or tissue donation. If the family consents to donating some or all of the person's organs or tissues and the person is a candidate for donating vital organs (such as the heart), the person will be placed on life support machines and medications will be administered to help maintain the person's blood pressure at an adequate level. These measures help to keep oxygenated blood circulating throughout the person's body, which helps to keep the organs viable (healthy) until surgery can be performed to remove (or "recover") the organs that are being donated. This procedure is called an *organ procurement procedure*. After the organs are removed from the donor's body, they need to be transplanted into the recipient's body as soon as possible.

Most health care facilities have a private area where family members can stay with the person until the organ procurement procedure takes place. Because the person's condition must be kept stable until the organ procurement procedure takes place, there may be a lot of activity around the person. Nurses and other health care workers may be very busy adjusting medications, managing the ventilator and other life-support machines, and collecting blood samples. As a result, family members may feel that they are in the way.

If you are helping to care for a person who is soon to be a donor, you must remember to think of the person's family members as well. Although the decision to donate a loved one's organs or tissues to help others can be a source of comfort to family members, this will still be a very difficult time for them. Remember what you learned as part of your basic nursing assistant training about providing comfort for family members who are grieving the loss of a loved one. Simple actions, such as making sure there are enough chairs in the room so that all of the family members can sit down, can be very comforting.

Caring for a person who is soon to become a donor can be difficult for members of the health care team. In most instances, the person just looks as if he or she is asleep or in a coma. Knowing that the person will soon be taken to the operating room to have organs and tissues removed for donation can be very hard for health care workers. You may feel a sense of frustration or anger that more cannot be done to save the person's life. You may feel very helpless and sad. You may be caring for a person who is your age or the same age as one of your children. If you are having difficulty dealing emotionally with a situation at work, talking to more experienced staff members or to a counselor can be very helpful. You must be able to maintain your own emotional health in order to continue to provide humanistic care for others.

CARING FOR RECIPIENTS AND THEIR FAMILIES

Many conditions can make an organ or tissue transplant necessary, and patients may be children or adults. Many patients need an organ transplant to treat end-stage disease (that is, the damage to the person's organ is irreversible and so severe that the organ is barely functioning, and the person's condition is terminal unless the organ can be replaced). Organ transplants are also often done in young children to treat certain congenital disorders. You may have the opportunity to care for a transplant recipient and her family while they are waiting for a transplant, after receiving a transplant, or both.

A Donor Family's Story

On May 30, 2000, 17-year-old Sarah Studt of LaBarge, Wyoming, came home from her last day of high school feeling very excited and relieved. She told her mom that she was going to go downtown. "I'll be right back," she said. "Love you." Two minutes later, Sarah's mom, Trish, got a call from the local postmaster saying she thought that Sarah's car had been hit by another vehicle. Trish called her husband and Sarah's father, Woody, who is the town's fire chief, and told him what happened. He was the first person on the scene. Sarah, critically injured, was taken by ambulance to Big Piney, Wyoming, and then evacuated by air to Eastern Idaho Regional Medical Center in Idaho Falls, Idaho. Four days later, the family was told that Sarah was brain dead. Trish doesn't remember much that occurred at that time, but she does remember that they let the hospital staff know that they wanted Sarah to be an organ donor. "As a family, we always talked about donating organs," she says.

It is apparent when talking to the Studts that their feelings of loss are as great as their love for their daughter. In the years since Sarah's death, there are two things that have helped sustain Trish and Woody and Sarah's sister Brittany. The first is their faith. Trish states, "I don't know how people do it without some belief system. We don't see this as a 'good-bye,' but as a 'so long for now.' We also feel like we have our own guardian angel." The Studt family's faith has also given them the strength to help others who have experienced the loss of a child. "Sarah's death, with all the heartache, has been a blessing . . . to be able to help others with their grief," says Trish.

The second way that the Studts feel blessed is through Sarah's gift of organ donation. "It was tough to lose Sarah, but it's awesome to know that someone is alive because of her," says Trish. When Woody and Trish were going through the consent process, Woody told the donor coordinator, "Sarah's organs need to go with warning labels. There is nothing ordinary about her. She has a lot of energy. She's very adventurous—maybe too impulsive! She's very compassionate. She always befriended those who had a harder time fitting in." Woody went on to say, "Wouldn't it be ironic [with her energy] if her heart went to a 60-year-old grandma?" As it turns out, the recipient of Sarah's heart was a 60-year-old grandfather.

The Studt family. From left to right, Sarah, Trish, Woody, and Brittany.

The Studts received letters early on from the man who received Sarah's heart, a man who is a hospice volunteer and coaches a girl's Little League team in Montana. He wrote, "Others say I'm a gentler, caring, more tolerant person . . . and they say it's because of Sarah." Trish and Woody can't help but also think that receiving Sarah's heart has something to do with that. "She was so funny and crazy but very compassionate." They also received a letter from the person who received Sarah's right kidney. He wrote how thrilled he was that he would be able to indulge his love of traveling after being connected to a dialysis machine for 4 years. "Helping others to live or do better in their lives through her donation is Sarah's legacy," says Trish.

Woody and Trish have also found the yearly "Family Recognition Ceremony" sponsored by Intermountain Donor Services (a nonprofit community service organization dedicated to the recovery and transplantation of organs and tissues that serves residents of Utah, southeastern Idaho, and western Wyoming) to be of value. "Attending the ceremony gives you the chance to mingle with other donor families and recipients and talk about how your life has changed, and it

A Donor Family's Story (*Continued*)

is uplifting to hear recipients' stories about how organ and tissue donation has helped them."

The Studt family will always feel the loss of Sarah strongly. "It doesn't get easier; it gets tolerable. It's always going to be a part of you," Trish says. It helps that Sarah is still an ongoing part of their lives. "We talk about Sarah all the time. We have her pictures . . . the feelings of loss are going to continue to go on no matter what. You think you won't go on, but you will."

CARING FOR RECIPIENTS AND FAMILIES WAITING FOR A TRANSPLANT

Meeting Physical Needs

Many people who are on the transplant waiting list are stable enough to live at home while they wait for an organ. Others are very critically ill and are hospitalized.

Many people who are awaiting a transplant will have extreme fatigue because of the nonfunctioning organ. As a result, you may need to help them with many of their activities of daily living (ADLs). Preventing the complications associated with inactivity is very important. A person with organ failure is at very high risk for skin breakdown, which puts the person at risk for infection. The organ transplant procedure cannot be done if the person has an infection. When caring for a person who is waiting to receive a transplant, be especially observant for any signs of infection or skin breakdown and report any findings to the nurse immediately.

Meeting Emotional Needs

Imagine what it would be like to find out that one of your vital organs is no longer functioning properly and will only continue to get worse. Unless you receive a healthy organ from a donor, you will certainly die. You pass through the stages of denial, anger, bargaining, depression, and acceptance, perhaps back and forth many times, but there is still that huge element of hope. Maybe you will receive a transplant in time. Maybe you will be granted a second chance at life! But wait a minute—what are you thinking? Yes, you're very sick and you don't want to die yet, but for you to live, someone else may have to die or lose a loved one. How would that knowledge make you feel? You may even be told that an organ has been matched and is available for you, only to have your hopes dashed when you find out that something was wrong with the organ or it was damaged and could not be used.

Many patients and families who are waiting for a transplant are on an emotional roller coaster that plummets frequently from hope to despair. To endure the waiting while their own or their loved one's physical condition worsens daily is more than many people can bear. The patient or his family members may display behavior that seems inappropriate. For example, they may respond with anger to members of the health care team. Remember that grief can make people behave in ways they ordinarily would not. Try to be empathetic and make sure to report your observations to the nurse. Medication for depression, the use of counseling services offered by the facility, or both may be necessary to help the patient and family members cope with this type of stress.

When caring for a person in this situation, making an effort to provide humanistic health care can make the waiting more bearable for the person and family. If the person must remain in the hospital for an extended period of time, he may be in a location far from home and unable to receive frequent visits from family members and friends. The person may become homesick, bored, and lonely. As a nursing assistant, you can play a critical role in helping to preserve the person's emotional well-being. Spend as much time with the person as you can and talk with him. Find out what types of movies, books, hobbies, and so forth the person enjoys. For example, one transplant patient shared that the nursing assistants who helped care for her during the 3 months she waited for a heart would bring in DVDs for her to watch and books they knew she would enjoy. They essentially became her "family." Their actions helped relieve some of the feelings of loneliness, isolation, and depression she was feeling during that difficult time.

Effects on the Caregiver

As a health care worker, you may also be on an emotional roller coaster as you care for a person who is waiting to receive a transplant. Your emotions will range from hope that an organ will become available in time to despair, frustration, and helplessness if this does not happen. It will be difficult for you to watch your patient's condition worsen. Because of the shortage of available organs, some of your patients will die while waiting for their transplants. You will grieve for your patients, and it is important for you to recognize that this is a normal and healthy process. To provide humanistic care to others, we have to have the capacity to give a little of ourselves to them.

CARING FOR RECIPIENTS AND FAMILIES WHO ARE ABOUT TO RECEIVE A TRANSPLANT

Word has just arrived that a suitable organ has become available for the patient. Phone calls are made to the patient's family members. The surgical transplant team is alerted, and a flurry of activity surrounds the patient. You may have many duties related to helping prepare the patient for the transplant procedure. You may need to help the patient bathe with special antibacterial soap. Blood for diagnostic laboratory work may need to be drawn. Surgical consents will need to be signed. Family members begin to arrive to be with the patient and to wait during the surgery. There is an air of excitement that can be felt throughout the unit!

Along with the excitement, however, there is concern. The patient, family members, and health care team worry about whether the transplant will be successful. There is also the concern that the person may not survive the surgery. Many people who have been waiting a long time for an organ to become available are very weak and very ill going into the surgery, and their bodies may not be able to handle the stress of surgery. As always, simple kindnesses, such as showing family members where they can wait during the surgery; making sure they know the location of restrooms, telephones, and vending machines; and promptly relaying questions and concerns the family members may have to the nurse can go a long way toward providing comfort.

CARING FOR RECIPIENTS AND FAMILIES AFTER THE TRANSPLANT

After the transplant procedure, the patient will most likely be transferred to the intensive care unit (ICU). After the patient's medical condition is stable, she may need a lot of assistance with routine personal care, toileting, and ambulation while she regains strength and mobility. If the person was very ill before the transplant, the recovery period could be lengthy.

It is common for the person's immune system to try to reject the new organ or tissue. The cells of the immune system react to the new tissue in the same manner they would react to any "foreign" invader. Immunosuppressant (anti-rejection) medications are administered to help block this reaction and allow the person's body to accept the new organ. The person may need to remain on these medications for the rest of her life. Because these medications suppress the person's immune system, they place the person at high risk for catching contagious illnesses from other people, and if an infection does occur, it is likely to be more severe than it would be in a person who is not immunosuppressed.

When you are caring for a person who has received a transplant, make sure you observe the person closely for any signs of infection. You will also need to stay healthy yourself. You could easily pass a cold or other contagious illness on to the patient. You may need to remind family members and other visitors to wash their hands thoroughly before visiting the patient and have them speak with the nurse before visiting if they feel ill or have a cold or cough.

Occasionally, despite the anti-rejection medications, the person's body will reject the transplanted organ. A biopsy of the organ is usually performed to determine the extent of the rejection. The doctor may order different anti-rejection medications in an effort to stop the process. If these medications do not work, the organ may need to be removed. If a kidney is rejected, the person will need to have regular hemodialysis again and will be placed back on the waiting list. If an organ such as the heart is rejected, the person will need another transplant immediately or he will die.

Fortunately, because of advances that have been made in the ability to more closely match donor tissue to the appropriate recipient, the success rate of organ transplants has improved greatly. Newer anti-rejection medications are being developed that are better at helping to prevent rejection and cause fewer side effects. As the number of people who become registered organ donors increases, more organs will be made available for the people who need them. This, in turn, means that many patients will receive a new organ earlier in the course of their illness before their bodies are so critically ill. This also improves the overall success rate.

Some transplant recipients experience a type of "survivor guilt" after receiving an organ from a person who died. The person feels guilty that she is alive because someone else died. Some recipients want to know about the person whose organ they received, and they may contact the donor's

(Text continues on page 354)

An Organ Recipient's Story

By Penne Swenson

Penne and her granddaughter, Sydney . . .

her grandson Jeremiah . . .

and her new grandson, Justin.

All the doctors were so positive. They said they wouldn't be surprised if I got my heart within the first week after everything was approved by the transplant committee and the insurance company. After all, I was only 45 years old and had been totally healthy all of my life up until now. I was the only person on the transplant waiting list with B+ blood, and I was in dire need of a new heart soon. In short, I was an excellent candidate for a transplant.

It was the end of October. The first week went by. The second week passed by as well, and still no heart was available. Week three went by—still, no heart available. The doctors kept saying it would happen "soon." Week four came and went.

(*continued*)

An Organ Recipient's Story (*Continued*)

I had an IV drip of medication that went directly to my heart to make it contract harder. Blood tests were performed daily, and every few days the health care team would have to move my special IV line to a new vein. During week number five, in came the crew to move the IV line again. They tried to put it into the upper part of my arm near my shoulder. After six very painful attempts at inserting the IV, they were finally successful, and the medication that was keeping my heart pumping continued. But by then, I had lost my sense of humor. When my husband, Dick, came back into my room, I told him I didn't care if I was going to die. . . . I just wanted to go home. I had had enough. But home was far away in Montana.

One of the nurses must have heard me say that to my husband because the very next day, into my room sailed the entourage of doctors who visited me daily. The head doctor on my case looked at me and said, "What can we do to make your stay and your waiting more tolerable?" I was feeling much better by the time the doctor asked me this question, and I looked at her and said, "Oh, nothing. . . . I'm okay." But she was adamant, and the next thing I knew, the health care team had decided to implant an internal defibrillator and set up a travel IV pack so I could spend Thanksgiving with my husband outside of the hospital.

Surgery to implant the internal defibrillator was scheduled for 9:30 AM 2 days later. I went into ventricular tachycardia on the operating table, and it took three shocks with the defibrillator to get my heart going again. After all that, I had a defibrillator that was implanted but not hooked up because I was too weak to make it through the rest of the surgery. Out of surgery I went and into the thoracic intensive care unit. I remember being somewhat conscious and hearing the doctor tell my husband that they had nearly lost me. Then I felt my husband's hand, and he was talking to me. I heard his voice break and a sob . . . it was the only time I had ever heard him break down during all that we went through. Dick was a pillar of strength, and I relied on him heavily.

My other pillar of strength was my very dear friend Patty McIntyre, who lives in Ogden, Utah, 50 miles from LDS Hospital in Salt Lake City, where I was being cared for. Who knew that when I helped Patty through chemistry in high school, she would someday return the favor by helping me through a heart transplant! Patty and her husband Chris showed up several days a week, brought their laptop along with movies to watch, and called often to check in and see how I was. When December came, they brought in a miniature Christmas tree and decorated it right in my room. It was beautiful. Many of the nurses and aides brought in decorations to add to my tree as well.

The nurses, the aides, the physical therapists, the dietician, the mail gals from the front desk on the main floor, the cleaning lady, the heart transplant team family nurse practitioners—I hope I can come close to remembering all the wonderful things these people did for me as I struggled through this time. They brought in their personal movies and movie rentals to help pass the time. They brought me candy and Idaho baked potatoes and Honey Nut Cheerios and other treats. They would come in and just visit with me, give me back rubs, and massage the back of my neck. One of them even brought in her personal hairdresser to trim my hair. I received a great deal of mail, and the lovely ladies from downstairs would make a couple of trips upstairs each day just to bring me my mail. They waited on Dick hand and foot—whatever he wanted. They had kind words for us daily. These people made this entire event in my life such a wonderful and special memory. But more than that, they gave us hope, shared their love, and lifted us up with their faith, their commitment, and their desire to help us all that they could.

I received more than 500 cards and letters from my hometown friends and family. My husband hung them together with paper clips and displayed them from the ceiling to the floor. The sight of all of those cards, plus the huge posters made by various grade school classes wishing me well and wishing me a Merry Christmas, was truly overwhelming and moving to see. Everyone was praying for me, and you could feel it.

Thanksgiving was spent in the hospital. Time went on, and by the middle of December, my heart had become much weaker. The doctors changed my medication to try to improve the situation. Still, no donor heart became available. Then, shortly before Christmas, one of my doctors came in to tell me that she

An Organ Recipient's Story (*Continued*)

thought they had a heart for me. I felt like a lamb going to slaughter. I knew this really had to happen, but the sheer terror of this reality was incomprehensible. It was just so impossible to imagine what was about to happen. A little bit later, the doctor came back in and said the organ was not a good one for me because the donor had a drug and alcohol history. I was . . . relieved.

Right after Christmas, a second potential heart was found, but once again, the donor was not acceptable to the doctors for me. Days went by, and there were just no hearts available. . . . I felt no pain at any time. I just didn't have any energy or air, and then I began to notice that I could not see all the way down the hallway when I would get up and walk a little. I was becoming even weaker. The possibility that I would need an artificial heart to keep me going until a suitable organ for transplant became available was becoming more of a likelihood.

Then, one evening in January, around 7 PM, in came a nurse to draw a blood sample. I was watching TV, and I really wasn't thinking about how odd it was that she was taking blood samples at night. She said the doctor ordered the samples, and I just assumed he had a reason, so I didn't give it any thought. Around 9 PM, my doctor came into my room, walked over, grabbed my hands in his, and said, "I think we have a good heart for you. As you know, we keep testing the heart and checking it right up until we transplant it, so this may not happen . . . but at this time, everything is a go."

I was numb. It was really going to happen. I couldn't think about it. Thankfully, the nurse gave me a sedative to help keep me calm. Here came the heart transplant team, getting the frozen plasma hooked into my IV, taking more blood samples, inserting a very painful arterial line in my wrist. I think by then it was about 11 or 11:30 PM. I remember going down the hallway on the transport gurney. All the nurses and aides were lined up and cheering for me, wishing me well, and helping me take that first step toward a whole new life. I was just about asleep.

After the surgery, I remember thinking I had been kidnapped and was tied up in the basement of this . . . hospital, maybe? There were two evil nurses, a man and a woman, who kept coming into my room and trying to feed me what looked like really awful baby food. There was a mask on my face, and I would try to remove it, and they would force me to keep it on. They liked to torture me. I was absolutely positive of that. They even tied my hands and arms down to the bed. The nurses would come in and put those elastic socks on my legs. Oh, but their touch was so intensely painful. The oxygen mask was absolutely intolerable. At the time, the fact that I was even alive wasn't really something that I was thinking about!

After 4 days, the big mask, the catheter, and the elastic socks were gone, and my kidneys were working. . . . Oh what a relief! The nurses got me up to walk and took me to the exit with the stairs. There, they had me go up and down the stairs a couple of times. I was still a little shaky, to say the least, but I was headed for a regular room on North 7th, and boy, was I ever glad.

The doctors came in, told me I was doing well, and said I could be discharged from the hospital as soon as I knew what all my medications were, what dosage I was to take, and when to take them. It didn't take me long to get that down, and just 8 short days after my transplant surgery, I was transferred to the transplant housing center on Little Cottonwood Drive to begin my rehabilitation process.

Each day, I gained strength. I watched my diet, exercised, and took my medications as instructed. I only had one episode of mild rejection, which the doctors dealt with immediately by increasing my steroid dose. My husband took me back home to Montana for a week-long visit in March. I did okay, although I did suffer a little bit of anxiety about being so far away from the doctors and the hospital. My dad, mother, and youngest daughter took turns staying with me as I healed, caring for me and taking me back and forth to the doctors when my husband returned to our home in the spring to plant the crop. I moved back home to Montana in June of that year.

Today, I have three grandchildren. I walk, I do aerobics, I babysit my grandchildren, and I golfed my first hole-in-one on a par 3 on our local golf course on my 50th birthday. I thank God for every day I have had and for all the wonderful caregivers He sent my way.

family. Other recipients do not want to contact the donor's family. Similarly, some families may want to meet the person or people who benefited from their loved one's donations. Other families of donors may prefer not to. These decisions are personal decisions that only the patients and families involved in the transplant can make, and they should be respected.

COMMONLY ASKED QUESTIONS ABOUT ORGAN AND TISSUE DONATION

Q Who can donate?

A Anyone can donate. Potential donors may range in age from newborn to 80 years. The deciding factor on whether a person can donate organs and tissues is the person's physical condition at the time of death.

Q How does a person who wishes to donate make those wishes known?

A State-specific information about how to indicate intent to become an organ donor can be found at the website for the United Network for Organ Sharing at www.unos.org. Most states indicate a person's intent to become a donor on the person's driver's license or on a uniform donor card (if the person does not have a driver's license) so the health care team has this information in the event of an emergency. It is also very important for a person who wishes to donate to make that desire known to family members. In the event of the death of a person who is a potential organ donor, the person's family members will be asked to consent to organ donation. In many states, informed consent must still be obtained from the family even if the person had gone through the formal process of indicating intent to become an organ donor before his death. Unfortunately, many people never discuss their desire to become organ donors with their family members, and as a result, the family does not consent to the donation. Studies have shown that 95% of families would have given consent for organ donation if they had known that the deceased person desired this to happen.

Q If a person indicates a desire to become a donor, does that mean that less of an effort will be made to save her life in the event of an emergency?

A Absolutely not. The people who are working to save the person's life are not the same people who coordinate the donation of organs and tissues. The people working to save the person's life must determine that nothing more can be done for the person before the donor coordinator would even be notified that the person was a potential donor.

Q Does the family have to pay for the organ procurement procedure?

A There is no cost to the donor's family for the organ procurement procedure. Organ donation is considered a "gift."

Q Does the organ procurement procedure disfigure the person's body in any way?

A No. The organ procurement procedure is just like any other surgical procedure in that the doctor sutures the incisions closed afterward. Cultural or religious practices that involve viewing the body after death (for example, an open-casket funeral) are still possible.

Q What impact can becoming a donor have on the lives of others?

A Just one donor can save the lives of up to eight people through the donation of her vital organs and improve the lives of up to 100 others through the donation of tissues. At the present time in the United States, there are more than 96,000 people waiting to receive life-saving organ transplants. Approximately 300 people are added to the waiting list for an organ transplant each month. Every year, an estimated 8000 people die while waiting for an organ transplant.

Q How are donors matched with recipients?

A Several factors are taken into account, including the severity of the potential recipient's condition (that is, the likelihood that the person will die without a transplant) and whether the donor's blood and tissue type "match" the recipient's blood and tissue type. If the donor's and recipient's blood and tissue types do not match, the recipient's body will reject the transplant.

Q I have heard that there is a great need for donors who belong to ethnic minority groups in the United States. Why is this the case?

A The likelihood that a match will be found between a donor and a recipient is greater when the two people are from the same race or ethnic group because they will have more genetic similarities. By definition, the number of potential donors who belong to ethnic minority populations is proportionately less because there are fewer people who belong to these groups in the United States. That means that many people who belong to ethnic minorities and are awaiting transplants have to wait longer for an appropriate match to be found because there are fewer people like them in the United States who could potentially donate. In addition, the need for organ transplants is very high among some ethnic minorities in the United States because these populations are more at risk for certain disorders than their white counterparts. For example, Native Americans are four times more likely to have diabetes, and African-Americans, Asian and Pacific Islanders, and Hispanics are three times more likely to have kidney disease. So, among ethnic minorities in the United States, the need for organs to transplant is proportionately higher and the available supply of matched organs to transplant is proportionately lower.

APPENDIX

C

Basic Math Review

An understanding of basic math functions is important for anyone working in health care. As a nursing assistant, you will use basic math every day. For example, basic math skills are needed to convert a Fahrenheit temperature to a Celsius temperature or pounds to kilograms. (Common conversions are given in Box C-1.) You also use basic math skills when you are calculating a patient's fluid intake or output. If you have received advanced training that allows you to administer medications, you will use basic math skills to calculate correct medication dosages.

BOX C-1 Common Conversions

Weight
2.2 pounds (lbs) = 1 kilograms (kg)
1 ounce (oz) = 30 grams (g)

Volume
1 liter (L) = 1000 milliliters (mL) = 1 quart (qt)
1 milliliter (mL) = 1 gram (g) = 1 cubic centimeter (cc)
1 gallon (gal) = 4 liters (L)
1 teaspoon (tsp) = 5 milliliters (mL)
1 tablespoon (Tbsp) = 15 milliliters (mL)
1 ounce (oz) = 30 milliliters (mL)

Length
1 meter (m) = 39.37 inches (in) = approximately 1 yard (yd)
1 yard (yd) = 3 feet (ft) = 36 inches (in)
1 inch (in) = 2.54 centimeters (cm)

Temperature
°C = (°F − 32) × 0.56
°F = (°C × 1.8) + 32

THE MULTIPLICATION TABLE

A multiplication table shows you the product that results when two numbers between 1 and 12 are multiplied together. The lines of numbers that go from left to right are called rows. The lines of numbers that go from top to bottom are called columns. To find the product of two numbers, find one of the numbers in the column at the far left of the table and find the other number in the first row of the table and then see where the column and the row intersect.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

FRACTIONS

A fraction is a way of representing how a whole object is divided into a number of equal-sized parts. For example, the fraction $\frac{2}{5}$ says that you have 2 equal-sized parts of an object out of a total of 5. The top number of the fraction (in this example, the 2) is called the *numerator*. The numerator tells you how many parts are being referred to. The bottom number of the fraction (in this example, the 5) is called the *denominator*. The denominator tells you how many parts are available in total.

The numerator and denominator of a fraction can be separated on the same line by a slanting line like this: 2/5, or they can be "stacked" (written on top of one another and separated by a horizontal line, like this: $\frac{2}{5}$). In both cases, the line between the numerator and the denominator is basically just a division sign. So, in this example, the fraction "two fifths" ($\frac{2}{5}$) is the same as "two divided by five."

A fraction can be "proper" or "improper." It can also be accompanied by a whole number:

- A *proper fraction* is one in which the numerator is less than the denominator (for example, $\frac{2}{5}$).
- An *improper fraction* is one in which the denominator is less than the numerator (for example, $\frac{5}{2}$).
- A *mixed number* is a whole number plus a fraction (for example, $2\frac{1}{2}$). A mixed number can be converted to an improper fraction by multiplying the denominator of the fraction by the whole number and then adding the numerator to the result. This gives you a new numerator, which you place over the original denominator. So, for example, when expressed as an improper fraction, $2\frac{1}{2}$ becomes $\frac{5}{2}$ ($2 \times 2 + 1 = 5$, the new numerator, which you place over the original denominator, which was 2). Converting a mixed number to an improper fraction makes it easier to add, subtract, multiply, and divide fractions.

ADDING AND SUBTRACTING FRACTIONS

To add or subtract fractions, you add or subtract the numerators because what you are working with is the number of parts of the whole. So, for example:

$$\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$$
$$\frac{3}{5} - \frac{1}{5} = \frac{2}{5}$$

But what if you need to add or subtract fractions that have different denominators?

$$\frac{1}{3} + \frac{2}{5} = ?$$

First, you need to convert the fractions into equivalent fractions with the same denominator. The easiest way to do this is to multiply the denominators to get a common denominator. So in this example, 15 could be the new (common) denominator for both fractions:

$$\frac{1}{3 \times \mathbf{5}} + \frac{2}{5 \times \mathbf{3}} \rightarrow \frac{?}{15} + \frac{?}{15}$$

Now, because you changed the denominator, you need to multiply the numerators by the same factors as well so that the new fractions you are working with are equivalent to the old ones:

$$\frac{1 \times \mathbf{5} = 5}{3 \times \mathbf{5} = 15} + \frac{2 \times \mathbf{3} = 6}{5 \times \mathbf{3} = 15} \rightarrow \frac{5}{15} + \frac{6}{15} \rightarrow \frac{11}{15}$$

When you finish adding or subtracting your fractions, you should *reduce* the fraction, or state it in its simplest form. To do that, you divide both the numerator and denominator by a number that they both can be evenly divided by, with nothing left over. The fraction in the example above ($\frac{11}{15}$) is already reduced to its simplest form because there is no number that can be divided evenly into both 11 and 15. However, a fraction such as $\frac{2}{4}$ can be reduced to $\frac{1}{2}$ by dividing both the numerator and the denominator by 2, and a fraction such as $\frac{5}{15}$ can be reduced to $\frac{1}{3}$ by dividing both the numerator and denominator by 5.

If the result of your calculation is an improper fraction, you should convert it into a mixed number. To do that, you divide the numerator by the denominator and state whatever is left over as a fraction. For example, 8/3 would reduce to $2\frac{2}{3}$ (3 goes into 8 twice, with 2 left over).

Now, let's try a few to see how you do (the answers are at the end of this appendix):

1. $\frac{1}{5} + \frac{3}{5} =$
2. $\frac{2}{7} + \frac{4}{7} =$
3. $\frac{1}{5} + \frac{2}{3} =$
4. $\frac{1}{3} + \frac{1}{2} =$
5. $\frac{3}{5} + \frac{4}{5} =$
6. $1\frac{1}{3} + 2\frac{1}{3} =$
7. $\frac{5}{8} - \frac{3}{8} =$

8. $\frac{2}{3} - \frac{1}{4} =$

9. $4\frac{1}{2} - 3\frac{1}{2} =$

10. $2\frac{3}{4} - \frac{1}{2} =$

MULTIPLYING AND DIVIDING FRACTIONS

To multiply two fractions, just multiply the numerators and multiply the denominators. There is no need to find a common denominator. So, for example:

$$\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$$

The fraction $\frac{2}{15}$ cannot be reduced, so this is the final answer.

To divide two fractions, you must invert (flip over) the second fraction and then multiply. So, for example:

$$\frac{1}{3} \div \frac{2}{5} = ?$$

$$\frac{1}{3} \times \frac{5}{2} = \frac{5}{6}$$

Again, the fraction $\frac{5}{6}$ cannot be reduced, so this is the final answer.

Let's try one more to make sure you see how to do it:

$$\frac{3}{4} \div \frac{1}{7} = ?$$

$$\frac{3}{4} \times \frac{7}{1} = \frac{21}{4}$$

To finish, convert the improper fraction to a mixed number: 4 goes into 21 five times with 1 left over, giving us $5\frac{1}{4}$ as the final answer.

Ready to give it a try?

1. $\frac{2}{3} \times \frac{3}{4} =$

2. $\frac{1}{4} \div \frac{2}{5} =$

3. $\frac{3}{7} \div \frac{1}{3} =$

4. $\frac{2}{9} \times \frac{1}{2} =$

5. $\frac{3}{5} \div \frac{2}{3} =$

DECIMALS

Decimals measure beyond the whole number to the tenths (0.1), hundredths (0.01), thousandths (0.001), and beyond. Decimals can easily be expressed as fractions. For example:

$$0.1 = \frac{1}{10}$$

$$0.01 = \frac{1}{100}$$

$$0.001 = \frac{1}{1000}$$

$$0.5 = \frac{5}{10} = \frac{1}{2}$$

$$0.03 = \frac{3}{100}$$

$$0.075 = \frac{75}{1000} = \frac{3}{40}$$

To compare the value of two decimals, look at the number in the tenths place. The decimal with the higher number in the tenths place is the greater of the two decimals. For example, 0.1 is greater than 0.01, and 0.5 is greater than 0.25.

Accuracy is extremely important when working with decimals. A decimal point in the wrong place changes the entire number by very large amounts.

ADDING AND SUBTRACTING DECIMALS

When adding and subtracting decimals, it is important to line up the decimal points and then perform the math. For example:

$$\begin{array}{r} 2.36 \\ +3.10 \\ \hline 5.46 \end{array}$$

When one of the numbers is not as long as the other, you can place a 0 to hold the place if it helps you. For example:

$$\begin{array}{r} 3.756 \\ -1.23\mathbf{0} \\ \hline 2.526 \end{array}$$

Here are some sample problems for you to try:

1. 6.18 + 3.26 =

2. 7.2 − 4.66 =

3. 3.78 + 8.34 =

4. 9.56 − 7.23 =

MULTIPLYING AND DIVIDING DECIMALS

To multiply decimals, you multiply the numbers, count how many decimal places there were in both numbers, count over from the right that many places in your answer, and place the decimal point. For example:

1.23 (1.23 has two decimal places)
$\underline{\times\ 4}$ (4 has no decimal places)
4.92 (So, 4.92 has two [2 + 0] decimal places)

If the numbers you are multiplying each have two decimal places, then you will have four decimal places in your answer. For example:

$$\begin{array}{r l}
2.32 & \text{(2.32 has two decimal places)} \\
\underline{\times 1.22} & \text{(1.22 has two decimal places)} \\
464 & \\
464\mathbf{0} & \\
\underline{232\mathbf{00}} & \\
2.8304 & \text{(2.8304 has four [2 + 2] decimal places)}
\end{array}$$

To divide decimals, you must make the *divisor* (the number you are dividing by) a whole number. To do this, move the decimal point to the right however many places you need to in order to make the divisor a whole number. Then move the decimal point in the *dividend* (the number that is being divided) the same number of places. For example:

$$1.2\overline{)24.22}$$

In this example, 24.22 is the dividend, and 1.2 is the divisor. To make the divisor a whole number, you need to move the decimal point one place to the right, so you will also have to move the decimal point one place to the right in the dividend:

$$12\overline{)242.2}$$

$$\begin{array}{r}
20.183 \\
12\overline{)242.200} \\
\underline{24} \\
2 \\
\underline{0} \\
22 \\
\underline{12} \\
100 \\
\underline{96} \\
40 \\
36
\end{array}$$

The answer, rounded to the nearest 100th, is 20.18. Note that the decimal point in the answer is placed right above the decimal point in the dividend.

In the example above, we *rounded off* the decimal to a certain number of places. Depending on what you are calculating, you will be told what place it is acceptable to round the answer off to. (In the answers for the practice problems that follow, we have rounded off to the nearest 100th.) The rule for rounding off is if the number to be dropped is 5 or more, drop the number and add 1 to the previous number. If the number to be dropped is 4 or less, just drop the number.

Here are some practice problems that involve multiplying and dividing decimals:

1. $1.2 \times 14.6 =$
2. $22.34 \times 0.25 =$
3. $6.268 \div 2.1 =$
4. $14.14 \div 3.2 =$
5. $36.9 \div 3.3 =$
6. $9.50 \div 0.003 =$

PERCENTAGES

A percentage is a way of expressing a number as "parts per 100." Percentages can be whole numbers, decimals, or fractions. For example:

Whole number: 5% (five percent)
Decimal: 0.5% (five-tenths percent, or one-half percent)
Fraction: $\frac{1}{5}$% (one-fifth percent)

A percentage can be expressed as a decimal or a fraction. For example, $5\% = 0.05 = \frac{5}{100}$ (or $\frac{1}{20}$).

- To change a percentage that is expressed as a whole number to a decimal, move the decimal point two places to the left. For example, $4\% = 0.04$ and $33\% = 0.33$.
- To change a percentage that is expressed as a whole number to a fraction, simply place the number in the percent over 100 and reduce. For example, $4\% = \frac{4}{100} = \frac{1}{25}$ and $33\% = \frac{33}{100}$.

RATIOS AND PROPORTIONS

A ratio is used to make a comparison between two things. We can use words or symbols to make the comparison. For example, if you have two bananas, three apples, and four oranges in your shopping basket, the ratio of bananas to apples is 2 to 3. This can also be expressed using a colon (2:3) or as a fraction ($\frac{2}{3}$). When comparing two ratios, it is easiest to write them as fractions.

A proportion is an equation with a ratio on each side. By definition, the ratios on each side of a proportion are equal. You can check to see if two ratios are equal by *cross-multiplying*. That means that you multiply the numerator of the first ratio by the denominator of the second ratio, and you multiply the denominator of the first ratio by the numerator of the second ratio. If the two ratios are equal, you will get the same answer. For example:

$$\text{Does } \frac{1}{2} = \frac{6}{12}\,?$$

Yes, because $1 \times 12 = 12$, and so does 2×6. So these two ratios are equal.

When doing dosage calculations, we use proportions to help us figure out how much medication we need. Let's say that our medication comes as 10-mg tablets and we need to give 5 mg. You can set up a proportion by using the information that you know:

$$10 \text{ mg}:1 \text{ tablet} = 5 \text{ mg}:\mathbf{X} \text{ tablets}$$

Expressed as fractions, that would be:

$$\frac{10 \text{ mg}}{1 \text{ tablet}} = \frac{5 \text{ mg}}{\mathbf{X\ tablet}}$$

To solve for **X** (the number of tablets you need to give), first you cross-multiply:

$$10X = 5$$

Then you "clear" the X (make it stand alone). To do this, you divide by the number in front of it. Because you did this on the left side of the proportion, you also have to do it on the right to make sure that the two ratios remain equal:

$$\frac{10X}{10} = \frac{5}{10}$$

The 10s on the left side cancel each other out (because 10 goes into 10 one time), and you are left with

$$X = \frac{5}{10} = \frac{1}{2} \text{ tablet}$$

When you reduce the answer, you get $\frac{1}{2}$ (which can also be expressed as a decimal, 0.5). So you need to give $\frac{1}{2}$ of a 10-mg tablet to meet the doctor's order for a dose of 5 mg. If there are units given in the proportion that you are working with, always include the units in your answer.

You can check your work by plugging the answer back into the original proportion and cross-multiplying:

$$\frac{10}{1} = \frac{5}{0.5}$$

$$0.5 \times 10 = 5, \text{ and } 1 \times 5 = 5$$

Because both sides of the proportion are equal, the proportion is correct.

Let's put your knowledge to the test. Solve for X.

1. 2:3 = X:6
2. $\frac{5}{15} = \frac{1}{X}$
3. You have a medication that is supplied as 5 mg per 20 mL. The doctor has ordered a dose of 2.5 mg. How many mL will you give?
4. 6:10 = X:30
5. You have a medication that is supplied as 10-mg tablets. The doctor has ordered a dose of 15 mg. How many tablets will you give?
6. You have a medication that is supplied as 3 mg per 1 mL. The order is for 15 mg. How many mL will you give?
7. 9:3 is to X:1
8. If you have a medication that is supplied as 325-mg tablets, and you need to give a dose of 650 mg, how many tablets will you give?
9. The doctor has ordered 25 mg of a medication. The bottle states that the medication is supplied as 50-mg tablets. How many tablets will you give to provide the correct dose?
10. The order is for digoxin, 0.125 mg. The digoxin is supplied as 0.25-mg tablets. How many tablets should you give?

ANSWERS

ADDING AND SUBTRACTING FRACTIONS

1. $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$
2. $\frac{2}{7} + \frac{4}{7} = \frac{6}{7}$

3. $\frac{1}{5} + \frac{2}{3} = \frac{3}{15} + \frac{10}{15} = \frac{13}{15}$

4. $\frac{1}{3} + \frac{1}{2} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$

5. $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$

6. $1\frac{1}{3} + 2\frac{1}{3} = \frac{4}{3} + \frac{7}{3} = \frac{11}{3} = 3\frac{2}{3}$

7. $\frac{5}{8} - \frac{3}{8} = \frac{2}{8} = \frac{1}{4}$

8. $\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$

9. $4\frac{1}{2} - 3\frac{1}{2} = \frac{9}{2} - \frac{7}{2} = \frac{2}{2} = 1$

10. $2\frac{3}{4} - \frac{1}{2} = \frac{11}{4} - \frac{1}{2} = \frac{11}{4} - \frac{2}{4} = \frac{9}{4} = 2\frac{1}{4}$

MULTIPLYING AND DIVIDING FRACTIONS

1. $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$

2. $\frac{1}{4} \div \frac{2}{5} = \frac{1}{4} \times \frac{5}{2} = \frac{5}{8}$

3. $\frac{3}{7} \div \frac{1}{3} = \frac{3}{7} \times \frac{3}{1} = \frac{9}{7} = 1\frac{2}{7}$

4. $\frac{2}{9} \times \frac{1}{2} = \frac{2}{18} = \frac{1}{9}$

5. $\frac{3}{5} \div \frac{2}{3} = \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$

ADDING AND SUBTRACTING DECIMALS

1. 6.18 + 3.26 = 9.44
2. 7.2 − 4.66 = 2.54
3. 3.78 + 8.34 = 12.12
4. 9.56 − 7.23 = 2.33

MULTIPLYING AND DIVIDING DECIMALS

1. 1.2 × 14.6 =

$$\begin{array}{rl} 1.2 & \leftarrow \text{one decimal place} \\ \times\ 14.6 & \leftarrow \text{one decimal place} \\ \hline 72 & \\ 480 & \\ 1200 & \\ \hline 17.52 & \leftarrow \text{two decimal places} \end{array}$$

2. 22.34 × 0.25 =

$$\begin{array}{rl} 22.34 & \leftarrow \text{two decimal places} \\ \times\ 0.25 & \leftarrow \text{two decimal places} \\ \hline 11170 & \\ 44680 & \\ \hline 5.5850 & \leftarrow \text{two decimal places} \end{array}$$

= 5.585 (rounded off to the nearest 100^{th})

3. 6.268 ÷ 2.1 =

$$\begin{array}{r} 2.984 \\ 21\overline{)62.680} \\ \underline{42} \\ 206 \\ \underline{189} \\ 178 \\ \underline{168} \\ 100 \\ \underline{84} \\ 16 \end{array}$$

= 2.98 (rounded off to the nearest 100^{th})

4. 14.14 ÷ 3.2 =

$$\begin{array}{r} 4.418 \\ 32\overline{)141.400} \\ \underline{128} \\ 134 \\ \underline{128} \\ 60 \\ \underline{32} \\ 280 \\ \underline{256} \\ 24 \end{array}$$

= 4.42 (rounded off to the nearest 100^{th})

5. 36.9 ÷ 33 =

$$\begin{array}{r} 11.181 \\ 33\overline{)369.000} \\ \underline{33} \\ 39 \\ \underline{33} \\ 60 \\ \underline{33} \\ 270 \\ \underline{264} \\ 60 \\ \underline{33} \\ 27 \end{array}$$

= 11.18 (rounded off to the nearest 100^{th})

6. $9.50 \div 0.003 =$

$$3\overline{)9500.000} = 3166.666 = 3166.67 \text{ (rounded off to the nearest } 100^{th}\text{)}$$

```
   3166.666
3)9500.000
  9
   5
   3
   20
   18
    20
    18
     20
     18
      20
      18
       20
       18
        2
```

RATIOS AND PROPORTIONS

1. $2{:}3 = X{:}6 \rightarrow \frac{2}{3} = \frac{X}{6} \rightarrow 2 \times 6 = 3X \rightarrow$

$12 = 3X \rightarrow X = 4$

2. $\frac{5}{15} = \frac{1}{X} \rightarrow \frac{5}{15} = \frac{1}{X} \rightarrow 5X = 15 \rightarrow X = 3$

3. $\frac{5 \text{ mg}}{20 \text{ mL}} = \frac{2.5 \text{ mg}}{X \text{ mL}} \rightarrow 5X = 50 \rightarrow X = 10 \text{ mL}$

4. $6{:}10 = X{:}30 \rightarrow \frac{6}{10} = \frac{X}{30} \rightarrow 180 = 10X \rightarrow$

$X = 18$

5. $\frac{10 \text{ mg}}{1 \text{ tablet}} = \frac{15 \text{ mg}}{X \text{ tablets}} \rightarrow 10X = 15 \rightarrow$

$X = \frac{15}{10} = 1.5$ tablets

6. $\frac{3 \text{ mg}}{1 \text{ mL}} = \frac{15 \text{ mg}}{X \text{ mL}} \rightarrow 3X = 15 \rightarrow X = 5 \text{ mL}$

7. $9.3 = X{:}\ 1 \rightarrow \frac{9}{3} = \frac{X}{1} \rightarrow 9 = 3X \rightarrow X = 3$

8. $\frac{325 \text{ mg}}{1 \text{ tablet}} = \frac{650 \text{ mg}}{X \text{ tablets}} \rightarrow 325X = 650 \rightarrow$

$X = 2$ tablets

9. $\frac{25 \text{ mg}}{X \text{ tablets}} = \frac{50 \text{ mg}}{1 \text{ tablet}} \rightarrow 25 = 50X \rightarrow$

$X = \frac{1}{2}$ tablet

10. $\frac{0.125 \text{ mg}}{X \text{ tablets}} = \frac{0.25 \text{ mg}}{1 \text{ tablet}} \rightarrow 0.125 = 0.25X \rightarrow$

$0.25\overline{)0.125} \rightarrow$

```
    00.5
25)012.5
   0
   12
    0
   125
   125
     0
```

$\rightarrow X = 0.5$ (or $\frac{1}{2}$) tablet

Glossary

Use the CD in the front of your book to hear these terms pronounced, defined, and used in a sentence. (The number following the entry refers to the chapter in which the entry is found.)

A

Abdominal binder: a wide, flat piece of material that is wrapped around the person's body and securely fastened; used to support the incision site and prevent wound dehiscence (3)

Abruptio placentae: a complication of pregnancy in which the placenta separates from the wall of the uterus before delivery of the baby (compare with *placenta previa*) (12)

Additives: substances added in small amounts to something else to improve, strengthen, or otherwise alter it (7)

Advanced (acute) care setting: a health care facility that provides care for people who require a high level of care; patients usually have severe illnesses or are medically unstable (1)

Affect: facial expression (13)

Air embolism: a serious complication of intravenous therapy given through a central line that can occur if a pocket of air enters the system and travels to the heart (7)

Akathisia: an intense feeling of restlessness; an extrapyramidal side effect of antipsychotic medications (13)

Ambulatory surgical center (ASC): a facility that specializes in providing surgical services on an outpatient basis (that is, the patient is admitted to and discharged from the facility on the same day); also called *outpatient surgical center (OSC)* (10)

Analgesics: medications used to treat pain (15)

Angiogram: an x-ray (radiograph) of blood-filled structures (such as blood vessels or the chambers of the heart) obtained by injecting dye into the blood-filled structures to make them visible on the x-ray (9)

Angiography: a type of radiographic study that uses dye to look at blood-filled structures, such as blood vessels or the chambers of the heart (9)

Anomaly: something that is different from what is normally expected (11)

Antecubital space: the inner aspect of the elbow (7)

Antibiotic: a medication used to treat infections caused by bacteria (15)

Anticoagulants: medications that are given to prevent the blood from clotting (15)

Antihypertensive: a medication used to lower the blood pressure (15)

Antispasmodics: medications used to suppress contraction of the smooth muscle in the walls of hollow muscular organs, such as the bladder and the intestines (15)

Appendectomy: surgical removal of the appendix (11)

Appendicitis: inflammation of the appendix, a tiny closed pouch that dangles from the end of the cecum (11)

Approximated: brought together (as in the edges of a wound) (3)

Arterial blood gas (ABG) analysis: an invasive method of measuring the amount of oxygen the arterial blood is carrying; a sample of arterial blood is drawn and sent to the laboratory for analysis (6)

Arterial line: a catheter inserted into the radial or femoral artery for the purpose of continuously and closely monitoring a person's blood pressure, pulse, and blood oxygen level (8)

Artifact: abnormal tracings on an electrocardiogram (ECG) caused by something that interferes with the electrodes' ability to receive and transmit the electrical impulse from the heart (8)

Aspirate: to "draw something in" (for example, fluid into a syringe) (4)

Aspiration port: a receptacle on an indwelling urinary catheter for a needle and a syringe; used to remove urine when it is necessary to obtain a sterile urine specimen and to instill irrigation fluid during closed irrigation (4)

Assess: to gather and interpret information (1)

Atresia: a condition that occurs when a passageway in the body that is usually open or clear becomes closed or blocked (11)

Atrial diastole: relaxation of the atria, the upper chambers of the heart (compare with *atrial systole*, *ventricular systole*, and *ventricular diastole*) (8)

Atrial systole: contraction of the atria, the upper chambers of the heart (compare with *atrial diastole*, *ventricular systole*, and *ventricular diastole*) (8)

Atrioventricular (AV) node: a specialized group of cells located in the wall of the right atrium of the heart near the tricuspid valve that is responsible for pausing the electrical impulse before transmitting it through to the ventricles (8)

B

Bacteremia: bacteria in the bloodstream (7)

Balloon angioplasty: a procedure used to open a blocked artery; a catheter with a small balloon on the tip is inserted into the artery, the balloon is inflated (pressing the plaque against the arterial wall), the balloon is deflated, and the catheter is removed (9)

Bandage: material used to hold a dressing in place (3)

Bloody show: a blood-tinged vaginal discharge that may appear to be mixed with a large amount of thick mucus; a sign that labor may begin shortly (12)

Bolus intermittent feeding: a schedule for providing enteral nutrition in which the person receives a large amount of formula over a relatively short period of time (for example, less than 30 minutes) (compare with *intermittent feeding*, *continuous feeding*, and *cyclic feeding*) (5)

Brand name: the name of a medication that is used by the medication's manufacturer for marketing purposes (compare with *chemical name* and *generic name*) (14)

Braxton Hicks contractions: irregular contractions of the uterus that occur throughout pregnancy but may occur with more frequency as labor approaches (12)

Breech presentation: in preparation for delivery, the fetus' legs or buttocks enter the mother's pelvis and contact the cervix first (compare with *cephalic presentation* and *shoulder presentation*) (12)

Bronchiolitis: inflammation of the bronchioles, the tiny airways that lead to the alveoli in the lungs (11)

Bronchodilators: medications used to open the airways (15)

C

Capsules: medication enclosed in a gelatin shell (14)

Cardiotonics: medications that slow the heart rate and increase the force of each heart beat, allowing the heart to pump more blood with each beat (15)

Central line: a large intravenous catheter that is inserted into a large vein in the neck, chest, or groin and that ends in one of the large veins that empties directly into the heart; used for the long-term administration of fluids, medication, nutrition, or blood products or when the product being administered contains large molecules or is potentially irritating to the lining of the veins (7)

Cephalic presentation: in preparation for delivery, the fetus' head enters the mother's pelvis and contacts the cervix first (compare with *breech presentation* and *shoulder presentation*) (12)

Cephalopelvic disproportion (CPD): a complication of pregnancy in which the baby's head is too large to pass through the mother's pelvis (12)

Cerebrovascular accident (CVA): a "stroke;" occurs when part of the brain is deprived of blood flow, causing the tissue to die (9)

Certified nurse midwife: a registered nurse who completes 1 to 2 years of additional graduate training to learn how to assist a woman through pregnancy and childbirth (12)

Cervical cerclage (Shirodkar) procedure: placement of a suture around the cervix to help keep it closed; used to prevent pre-term labor and delivery of the baby in a woman with cervical incompetence (12)

Chemical name: the name of a medication that describes its molecular structure (compare with *generic name* and *brand name*) (14)

Coarctation of the aorta: a congenital heart condition characterized by narrowing of the aorta where it leaves the left ventricle (11)

Continuous feeding: a schedule for providing enteral nutrition in which the person receives a small amount of formula constantly, 20 to 24 hours a day (compare with *bolus intermittent feeding*, *intermittent feeding*, and *cyclic feeding*) (5)

Controlled substances: medications with a high potential for abuse, such as narcotics (14)

Corticosteroids: medications that mimic the effect of glucocorticoids on the body; used to suppress the body's immune response and reduce inflammation (15)

Cross-training: teaching employees how to do skills that are not usually within their scope of practice (1)

Croup: the general name for a group of disorders caused by viral or bacterial infection of the upper respiratory tract that typically affect children younger than 3 years (11)

Crowning: the appearance of the baby's head at the vaginal opening during labor; a sign that the baby will be delivered soon (12)

Cryptorchidism: a congenital condition that occurs when the testes fail to descend from the abdominal cavity into the scrotum (11)

Cyclic feeding: a schedule for providing enteral nutrition in which the person receives a small amount of formula constantly for 8 to 12 hours and is then disconnected from the feeding pump for a rest period (compare with *bolus intermittent feeding*, *intermittent feeding*, and *continuous feeding*) (5)

Cystic fibrosis: an inherited disorder that affects the body's exocrine glands; characterized by the production of thick, sticky mucus that can block the airways (11)

D

Débridement: the removal of necrotic tissue; methods include sharp (surgical) débridement, mechanical débridement, autolytic débridement, enzymatic (chemical) débridement, and biologic débridement (3)

Deep venous thrombosis (DVT): formation of a blood clot (thrombus) in one of the veins of the lower leg (9)

Defibrillation: the administration of an electrical shock to the heart to stop fast, abnormal heart beats and restore the heart's normal rhythm (8)

Dehiscence: separation of a wound that has been sutured or stapled closed along the incision line; may be partial or complete (3)

Depolarization: the activation of a muscle cell caused by the inside of the cell's becoming positively charged (compare with *repolarization*) (8)

Digitalis toxicity: adverse effects caused by digoxin, a cardiotonic medication (15)

Dilate: to open or become wider (12)

Diuretics: medications that help the kidneys remove extra water from the body (15)

Dizygotic: twins that result when two eggs are fertilized by two sperm (compare with *monozygotic*) (12)

Dose: the amount of medication a person is supposed to receive (14)

Dressing: Material placed directly on a wound to keep the wound clean, promote wound healing, absorb wound drainage, and protect the wound from further injury (3)

Drug-induced parkinsonism: the development of signs and symptoms similar to those of Parkinson's disease (such as a shuffling gait, a stooped posture, drooling, and tremors); an extrapyramidal side effect of antipsychotic medications (13)

Dysphagia: difficulty swallowing (9)

Dystocia: labor that is long and difficult and does not progress normally (12)

Dystonia: acute muscle spasms or stiffness in the neck, back, or body that may affect the person's ability to breathe and swallow; an extrapyramidal side effect of antipsychotic medications (13)

E

Eclampsia: increased blood pressure in a pregnant woman accompanied by protein in the urine and edema (compare with *preeclampsia*) (12)

Ectopic pregnancy: a pregnancy in which the fertilized egg implants outside of the uterus (usually in the fallopian tube), resulting in a pregnancy that cannot progress to term (12)

Efface: to become thinner; a change that is seen in the cervix during the early stages of labor (12)

Electrocardiogram (ECG, EKG): a graphic representation of the heart's electrical activity obtained using electrocardiography (8)

Electrocardiograph: the machine used to obtain an electrocardiogram (8)

Electrocardiography: a method of recording the electrical activity of the heart used for diagnostic and monitoring purposes (8)

Electroconvulsive therapy (ECT): the delivery of an electrical shock to the brain through electrodes applied to the scalp; used to treat severe depression that does not respond to other types of treatment (13)

Electrodes: small, disposable adhesive pads with a gel center that conduct electricity (8)

Endospore: a protective shell that forms around some types of bacteria; the shell allows the bacterium to remain alive but enter a state of inactivity; when the bacterium's best growing conditions become available, the bacterium becomes active again (2)

Enteric coating: a waxy layer on a tablet or capsule that causes the medication to dissolve more slowly in the digestive tract (14)

Envelope-wrapped: adjective used to describe a sterile package that is wrapped in a way that allows the user to unfold one corner at a time to access the item inside; in some cases, the inner portion of the wrapper becomes the sterile field (2)

Epiglottitis: inflammation of the epiglottis, the flap of cartilage that covers the opening to the larynx (11)

Epispadias: a congenital condition that occurs when the urethral opening (urinary meatus) is located on the top of the penis instead of on the tip (compare with *hypospadias*) (11)

Esophageal atresia: a congenital condition that occurs when the esophagus does not develop properly; in the most common form, the proximal end of the esophagus ends in a blind pouch, and the distal end of the esophagus opens into the trachea (11)

Evisceration: protrusion of an organ through a completely dehisced wound (3)

Extrapyramidal side effects: serious and potentially life-threatening neurologic complications caused by the use of antipsychotic medications; examples include dystonia, akathisia, drug-induced parkinsonism, and tardive dyskinesia (13)

Extubation: removal of a tube that was inserted through the nose or mouth; may be intentional or accidental (6)

F

First-intention wound healing: a type of wound healing in which an open wound is closed surgically with sutures or staples as soon as possible (compare with *second-intention wound healing* and *third-intention wound healing*) (3)

Flammable: capable of catching fire and burning quickly (10)

Flat affect: absence of facial expressions (compare with *inappropriate affect*) (13)

Frail: physically weak and fragile (9)

Fungemia: fungi in the bloodstream (7)

G

Generic name: the name of a medication that is its official, nonproprietary name (compare with *chemical name* and *brand name*) (14)

Gestational diabetes: diabetes that develops during the second trimester of pregnancy in a woman who never had diabetes before (12)

Gestational hypertension: increased blood pressure (greater than 140/90 mm Hg) that develops in a pregnant woman after the 20th week of pregnancy (12)

Glasgow Coma Scale (GCS): a tool that health care workers use to evaluate a person's level of consciousness (LOC); the person is given a score in each of three categories (eye opening response, verbal response, and motor response), and then the scores are added together (9)

Granulation tissue: the fragile, thin layer of new tissue and blood vessels that is formed during the proliferative phase of wound healing (3)

H

Hematoma: a collection of blood caused by a break in a blood vessel wall (3)

High-level disinfection: the use of very strong chemicals to kill microbes on items that will come in contact with a person's skin or mucous membranes; effective against all microbes except for bacterial endospores (2)

High-risk pregnancy: a pregnancy in which some condition puts the mother, the baby, or both at higher-than-normal risk for complications during the prenatal period, during labor and delivery, or during the postpartum period (12)

Hip dysplasia: a congenital condition that occurs when the acetabulum (the place on the pelvis where the ball of the femur fits, forming the hip joint) is not formed properly, leading to frequent dislocation of the hip (11)

Hyperemesis gravidarum: severe nausea and vomiting in a pregnant woman that leads to dehydration and weight loss (12)

Hypospadias: a congenital condition that occurs when the urethral opening (urinary meatus) is located on the underside of the penis instead of on the tip (compare with *epispadias*) (11)

Hypothermia: a body temperature that is too low (10)

Hypovolemic shock: a condition that occurs when the organs and tissues of the body do not receive enough blood because of low circulating blood volume, for example, from blood loss during or after surgery (10)

Hypoxemia: a low blood oxygen level (6)

I

Imperforate anus (anal atresia): a congenital condition that occurs when the rectum does not open to the outside of the body (11)

Implanted venous access device: a special type of central line that is surgically placed under the skin (7)

Inappropriate affect: facial expressions that do not match the situation (compare with *flat affect*) (13)

Incompetent cervix: a complication of pregnancy that occurs when the cervix spontaneously dilates during the second trimester or early third trimester, causing delivery of the baby too early for him to survive (12)

Infiltration: leaking of fluid that is being administered through an intravenous line into the tissues around the vein (7)

Inhaler: a device used to administer medications via the respiratory route; consists of a canister of medication that is under pressure, a holder, and a mouthpiece (14)

Injection port: the lumen on an indwelling urinary catheter that is used to inject the sterile water that inflates the balloon (4)

Insomnia: an inability to go to sleep or remain asleep (13)

Intermittent feeding: a schedule for providing enteral nutrition in which the person receives a large amount of formula over a slightly longer period of time (for example, less than 30 to 60 minutes) (compare with *bolus intermittent feeding*, *continuous feeding*, and *cyclic feeding*) (5)

Intervention: an action taken by the nursing team to help the patient (3)

Intracranial pressure (ICP): the pressure in the space between the skull and the brain (9)

Intradermal injection: the administration of medication under the skin using a needle and syringe (compare with *subcutaneous injection* and *intramuscular injection*) (14)

Intramuscular (IM) injection: the administration of medication into the muscle using a needle and syringe (compare with *intradermal injection* and *subcutaneous injection*) (14)

Intubation: insertion of a tube through the nose or mouth (6)

Invasive: adjective used to describe a procedure that involves inserting equipment into the patient's body or breaking the skin (1)

Irrigation: flushing of a wound with sterile saline or other solutions to clean the wound (3)

L

Lancet: a sharp instrument used to puncture the skin (5)

Lead: an imaginary line formed between an electrode and another point in electrocardiography; used to record the electrical impulse as it moves through the heart's conduction system (8)

Lightening: the movement of the baby down into the mother's pelvis; a sign that labor will most likely begin within the next 2 weeks (12)

Lumbar puncture: a procedure that involves inserting a needle into the spinal canal in the lumbar (lower back) area and withdrawing a sample of cerebrospinal fluid (CSF) for analysis (11)

Lumen: a passageway (4)

M

Mechanism of action: the way a medication produces its effects on the body (15)

Medication administration record (MAR): a form that is used to list each medication ordered for a patient along with the dose, the route, and the time the medication should be administered, as well as to document medication administration (14)

Medication-crushing device: a tool used to crush a tablet into a fine powder (14)

Medication cup: a small paper or plastic cup used for dispensing oral medications (14)

Meningitis: inflammation of the meninges, the three layers of connective tissue that surround the brain and spinal cord (11)

Monozygotic: twins that result when one egg is fertilized by one sperm and then divides into two separate babies (compare with *dizygotic*) (12)

Multipara: a woman who has delivered a baby before (compare with *primipara*) (12)

Multiple gestation: a pregnancy in which the mother is carrying more than one baby (12)

Mutilation: physical injury resulting in a permanent change in appearance; a common fear of hospitalized children (11)

N

Needle: a slender, hollow steel tube with a sharp end used for piercing (7)

Neurotransmitters: chemicals that carry nerve impulses across the synapse (the gap between the axon of one neuron and the dendrites of the next) (13)

Nitroglycerin: a medication that relaxes the arteries, increasing the flow of blood to the heart and relieving chest pain (15)

Non-steroidal anti-inflammatory drugs (NSAIDs): the general term for a group of nonnarcotic pain medications that work to reduce pain, inflammation, and fever by reducing the level of prostaglandins in the body (15)

Nuchal cord: a complication of labor and delivery in which the umbilical cord is looped one or more times around the baby's neck (12)

O

Obstetrician: a doctor who specializes in caring for pregnant women during the prenatal period, labor and delivery, and the postpartum period (12)

Omphalocele: a congenital condition that occurs when abdominal organs protrude through an opening around the umbilicus (11)

Oral (PO) route: a method of administering medications in which the medication is placed in the mouth and swallowed (compare with *sublingual route*, *topical route*, *respiratory route*, and *parenteral route*) (14)

Outpatient surgical center (OSC): a facility that specializes in providing surgical services on an outpatient basis (that is, the patient is admitted to and discharged from the facility on the same day); also called *ambulatory surgical center (ASC)* (10)

P

Paranoid: adjective used to describe a person who is suspicious and distrustful of others (13)

Parenteral route: a method of administering medications in which the medication is injected into the skin, subcutaneous tissue, or muscle or placed directly into the bloodstream via an intravenous (IV) catheter (compare with *oral route*, *sublingual route*, *topical route*, and *respiratory route*) (14)

Patent: open (11)

Patent ductus arteriosus: a congenital heart condition that occurs when the ductus arteriosus, a vessel that connects the pulmonary artery to the aorta in the fetus, fails to close after birth (11)

Patent foramen ovale: a congenital heart condition that occurs when the foramen ovale, a passage between the left and right atria in the fetus, fails to close after birth (11)

Patient-controlled analgesia (PCA) unit: a device that delivers a small amount of intravenous pain medication to a patient on demand (15)

Peak: the time at which a medication reaches its maximum effectiveness (15)

Peel pouch (sterilization pouch): a type of wrapper used to contain a sterile item; the user peels the two sides of the wrapper apart to access the item inside (2)

Peripheral line: a small intravenous catheter that is inserted into a small vein in the hand or arm; used for the short-term administration of fluids, medication, nutrition, or blood products (compare with *central line*) (7)

Peripherally inserted central catheter (PICC) line: a special type of central line that is inserted in a large vein in the upper arm and that ends in one of the large veins that empties directly into the heart (7)

Peritonitis: inflammation of the thin membrane that lines the abdominal wall and the organs in the abdominal cavity (11)

Personality: the group of traits, attitudes, and behaviors that defines a person (13)

Phlebitis: inflammation of a vein (7)

Phlebotomist: a health care professional who has undergone specialized training and received certification in the practice of phlebotomy (obtaining blood from a vein for therapeutic or diagnostic purposes) (7)

Phlebotomy: the act of obtaining blood from a vein for therapeutic or diagnostic purposes (7)

Phlegm: abnormally thick mucus produced by the respiratory tract in response to infection (6)

Pill splitter: a device used to split a tablet evenly (14)

Pin care: wound care provided for sites where the pins used to secure external fixation devices or traction devices to the bone exit the skin (3)

Placenta: an organ that develops along with the fetus and that serves to transfer oxygen and nutrients from the mother's blood to the fetus' blood and to transfer waste products from the fetus' blood to the mother's blood; also serves to prevent some substances from entering the fetal bloodstream and acts as an endocrine gland that secretes some pregnancy-related hormones (12)

Placenta previa: a complication of pregnancy in which the placenta attaches too low in the uterus (compare with *abruptio placentae*) (12)

Polydipsia: excessive water drinking (13)

Preeclampsia: increased blood pressure in a pregnant woman accompanied by protein in the urine (compare with *eclampsia*) (12)

Premature rupture of membranes (PROM): rupture of the amniotic sac (the fluid-filled sac that surrounds and protects the fetus) before labor begins in a woman who is near her due date (compare with *rupture of membranes* and *pre-term premature rupture of membranes*) (12)

Pre-term labor: labor that begins after the 20th week but before the 37th week of pregnancy, resulting in the delivery of a baby who may not be mature enough to survive on her own (12)

Pre-term premature rupture of membranes (pre-term PROM): rupture of the amniotic sac (the fluid-filled sac that surrounds and protects the fetus) before labor begins and before the 37th week of pregnancy; often leads to pre-term labor (compare with *rupture of membranes* and *premature rupture of membranes*) (12)

Primipara: a woman delivering her first baby (compare with *multipara*) (12)

Products of conception: the fetus, placenta, and amniotic sac (12)

Prolapsed cord: a complication of labor and delivery in which a loop of umbilical cord slips past the presenting part of the baby, through the cervix, and into the vagina (12)

Psychotherapy: counseling or "talk therapy;" used to help patients with psychiatric disorders gain better self understanding and make positive changes by exploring feelings, attitudes, thinking, and behavior (13)

Psychotic depression: a very severe form of clinical depression that causes the person to lose contact with reality; intense feelings of sadness and hopelessness may be accompanied by hallucinations and delusions (13)

Puerperal infection: an infection that develops after childbirth (12)

Pulse oximetry: a non-invasive method of measuring the amount of oxygen the arterial blood is carrying; pulse oximetry works by passing light through the tissues to a special sensor on the other side (6)

Purulent: pus-containing (3)

Pus: a thick, yellowish fluid that is often a sign of infection (3)

Q

Quadruplets: four babies in a single pregnancy (compare with *triplets* and *quintuplets*) (12)

Quintuplets: five babies in a single pregnancy (compare with *triplets* and *quadruplets*) (12)

R

Rancho Los Amigos Scale: a tool developed by the Rancho Los Amigos National Rehabilitation Center that describes the stages of recovery that a patient with a traumatic brain injury (TBI) may go through (9)

Repolarization: the return of a muscle cell to the resting state caused by the outside of the cell becoming positively charged (compare with *depolarization)* (8)

Respiratory route: a method of administering medications in which the medication is inhaled into the lungs (compare with *oral route*, *sublingual route*, *topical route*, and *parenteral route*) (14)

Reverse (protective) isolation: a set of practices designed to prevent an immunocompromised patient who is at risk for becoming very ill if she gets an infectious disease from being exposed to potential pathogens (11)

Rooming-in: the practice of accommodating a child's family caregiver in the child's hospital room overnight, for example, by providing an extra bed or a pull-out sofa (11)

Rotavirus: a virus that infects the bowels and causes severe diarrhea and vomiting in children younger than 5 years (11)

Route: the way a person receives a medication; may be oral, sublingual, topical, or parenteral (14)

Rupture of membranes (ROM): rupture of the amniotic sac (the fluid-filled sac that surrounds and protects the fetus) during the early stages of labor, causing amniotic fluid to flow from the vagina ("water breaking") (compare with *premature rupture of membranes* and *pre-term premature rupture of membranes*) (12)

S

Sanguineous: adjective used to describe wound drainage that consists mostly of blood (compare with *serous* and *serosanguineous*) (3)

Scar tissue: a type of connective tissue formed mostly of collagen that replaces injured tissue as part of the wound healing process (3)

Seclusion: the placement of a patient alone in a specially equipped locked room; used in the care of psychiatric patients to limit the patient's exposure to people or situations that are overstimulating and to give the patient quiet time to regain control over her emotions (13)

Second-intention wound healing: a type of wound healing in which the wound is left open to heal from the inside out (compare with *first-intention wound healing* and *third-intention wound healing*) (3)

Serosanguineous: adjective used to describe wound drainage that is mostly clear and watery (serous) but tinged with blood (compare with *serous* and *sanguineous*) (3)

Serous: adjective used to describe clear, watery wound drainage (compare with *sanguineous* and *serosanguineous*) (3)

Shoulder presentation: in preparation for delivery, the fetus' shoulder enters the mother's pelvis and contacts the cervix first (compare with *cephalic presentation* and *breech presentation*) (12)

Side effects: additional unwanted effects of a medication (15)

Sinoatrial (SA) node: a specialized group of cells located near where the superior vena cava enters the right atrium of the heart that is responsible for generating the electrical impulse that causes the heart to beat; also known as the primary pacemaker of the heart (8)

Sinus rhythm: a normal heart rhythm caused by electrical impulses that originate from the sinoatrial (SA) node at regularly timed intervals and travel normally through the heart's conduction system (8)

Small-volume nebulizer: a device used to administer medications via the respiratory route; compressed air or oxygen is used to turn liquid medication into an aerosol mist that the person then inhales (14)

Spacer: a plastic tube that attaches to the mouthpiece of the inhaler; makes the inhaler easier to use and more effective (14)

Spontaneous abortion: loss of the fetus before the 20th week of pregnancy; miscarriage (compare with *threatened abortion*) (12)

Standards of practice: standards developed by the state to establish a minimal acceptable level of nursing practice for each level of nursing licensure, to ensure that the care provided is of high quality, and to ensure accountability and responsibility on the part of licensed nurses (1)

Stent: a small, coiled wire that is inserted into a blocked artery to keep the artery open (9)

Sterile: the state of being completely free of microbes (2)

Sterile drape: a small paper or fabric towel that has been sterilized; used to create a sterile field (2)

Sterile field: (1) a microbe-free area to work (2); (2) the area in the operating room closely surrounding the operating table and the instrument tables that is kept free of microbes (10)

Sterile technique: a set of practices that health care workers use when it is necessary to ensure that the work area, equipment, supplies, and hands of health care workers are completely free of microbes; a method of preventing health care–associated infections (HAIs) (2)

Sterilization: the use of heat (steam under pressure), very strong chemicals, or ionizing radiation to kill microbes on items that will penetrate a person's skin, be placed inside a body cavity, or contact non-intact skin; effective against all microbes, including bacterial endospores (2)

Strike-through contamination: a type of contamination that occurs when a sterile field contacts a wet surface; microbes are carried through the moisture from the area that is not sterile to the sterile area, contaminating it (2)

Subcutaneous injection: administration of medication into the fatty tissue under the skin using a needle and syringe (compare with *intradermal injection* and *intramuscular injection*) (14)

Sublingual (SL) route: a method of administering medications in which the medication is placed under the tongue (compare with *oral route*, *topical route*, *respiratory route*, and *parenteral route*) (14)

Suicidal ideation: thoughts of taking one's own life (13)

Surgical suite: the area of the facility where surgery is performed and care is provided in the immediate pre-operative period and during the intra-operative period (10)

Sustained-release preparations: tablets or capsules that are designed to release medication slowly over an extended period of time (14)

Sutures: stitches; placed to hold the edges of a wound together to promote healing (3)

Syringe: a device used to inject or withdraw fluids (7)

T

Tablets: medication pressed into a solid form (14)

Tardive dyskinesia: involuntary movement of the muscles of the head, neck, and extremities; an extrapyramidal side effect of antipsychotic medications (13)

Tetralogy of Fallot: a congenital heart condition characterized by four anomalies: narrowing of the pulmonary artery, a ventricular septal defect, an abnormally placed ("overriding") aorta, and thickening of the right ventricle (11)

Therapeutic communication: communication between a health care worker and a patient that is directed at helping the patient express his concerns and resolve his problems (13)

Therapeutic effect: the intended effect of a medication (15)

Therapeutic environment: a safe, healing, supportive environment that helps patients learn how to interact with others in a healthy way (13)

Therapeutic play: a technique that uses play to help a child have a better understanding of a treatment or procedure (11)

Third-intention wound healing: a type of wound healing in which the wound is left open for a period of time and then the wound is closed surgically with sutures or staples (compare with *first-intention wound healing* and *second-intention wound healing*) (3)

Threatened abortion: the presence of signs and symptoms, such as cramping and bleeding, that suggest that a pregnancy might be lost before the 20th week (compare with *spontaneous abortion*) (12)

Topical route: a method of administering medications in which the medication is applied to the skin or mucous membranes (compare with *oral route*, *sublingual route*, *respiratory route*, and *parenteral route*) (14)

Tourniquet: a long, flat strip of stretchy latex or vinyl that is used to block blood flow away from an area; used during venipuncture to assist in identifying a suitable vein and to make it easier to insert the needle into the vein (7)

Toxicity: adverse effects caused by too much medication in a person's system (14)

Transfer forceps: an instrument used to move items around on a sterile field (2)

Transposition of the great arteries: a congenital heart condition that occurs when the pulmonary artery and aorta are switched (11)

Traumatic brain injury (TBI, head injury): an injury that affects normal brain function (9)

Triplets: three babies in a single pregnancy (compare with *quadruplets* and *quintuplets*) (12)

U

Unlicensed assistive personnel (UAP): health care workers who are not required to obtain a license to practice their profession and who work under the direction of a licensed professional (1)

Urinary meatus: the opening of the urethra on the surface of the body; the external urinary opening or urethral opening (4)

Urosepsis: a potentially fatal blood infection caused when bacteria gain access to the bloodstream from the urinary tract (4)

Uterine rupture: tearing open of the uterus during labor and delivery (12)

V

Vacuum: negative pressure (7)

Vacuum tube: a sealed glass or plastic tube from which the air has been removed to create a vacuum; used to collect blood specimens (7)

Vaginal birth after cesarean (VBAC): the delivery of a baby vaginally in a woman who previously delivered a baby by cesarean section (12)

Venipuncture: the use of a needle to puncture a vein (7)

Ventricular diastole: relaxation of the ventricles, the lower chambers of the heart (compare with *atrial systole*, *atrial diastole*, and *ventricular diastole*) (8)

Ventricular systole: contraction of the ventricles, the lower chambers of the heart (compare with *atrial systole*, *atrial diastole*, and *ventricular diastole*) (8)

W

Waveform: a graphic representation of a signal (such as an electrical signal or an audio signal) (8)

Withdrawal: an emotional and physical reaction that occurs when use of a substance (such as drugs or alcohol) is discontinued (13)

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Note: A *t* following a page number indicates tabular material, an *f* indicates a figure, and a *b* indicates a boxed feature.

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