HM110

Introduction to Patient Care

5th Edition

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Kaylah Thornton, B.S., RN

Kaylah Thornton obtained a Bachelor of Science in Nursing from Azusa Pacific University. As a Registered Nurse, she has provided nursing care in a variety of specialties, including surgical, orthopedics, neurology, cardiology and rehabilitation. In her nursing position, Kaylah monitored, documented and communicated patient conditions to a multidisciplinary care team. She collaborated with numerous disciplines to coordinate patient care, including patient transfer, discharge, referral and spiritual/psychosocial needs. Kaylah evaluated the learning needs of patients and families and educated them as needed.

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Chapter 1
Introduction to Patient Care

Learning Objectives

When you complete the instruction in this chapter, you will be trained to:

- Define and identify patients, clients and residents.
- Explain the process of patient rounding.
- Describe how to identify elder abuse and neglect and the process of reporting it.
- Discuss common exam room instruments and supplies.
- Describe common medical equipment.
- Explain the various processes used to sterilize instruments.

Introduction

Welcome to *Introduction to Patient Care*. Patient care involves numerous activities that ensure that patients, residents or clients receive adequate care. Healthcare professionals often perform a wide variety of tasks. This course provides the foundation of patient care, providing you with the basic knowledge of instruments and supplies, safety, first aid, vital signs and patient examinations that assist healthcare professionals in their performance of patient care. You begin by learning about the common instruments, supplies and equipment used in healthcare facilities. Then, you will explore the regulations and legislation pertaining to safety in health care, as well as your role during an emergency and the basics of first aid. You'll discover the details of vital signs and wrap up the course by learning about the patient exam.

Patients, Residents and Clients

In your work as a healthcare professional, you will care for patients, residents and clients. However, each term refers to a different group of people. Let's examine them in more detail.

A **patient** refers to someone who receives services at a hospital or doctor's or dentist's office. Some examples being Whitney arrives at Riverdale Hospital to deliver her first child; Shawn suffers from internal bleeding from a car accident and receives treatment in the Intensive Care Unit (ICU); Jean visits his dentist for a root canal procedure. Each person enters the medical facility as a patient.

Residents stay in a long-term care facility or assisted-living facility, usually for an extended time period, if not permanently. Let's look at some different types of residents.

> Peter, an 86-year-old former dentist, suffers from Alzheimer's and is in the advanced stages of the disease. He must move to the Memory Care Unit of a nursing home in order to receive proper care for his illness. Healthcare professionals perform numerous patient care tasks for Peter. They feed, bathe and dress him. They care for his hands, feet and nails. The healthcare professionals also brush and floss his teeth. As a former dentist, Peter surely would appreciate this. Healthcare professionals make his bed and clean his room. Additionally, the staff transfers Peter from his wheelchair to his bed or easy chair and vice versa.
>
> In contrast, Ruth is an active senior in good health. She takes long walks daily, enjoys working out, shops on her own, drives and has weekly dinners out on the town with her friends. She lives at an assisted-living facility where she often participates in group activities. Occasionally she dines with other residents but prefers to cook her own meals in her apartment.

Finally, a **client** receives health care in his own home. Take Charles, for example. Charles' wife passed away a few weeks ago. As an elderly man, Charles grew accustomed to his late wife, Irene, taking care of everything around the house. In addition, Charles is understandably depressed about Irene's death. Their relationship was a fairly traditional one—for 50 years, Charles worked outside the home while Irene took care of everything in the home. Charles has no idea how to clean, cook, grocery shop or wash clothes. Charles' children realize he wants to stay in his home, and, really, with a little help three days a week, Charles is perfectly capable of remaining there. Let's look at how a home healthcare agency helps Charles' situation.

Healthcare professionals allow people to stay at home with assistance.

Beth works for a home healthcare agency. The agency assigns her to Charles. Beth comes to Charles' home Mondays, Wednesdays and Fridays. Beth fixes Charles dinner and eats with him. She leaves him leftovers with notes on them, so he'll know how long to heat things in the microwave. She takes him grocery shopping, does light housekeeping and, most importantly, she listens to him talk about Irene.

Since Beth is a certified patient care technician, she performs health-related procedures for other clients and patients. On Tuesdays and Thursdays, Beth takes care of several clients in their homes. She takes Sally's vital signs, ensures that Robert takes his daily medications and helps Martha Ann bathe and dress.

ONLINE LEARNING

Build on what you are learning by reading about The Patient's Bill of Rights at https://www.cancer.org/treatment/finding-and-paying-for-treatment/understanding-financial-and-legal-matters/patients-bill-of-rights.html.

You may work with some or all of these types of people throughout your medical career. As a healthcare professional, you should use the proper terminology. For instance, someone in an assisted-living facility, like Ruth, may feel insulted if you refer to her as a *patient* rather than a *resident*. After all, she is in good health, and she currently doesn't need to receive treatment for any medical problems.

Two Patient Identifiers

Regardless if it's a patient, resident or client, it's essential to correctly identify the patient every time before care is administered. In the healthcare industry, the failure to correctly identify patients continues to result in medication errors, transfusion errors, testing errors, wrong person procedures and the discharge of infants to the wrong families. To ensure the correct match is made between the service and the individual, the practice of having the patient involved in identifying themselves and using "two patient identifiers" has become common practice. Patient identifier options include:

- Name
- Medical record number (MRN)
- Date of birth
- Phone number
- Social Security number
- Address
- Photo

The two identifiers must be directly associated with the individual and the same two identifiers associated with a source document. That source document may be the medication, blood product, specimen container (attached label), treatment or procedure. The identifier should not be the patient's room number.

Two Patient Identifiers[1]

While standardization of the identifiers used is beneficial, there are settings and situations when variations may need to be employed. For example, in an outpatient setting where ID bands may not be used as an information source, an infant or toddler, an unresponsive patient, etc. The organization determines how accurate patient identification will be completed in these types of situations. The two patient identifiers should be consistent within each setting, not just whatever the individual practitioner or staff person wishes to use.

You should avoid asking "yes" or "no" questions to verify information. Asking patients to verbally state their authentication factors is more effective. To use the two patient identifiers, you'll ask the patient to state his full name and date of birth.

This process will help eliminate errors and enhance patient care. Patients or their family may wonder why their identity is confirmed so often. Staff members should always explain that it is done to ensure the right care is provided to the right patient all the time.

In addition, clear protocols should be defined to identify patients who lack identification and for distinguishing the identity of patients with the same name. Nonverbal approaches for identifying comatose or confused patients should be developed and used.

ONLINE LEARNING

Build on what you are learning by reading the article at https://www.jointcommission.org/standards/standard-faqs/home-care/national-patient-safety-goals-npsg/000001545/#:~:text=Acceptable%20identifiers%20may%20be%20the,of%20a%20unique%20patient%20identifier.

Patient Rounding

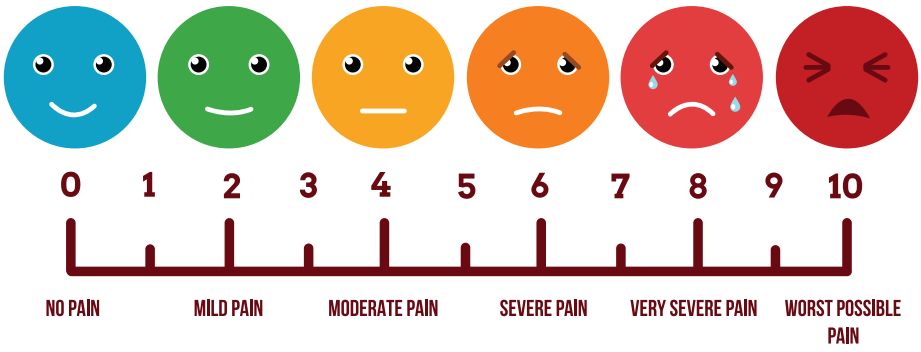
Patient rounding is the process in which a healthcare professional enters a patient's room at a designated time to assess the person's needs. This is a way to introduce yourself to your patient and build a relationship with your patient. Patient rounding is also a way to lay eyes on your patient to assess their physical condition, communicate the plan of care and make sure their basic needs are being met. Generally, rounding occurs every hour during the day shift and every two hours on the night shift. As the staff make their hourly rounds, they focus their assessment on four key concepts—pain, position, potty and possessions. In addition, you'll check for consciousness and breathing. Staff members use a checklist to ensure everyone asks the same questions with the goal of improving patient outcomes by addressing their needs in a proactive manner.

Hourly Rounding[2]

> The presence of nursing rounds positively impacted patient satisfaction, and has the potential to improve patient-nurse interactions and promote the quality of care. Furthermore, nursing round is a structured intervention providing nurses with the opportunity to identify and solve patient's needs and problems respectively. The findings on specific related problems are useful to support the evidence provided with regards to the possible benefits. This facilitates improved nurses decision-making abilities based on clinical observations and patient-centered care.

Whiteboards or communication boards are a huge way healthcare providers communicate to their patients. When you enter a patient's room, check the communication boards to make sure the plan of care is current. In addition, the use of the four "P's" of rounding has a positive impact on hourly rounding. Let's examine the four P's of rounding.

Pain: Patient rounding provides the opportunity to check on the patients' level of pain and give pain medication if necessary. Many healthcare professionals rely on pain scales to get a more concrete sense of a person's pain. They might seem simple, but pain scales have a lot of good research behind them. Of course, one problem with using a pain scale is that it's still subjective. However, using the same scale consistently with the same person, allows you to get a good sense of how the pain is progressing and how well the treatments are working. Keep in mind that while pain is subjective, pain is always what the patient says it is.



Position: During patient rounding, you are able to see if the patient is comfortable. You may also move the patient up in bed, rearrange pillows or offer extra blankets. This is also when you'll reposition patients who are at high-risk for skin breakdown.

Potty: During patient rounding you'll simply ask the patient if they need to use the bathroom. If so, help as needed.

Possessions: Finally, you'll offer assistance with possessions. Also known as placement of environmental items, you'll ensure that the phone, call light, trash can, water or bedside table are within the patient's reach.

Elder Abuse and Neglect

According to the CDC, elder abuse, including neglect and exploitation, is experienced by an estimated one out of every ten people ages 60 and older who lives at home.[3] There are five types of elder abuse and neglect:

Elder Abuse & Neglect	
Physical Abuse	The use of force that may result in bodily injury, physical pain, injury or impairment.
Emotional Abuse	The infliction of mental anguish, pain or distress through verbal or nonverbal acts.
Sexual Abuse	Non-consensual sexual contact of any kind with an older adult.
Neglect	The refusal or failure to fulfill any part of a person's obligations or duties to care for an older adult.
Financial Exploitation	The illegal, unauthorized or improper use of an older individual's resources for the benefit of someone other than the older individual.

Indications

In your position, you'll have opportunities to get to know your patients on an intimate level. You'll know their daily needs and should be able to identify when those needs are not being met. One important aspect of your job is to identify indications of abuse or neglect in the elderly. According to the CDC, the possible physical and psychosocial consequences of elder abuse are numerous and varied:[4]

Physical Effects

The most immediate probable physical effects include:

- Welts, wounds, and injuries (e.g., bruises, lacerations, dental problems, head injuries, broken bones, pressure sores)
- Persistent physical pain and soreness
- Nutrition and hydration issues
- Sleep disturbances
- Increased susceptibility to new illnesses (including sexually transmitted diseases)
- Exacerbation of preexisting health conditions
- Increased risks for premature death

Psychological Effects

Established psychological effects of elder abuse include high levels of distress and depression. Other potential psychological consequences that need further scientific study are:

- Increased risks for developing fear and anxiety reactions
- Learned helplessness
- Post-traumatic stress disorder (PTSD)

ONLINE LEARNING

Build on what you are learning by reading the information at https://www.justice.gov/elderjustice/red-flags-elder-abuse.

Mandated Reporting

The American Medical Association (AMA) has advocated for healthcare professionals to assume a greater responsibility in addressing elder abuse. Based partially on the Older Americans Act of 1975, 33 states currently have some form of mandatory reporting of elder abuse. The terms and enforcement of such laws vary by state.

Mandatory Reporting of Abuse and Exploitation of At-Risk Elders[5]

In Colorado, any person over the age of 70 is defined as an "at-risk elder." State law requires caregivers, healthcare providers, financial institution personnel, law enforcement members and others to report the abuse or exploitation of any at-risk elder. These service providers identified in the statute are required to report abuse or exploitation that they have observed, or have reasonable cause to believe has occurred, or believe is at imminent risk of occurring. The report must be made to a law enforcement agency within 24 hours after making the observation or discovery.

Generally, any person who is in some way responsible for the care of an elderly person should make a report if she has reason to believe that person has been abused or is subject to abuse. This could include professional at-home caregivers, caregivers hired through family members or other medical professionals who interact with the elderly person on a regular basis. You don't need proof of the abuse to make the call. Adult Protective Services will send someone to the person's home to check out the report and, if necessary, take steps to make sure he's safe.

Adult Protective Services (**APS**) programs are social services programs established through legislation enacted in all 50 states, the District of Columbia, Guam, Puerto Rico and the U.S. Virgin Islands. APS programs serve seniors and adults with disabilities by offering a system for reporting and investigating abuse as well as providing social services to assist victims. State APS laws vary in the age of eligibility for APS assistance, definition of abuse, types of abuse covered, classification of the abuse as criminal or civil, mandatory reporting requirements, investigative procedures and remedies for abuse.

Examination Room

Although the specifics of the supplies and instruments kept in an exam room will vary by the facility and specialty, you'll explore the most common types here. Later in this chapter, you'll discover instruments that are only needed in certain situations.

The standard exam room is furnished with an examination table, pillow, footstool, a supply cabinet, trash can, hazardous waste and sharps container, rolling stool and a chair.

Examination tables can be adjusted into many different positions. When you enter the doctor's office, the table is usually flat. The patient sits at the end of the table with her knees hanging over the edge. The table can be raised or lowered, the back can be raised, the footstep pulled out and so on. Many exam tables are adjusted electrically with a button. The table is covered with paper that is changed after every patient.

The table is adjustable so the doctor can perform different procedures while minimizing the patient's discomfort. For example, when the doctor listens to the patient's heart, the patient sits up. When the doctor performs a Pap smear, the patient must be lying down, with her head on a pillow for comfort, and her feet placed in the adjustable stirrups to support her legs.

Examination tables have supply drawers or cabinets on the sides where you can keep supplies. You can keep patient gowns, drape sheets and extra rolls of exam-table paper. Drawers at the end of the table are a handy place to keep supplies needed during the exam.

If the patient must wear a gown during the examination, one must be available in the exam room. It's also important that the patient understands if it should open to the front or the back. **Drape sheets** are large sheets of fabric that cover the patient during an examination or surgery. They are often put on the patient's lap during a physical.

Besides a regular wastebasket, each exam room should also have a hazardous waste and sharps container. According to the World Health Organization, of all waste generated by healthcare activities, 85 percent is general, non-hazardous waste but the remaining 15 percent is hazardous and may be infectious, toxic or radioactive.[6] Non-hazardous material or general healthcare waste should be separated from the biohazard waste and can be discarded with the rest of the non-hazardous material. Sharps must be placed in a puncture-proof, tamper-proof container. Typically, the container is made of metal or a high-density plastic but dense cardboard with plastic lining can also work. Infectious waste is placed in leak-proof plastic bags or containers that are suitable for the type of material and that bear the international infectious substance symbol.

International infectious substance symbol

In the supply cabinet, you'll often find disposable items used for patient examination and treatment. These items include dressings and bandages, and disposable gloves. Exam rooms *should not* contain:

- Syringes
- Needles
- Medication samples
- Cleaning supplies
- Chemical solutions

Dressings are sterile material, such as gauze, that is applied over a wound surface or site of a surgery. Be sure to use the proper size and thickness of gauze to soak up fluids. The gauze should completely cover the wound. Meanwhile, **bandages** are applied on top of dressings to keep the dressings in place. They also provide protection and extra padding for the wound. Bandages do not need to be sterile, although they should be clean.

Bandages

There are many types of bandages. Bandages may be a layer of gauze wrapped around the wound area, then covered with a stronger wrap such as an elastic bandage. There are also triangular bandages, slings, braces and splints. A tubular gauze bandage covers tubular body parts such as fingers, arms, toes and legs.

The table used to hold instruments is called a **Mayo stand**. This is an adjustable height table with a tray top that can be removed. You have probably seen something like this in the dentist's office when you've had your teeth cleaned or a cavity filled.

Mayo stand

The stand can be placed beside the patient or over the patient's legs. It should be positioned so that you and the doctor can reach the instruments easily and quickly. A light source should also be positioned over the tray and the patient.

Medical Equipment

If you work for a doctor who specializes in a certain type of patient or illness, then you may need other supplies specific to that field of medicine. For instance, a pediatrician's examination rooms might have books and toys so that children can entertain themselves. These items also help the doctor to monitor children's motor skills. If a child is very clumsy for his age, for example, it could suggest that the child has a problem.

Stethoscope

The **stethoscope** is used to listen to body sounds and to measure a patient's blood pressure. The stethoscope has two rubber tubes with a bell, or flat diaphragm, at one end that you put to the patient's chest or other body part. This piece transmits sounds through earpieces connected to the other end of the rubber tubes. You may store a stethoscope in each examination room, or you may carry one around your neck.

Stethoscope

Virtual Lab: Stethoscope

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Stethoscope* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Stethoscope, alcohol wipes

1. After washing your hands, identify the patient and explain the procedure.
2. Place the round diaphragm end of the stethoscope in your pocket or gently on the countertop so it isn't damaged while you are adjusting the earpieces.
3. Hold the stethoscope up and twist the metal part that holds the earpieces so that they angle towards your face, not backwards.
4. Place the earpieces in your ears snugly.
5. Bring the diaphragm out of your pocket and place it on the arm or chest to be listened to. Take care that it doesn't bang on any hard surfaces, which would create a very loud noise in your ears.
6. Use alcohol wipes to clean the earpieces and any part of the stethoscope that touched the patient each time you use it. This is an important component of infection prevention.
7. Document the procedure.

Otoscope

An **otoscope** is a tool used to examine the eardrum and external auditory canal. It looks somewhat like a hammer, but shorter and squatter. You'll use disposable earpieces each time you use the otoscope. If you work for an ENT, you will become very familiar with this tool. Almost any type of doctor, though, will use an otoscope. A nasal speculum may be attached to the otoscope to inspect the nasal cavities.

Otoscope

Steps to Take: Otoscope

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Choose a speculum size that is appropriate for the patient's ear canals and fit it to the otoscope. Children have narrower canals and will require a narrower speculum than adults. It is possible, though, that a small adult will have a smaller canal than a large child.
4. Hold the otoscope in the hand of the same side as the ear you are about to examine.
5. Hold the otoscope like you would hold a pencil. The pencil grip feels natural and gives you good control. Also, it lets you rest the side of your hand on the patient's temple. This provides more stability if the patient moves suddenly, which is common with children.
6. If one ear is healthy, examine it first to prevent possible spread of infection. It also provides a visual of what the patient's "normal" ear looks like. This allows you to compare it with the other ear.
7. Straighten the ear canal. For children less than 3 years of age, pull the pinna down and back. Age 3 and older, pull the pinna up and back.
8. Rest your hand against the side of the patient's temple while you slowly introduce the otoscope into the canal.
9. Look for redness, swelling, discharge and anything else that appears different from the healthy ear.
10. Record your findings in the patient's chart.

Ophthalmoscope

Tests and exams can show whether people have eye diseases such as glaucoma. **Glaucoma** occurs when the pressure in the eye increases to the point that it can damage the eye. Blindness results if it is left untreated. The instrument used to find diseases such as glaucoma is called an ophthalmoscope. The **ophthalmoscope** is a lighted instrument that reveals a view of the inside of the eye.

Ophthalmoscope

Nasal Speculum

The **nasal speculum** is used to enlarge the opening of a nostril so that the inside can be more easily seen. It is used with Lucae bayonet forceps when a doctor wants to perform a procedure inside the nose. Note that specula is a plural word. You will not say speculas. If you want to use the singular, you say speculum.

Nasal speculum

Vaginal Speculum

A **vaginal speculum** is a tool used to access the cervix and the vagina. It's available in many lengths and widths, and may be made of metal or plastic. A disposable speculum is thrown away after one use.

Vaginal speculum

Sphygmomanometer

A **sphygmomanometer** is a gauge that measures blood pressure. It is used along with a stethoscope. You are probably already familiar with the sphygmomanometer, better known as a blood pressure cuff. These are normally found in every examination room. Two types of sphygmomanometers are used in most doctors' offices:

- Manual (also called Aneroid) sphygmomanometers
- Digital (electronic) sphygmomanometers

Sphygmomanometer

An **aneroid manometer** has a cuff that contains a rubber bladder that is attached to a dial. The dial contains a needle that moves as you take the patient's blood pressure. You can tell what the patient's blood pressure is by listening and looking at where the needle falls within the dial.

The aneroid manometer can easily lose its calibrations if you do not handle and store it correctly. **Calibrations** mean how accurately the manometer measures. You will need to calibrate the aneroid manometer regularly.

Aneroid manometers cuffs come in different sizes. The size you use will depend on your patient's size. A cuff that is too small will make the patient's blood pressure appear higher than it really is. A cuff that is too large will make the blood pressure appear lower than it is.

The cuff of the manometer should cover a certain width and circumference of the arm. **Circumference** is the distance around the patient's arm. An adult cuff should be one-third larger than the circumference of a patient's arm. The bladder's length should cover about 80 percent of the patient's upper arm.

Fitting a cuff on a child or a very small person is slightly different. A cuff on a child should be two-thirds larger than the child's arm circumference. Use the appropriate size of cuff based on the patient's size rather than his age.

The other type of sphygmomanometer is the **digital manometer**. This manometer is electronic and measures average arterial pressure by calculating systolic and diastolic values. Because it doesn't actually measure blood pressure, the digital manometer may give inaccurate readings.

Practice Exercise 1-1

Select the best answer from the choices provided.

1. **This describes those that receive services at a hospital.**
   a. Clients
   b. Patients
   c. Residents

2. **This term describes people who stay in a long-term care facility.**
   a. Clients
   b. Patients
   c. Residents

3. **Which describes those that receive health care in their own homes?**
   a. Clients
   b. Patients
   c. Residents

4. **Tabitha visits a psychiatric facility for her weekly psychiatry appointment. Which describes Tabitha?**
   a. Client
   b. Patient
   c. Resident

5. **Rosalyn lives at Waypoint Acres. She moved into the facility shortly after her 75th birthday. She loves living at Waypoint Acres because of the assistance she receives with grooming, bathing and meals. Which describes Rosalyn?**
   a. Client
   b. Patient
   c. Resident

6. **Jen is delivering medication to the residents. To verify the patient, Jen says, "Mr. Smith, can you tell me your date of birth?" This is an example of two patient identifiers.**
   a. True
   b. False

7. **Every examination room should contain this.**
   a. Exam table
   b. Blood pressure cuff
   c. Three waste containers
   d. All of the above

8. **This should not be found in an examination room.**
   a. Gauze
   b. Syringes
   c. Otoscope
   d. Drape sheets

Determine if each statement is true or false.

9. **Hold the stethoscope up and twist the metal part that holds the earpieces so that they angle backwards.**

10. **A nasal speculum may be attached to the otoscope to inspect the nasal cavities.**

11. **A vaginal speculum comes in one standard size.**

Answer as directed in your own words.

12. **Why is the exam table adjustable?**

13. **What are the four p's in patient rounding?**

14. **Describe the five types of elder abuse and neglect.**

15. **Differentiate between dressings and bandages.**

Review Practice Exercise 1-1

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Caring for Instruments

Medical instruments are very expensive and should not have to be replaced often. When you are cleaning instruments, be careful with them so they are not damaged. A damaged surgical tool will not sanitize properly and could hurt a patient. Thoroughly examine tools every time you clean and sanitize them for signs of damage or overuse.

In this section, you'll learn about the equipment used to clean and sterilize surgical instruments. The most common forms of heat sterilization used in the medical office are autoclave, flash and dry-heat sterilization. Cold sterilization might also be used, but not as often. In addition, items are typically cleaned using an ultrasonic process prior to the sanitation process.

Steps to Take: Proper Surgical Instrument Cleaning

Prepare for transport:

1. Remove contaminated gloves, perform hand hygiene and put on clean gloves.
2. In the procedure room, remove the used instruments and place them on a tray.
3. Transport the tray with all contaminated instruments to the designated instrument processing area and place it on the counter.
4. Remove gloves, perform hand hygiene washing and put on puncture-resistant utility gloves to protect your hands from sharps.

Pre-cleaning instruments:

1. Collect the instruments and check for large debris, such as tissue. Rinse the instruments in tap water to remove the large debris as needed.
2. Place all instruments into the ultrasonic cleaner, ensuring all instruments are completely submerged. Turn the cleaner on.
3. While the instruments are inside the ultrasonic cleaner, remove the tray liner from the tray and dispose of it as indicated. Thoroughly disinfect the tray.
4. Place the clean tray in the clean tray area of the instrument processing area.
5. After the ultrasonic cleaner has completed its cycle, remove the cleaned instruments and rinse thoroughly in tap water.
6. Place wet instruments on a towel and gently pat the instruments to remove excess water.

Packaging instruments:

1. Package sets of instruments together as they will be needed.
2. Label each package with the sterilization date and method.

Ultrasonic Cleaning

Some surgical instruments are cleaned with **ultrasonic cleaning**, which uses sound waves to shake loose dirt, blood and body fluids. You must use a special cleaning solution in an ultrasonic cleaner.

Ultrasonic cleaner with solution

The contaminants will come off more easily if you put instruments with ratchets or hinges into the cleaner in an open position. When you take the instruments out of the cleaner, rinse, dry and wrap them for sterilization. Ultrasonic cleaning is useful for all instruments, but especially for delicate ones. Also, you do not have to clean instruments by hand, so an ultrasonic cleaner is safer for you.

Steps to Take: Ultrasonic Cleaning

1. Put the instruments in the ultrasonic cleaner in an open position. Make sure that sharp blades and points of instruments do not touch other instruments. Instruments need to have room in between them.
2. Make sure all instruments are completely covered by solution.
3. Place metals with like metals; do not mix metals in a single cycle. In other words, put stainless steel instruments with other stainless-steel instruments. Do not place stainless steel instruments with copper instruments.
4. Change the solution often; follow the manufacturer's instructions.
5. Rinse the instruments completely with water after they come out of the ultrasonic cleaning cycle. You should rinse off all of the ultrasonic cleaning fluid.
6. Process instruments for the amount of time recommended by the manufacturer. This is usually 5 to 10 minutes.

Flash Sterilization

Flash sterilization, also known as immediate-use steam sterilization (IUSS), is the shortest possible time from removing the item from the sterilizer to the aseptic transfer onto the sterile field. With this type of sterilization, the items should be cleaned before flash sterilization is performed. This type of sterilization may be appropriate when a specific instrument is needed for an emergency procedure; a non-replaceable instrument has been contaminated and needs to be replaced in the sterile field immediately; or an item has dropped on the floor and is needed to continue a surgical procedure.

Autoclave

You can think of an **autoclave** as a type of pressure cooker that you use to sterilize instruments. It cleans instruments of pathogens by using steam at very high pressure. A **pathogen** is a bacterium, virus or other microorganism that can cause disease. Steam reaches a higher temperature than boiling water does. An autoclave is usually located in a special room dedicated to sterilizing and storing instruments.

Autoclave

The autoclave has two compartments, one inside the other. The outside container is a metal jacket. The metal jacket surrounds an inner compartment where the sterilizing takes place. You put water between the metal jacket and the inner compartment. After you put in water, you close and secure the door. Then, you turn on the autoclave.

The steam in the autoclave needs to be between 250 °F and 254 °F in order to sterilize instruments. Some tools that you place in the autoclave are unwrapped, some are wrapped loosely, and some are wrapped tightly.

The company that made the autoclave will provide instructions on how long to sterilize instruments. The instruments will only become sterile if you follow the process properly. If you do not follow it carefully, pathogens can remain on the instruments and spread to other patients.

Use only distilled water in the autoclave. Before you use the autoclave, check the water level to make sure the autoclave has enough. The water should reach the fill line, which will be marked on the autoclave. The autoclave can be damaged if you allow it to dry out.

It is very important that you clean and maintain this equipment as directed.

You will need to run regular tests to make sure that your autoclave is sterilizing properly. You will also need to run tests to ensure that you do not have pathogens growing in the autoclave. There are several methods to make sure your autoclave is clean, but the two most common ways are by using sterilization strips or with culture tests.

Sterilization strips guard against unfinished cycles, indicating when the sterilization process is complete. These strips contain **thermolabile dye**, which responds to temperature by changing shades. The strip is placed in the center of a wrapped article, and when the article is at the appropriate temperature and pressure, the strip will darken. If it does not darken, then the autoclave is not sterilizing instruments properly.

Sterilization indicators

Culture tests also come in the form of a strip. A **culture test** contains heat resistant spores that will show if the autoclave contains pathogens. The spores are bacteria. If you run the autoclave properly, the spores will die. If you don't run it properly, the spores will grow. Place the strip in the middle of a wrapped article. Run the autoclave as usual, making sure it is fully loaded. When you take the article from the autoclave, you will unwrap it and put the strip in a culture medium. A **culture medium** is usually a jelly-like substance in which pathogens will grow. If the strip has pathogens from the autoclave, it will grow in the culture medium.

Wrap or package instruments before you put them in the autoclave. If you do this, they will stay sterile up to six months. This is especially convenient if the instruments are not used often. You must sanitize, rinse and dry instruments before you wrap them. There are several materials you may use to wrap instruments:

- Muslin
- Paper sterilization wrapping squares
- Sterilization pouch (bag)

Muslin is a type of cloth. It is inexpensive and can be purchased in different sizes and colors. Several instruments may be wrapped in a single piece of muslin. Then your instruments are in a set, and ready for a specific procedure, which is very convenient.

There are several things to consider when using muslin. First, you can't see which instruments are inside. Second, you have to inspect the muslin often for holes, tears or worn patches. You must throw away the muslin if it has any of these problems. Third, you need to wrap instruments in a particular way, which you'll learn about in a moment. Finally, you use special tape to seal the packages. It should be noted that muslin is not really used much anymore due to its permeability allowing bacteria to migrate much faster.

Paper sterilization wrapping squares are, obviously, made of paper and are also available in different sizes. Throw each square away after one use. You must use a new paper square every time you sterilize items. As with muslin, you can wrap packages of instruments, you cannot see the instruments inside and you'll use special sealing tape.

The third type of material is a pouch or bag. The **sterilization pouch** (**bag**) is made of plastic, paper or plastic and paper combined. These bags have a lot of advantages:

- Fairly inexpensive
- Easy to use
- Take little space
- Items are visible
- Bags can be cut to fit instruments

However, there are drawbacks as well. When you cut the bag to the size you want it to be, both ends of the bag will be open. This means that you have to seal both ends with tape. Having two ends open can be awkward. Be careful to keep the instrument sterile while you remove it from the package. If you don't seal the bag well, one end could open, and the instrument could slip out.

Another option is individual bags that come sealed on one end. The seal peels apart when you are ready to remove the instrument. Load the instrument in the bag through the unsealed end, then seal it. Sterilize the article as you would any other. When you are ready to remove the instrument, you simply open the pre-sealed end.

There are two disadvantages to these pre-sealed bags. One is the expense. The second disadvantage is that you cannot cut them to customize the size of package that you want, so you must buy different sizes.

The tape you use to seal muslin, wrapping squares or bags is called **autoclave tape**, which develops a striped pattern when it is exposed to heat. This tape does not guarantee that your wrapped instruments are sterile, but it does indicate that the autoclave is heating the packages.

Autoclave tape

Place items properly in the autoclave. Keep in mind that if they are positioned carelessly or too close together, the instruments will not steam properly and will not be sterilized. Do not pack the instruments tightly; pack them loosely. Leave at least one to three inches between the packs and from the sides of the autoclave. Without this space, the items will not sterilize.

If you use muslin or squares, you will need to learn to wrap instruments properly. Surgical instruments are wrapped in two layers of packaging. There are two basic techniques that you can use for wrapping.

The first method is to place two layers of wrapping material together. In other words, you lay one piece of gauze within another. You then wrap the instrument in the two layers of gauze or other wrapping material.

The second way of doing this is the wrap twice method. In the **wrap twice** method, you wrap the instrument in one layer of cloth. Then you wrap that package in another piece of cloth.

Label the contents of the package on the outside.

List on the label
Names of the instruments in the package
Date the instruments were sterilized
Initials of who wrapped the instruments

It's important to write the exact name of the instrument or instruments in the package. Remember, if you are using muslin or paper wrappings, you will not be able to see into the package. Only the label will identify the contents, so it must be accurate. When you sterilize a set of instruments that are going to be used for one procedure, label the instruments for that procedure.

It is also important to write the date of sterilization on the label. As previously noted, instruments only stay sterilized for a certain amount of time. If they have not been used by the expiration date, you must sterilize them again.

Include the initials of the person who wrapped the instruments, just in case they weren't wrapped correctly, and it creates a problem. The person would then be retrained in the correct wrapping method, so the problem doesn't occur again.

Write your labels with a fine-point permanent marker. Don't use an ordinary ballpoint pen because the steam will make it smear, and you won't be able to read the label. Write the label on the autoclave tape and be sure you don't puncture the package while doing so.

Virtual Lab: Autoclave

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Autoclave* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Autoclave, distilled water, various wrapping materials (these may be fabric, clear plastic or combo paper/plastic), indicator tape which has white stripes that turn black when sterilized, marker for labeling and dating the packages, brush, basin with detergent for washing instruments, gloves, sterilization indicator

Sanitizing contaminated instruments before autoclaving:

1. Take contaminated instruments to a designated work sink.
2. Wear gloves to protect yourself from blood and body fluids.
3. Check the working condition of each instrument while you are cleaning it. Check alignment, serrations, ratchets and ease in opening and closing. Set aside any faulty or rusted instruments.
4. Use a brush to clean every surface of the instruments.
5. Rinse thoroughly. They are now ready to be wrapped for sterilization.

Preparing instruments for autoclaving:

Plastic/paper-plastic combo wrap:

1. Measure length of wrap to fit instrument plus 1 inch.
2. Place instrument inside wrap.
3. Fold over ends and tape securely with autoclave tape across entire end of wrap.
4. Use marker to identify the instrument, date of sterilization and your initials.

Cloth wrap:

1. Lay appropriate size wrap on counter.
2. Center instrument diagonally on wrap. Place a sterilization indicator inside wrap beside the instrument.
3. Bring up bottom corner to cover instrument, folding tip of wrap back down slightly.
4. Bring side points of wrap in to center of package. Also fold back the tips so that they point outward.
5. Bring top point down to center of the pack and fold the tip upwards.
6. Set entire package onto a second wrap on the counter and repeat the process of wrapping.

7. Bring the top point down, wrap it around the entire package and put a piece of autoclave tape across it.
8. Write instrument, date and your initials on the tape.

Loading the autoclave:

1. Open autoclave and check water level. Add more distilled water as necessary.
2. Load cloth packages vertically onto autoclave tray allowing 3 inches between packages. Steam needs to be able to circulate freely in the autoclave.
3. Load unwrapped instruments flat with their handles/ratchets open.
4. Close door and tighten seal.
5. Turn on autoclave and set temperature to 250-254 °F and 15 pounds of pressure.
6. Wait to set timer until the dial indicates it has reached those levels. Wait 15 minutes for unwrapped instruments and 30 minutes wrapped instruments or cloth wrapped packages.
7. When timer sounds, exhaust steam pressure from the autoclave by following the manufacturer's instructions.
8. When pressure gauge reaches zero and the temperature gauge has decreased to at least 212 °F, you may open the door one inch.
9. Do not touch packs until completely dry (about 10-15 minutes) or you risk contaminating them.
10. Store sterilized packs in a clean, dry area designated for sterile items only.

If you use the autoclave daily, you should clean it daily. At least once a week, clean the autoclave more thoroughly. The maker of the autoclave will give you recommendations for cleaning products.

Steps to Take: Daily and Weekly Cleaning of the Autoclave

Daily cleaning of the autoclave:

1. Wash the inner chamber with a mild detergent and a soft cloth.
2. Rinse and dry the autoclave.
3. Wipe the outside with a soft, damp cloth so it doesn't collect dust that can get into the inner compartment.

Weekly cleaning of the autoclave:

Plan ahead to do this cleaning. You will need to clean the sterilizer when it will not be needed and when you have time to do it carefully and properly.

1. Begin by draining all of the water from the sterilizer.
2. Fill it with a cleaning solution and run it through a 20-minute heated cycle.
3. Drain the solution.
4. Fill the autoclave with distilled water.
5. Run it through another 20-minute cycle.
6. Drain it again.
7. Fill with distilled water and run it through a third cycle.
8. Remove the inner shelves and scrub them.
9. Wipe the inside of the autoclave.

10. Inspect the machine's rubber seals to make sure they are not cracked or broken. Keep an extra seal to replace any seal that is damaged. If you need a seal, you must have a replacement available. Even if the seal is not damaged, you will need to replace it as directed by the manufacturer. Old seals do not seal tightly.

Steps to Take: Flash Sterilization

1. Place the pre-cleaned instruments unwrapped in the sterilizer's cassette.
2. Leave space between each item placed in the sterilizer to ensure the sterilization process works properly.
3. Proceed to the sink; clean the sink thoroughly with a disinfectant wipe.
4. While wearing utility gloves, wash thoroughly with soap and water, then towel dry. Remove the utility gloves, placing them in the designated area.
5. Wash and dry hands.
6. Close the sterilizer cassette and insert it into the machine.
7. Choose the appropriate time, temperature and cycle, as recommended by the manufacturer. For unwrapped items, it typically takes 3.5 minutes to sterilize at 270 °F or 132 °C.
8. Run the sterilizer cycle, checking that the mechanical monitors and chemical indicator gauges are reading as normal.
9. At the completion of the cycle, remove the items from the sterilizer, wearing heat-resistant gloves.
10. Place them in the designated cool-down location.
11. Upon removal from the sterilizer, use the unwrapped items immediately or package the instruments for storage as soon as possible.

Cold Sterilization

Cold sterilization is used on very delicate instruments and on heat-based instruments such as endoscopes. The instruments are placed in a cold chemical solution which sanitizes the instruments. They are not put through a heated cycle. Be sure to follow the manufacturer's recommendations about how long to leave the instruments in the solution. They will not become sterile if you do not leave them in for the recommended amount of time.

Practice Exercise 1-2

Determine if the statement is true or false.

1. **You may think of an autoclave as a type of pressure cooker that you can use to sterilize instruments.**

2. **Tap water is typically used in the autoclave.**

3. **Because autoclave tape develops a striped pattern when exposed to heat, it guarantees that your wrapped instruments are sterile.**

4. **Ultrasonic cleaning uses sound waves to shake loose dirt, blood and body fluids.**

5. **For cold sterilization, the instruments are placed in a cold chemical solution which sanitizes the instruments, and then they are put through a heated cycle.**

Answer as directed in your own words.

6. **What are the advantages of the sterilization bags?**

7. **What should you include on the label on the outside of your sterile instrument packaging?**

Review Practice Exercise 1-2

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Summary

This chapter is the beginning to your medical specialty career! After exploring the differences between a patient, client and resident, you learned about the medical equipment, instruments and supplies you'll use as a healthcare professional. Are you enjoying getting some visual training in the Virtual Labs? This helps to cement the knowledge in your head, and it's a lot more fun than just reading and memorizing!

Critical Thinking

As you move through this course, it is important that you take the time to think critically about what you're learning. Topics here will allow you to reflect on course material through discussions you may have with other students, instructors or even family and friends. Be sure to read the questions and discuss them with others whenever possible as you work through the chapters. Doing so will further enhance your academic experience.

1. Where do you see yourself working in the healthcare field? How will patient care play a role in your future career?
2. What is the connection between quality patient care and the patient's overall well-being and dignity?
3. You learned that clean, sterile instruments, supplies and equipment are essential. Read the article at https://publicintegrity.org/health/filthy-surgical-instruments-the-hidden-threat-in-americas-operating-rooms/. What interesting facts did you learn from the article?

HM110 Exam 1

Once you've mastered the course content, locate this Exam in your *Workbook*. Read and follow the Exam instructions carefully.

Endnotes

[1] "Two Patient Identifiers - Understanding the Requirements." *The Joint Commission*, August 29, 2022. Accessed August 8, 2023. Web.

[2] Rahmawati, Ike Nesdia. "Implementing Patient Rounding." *National Library of Medicine*, 14 April 2021. Accessed August 8, 2023. Web.

[3] "Elder Abuse Prevention." *Centers for Disease Control and Prevention*, June 2, 2021. Accessed August 8, 2023. Web.

[4] "Fast Facts: Preventing Elder Abuse." *Centers for Disease Control and Prevention*, June 2, 2021. Accessed August 8, 2023. Web.

[5] "Mandatory Reporting of Elder Abuse or Exploitation." *Colorado Bar Association*. Accessed August 8, 2023. Web.

[6] "Identifying and Predicting Healthcare Waste Management Costs." *National Library of Medicine*, August 9, 2022. Accessed August 8, 2023. Web.

Chapter 2
Safety in Health Care

Learning Objectives

When you complete the instruction in this chapter, you will be trained to:

- Discuss the purpose, benefits and recommendations of regulations.
- Outline safety and emergency procedures in health care.
- Define the types of pathogens that cause infection.
- Explain the chain of infection and various methods of transmission, as well as how to break the chain of infection.
- Differentiate between the various aseptic techniques.
- Discuss the recommended Universal and Standard Precautions in regard to human tissue, blood and body fluids.

Introduction

On September 21, 1971, David Phillip Vetter was born in Texas Children's Hospital with severe combined immunodeficiency (SCID). Aware of the 50 percent chance that David would have the disease, the hospital staff made a heroic effort to create germ-free conditions. After less than twenty seconds of exposure to the world, the baby was placed in a plastic isolator bubble that would protect him from disease for the rest of his life. David became "the boy in the plastic bubble."[1]

Unlike David, whose body had no immunity to germs, most bodies perform their own heroic acts on a daily basis, fighting the pathogens. You will encounter more viruses and other disease-transmitting substances than the average office worker.

In 2018, the incidence of occupational injury and illness in hospitals was 5.6 cases per 100 full-time workers, compared with an average of 2.8 for private industry overall.[2] Healthcare workers involved in direct patient care must take precautions to prevent back strain from lifting patients and equipment; to minimize exposure to radiation and caustic chemicals; and to guard against infectious diseases, such as AIDS, tuberculosis and hepatitis.

The best way to take these precautions is to follow the policies and procedures that you learn about in this chapter. These techniques protect you and others from danger on a daily basis. From ensuring comfortable access to the medical facility for all patients to properly disposing of used medical supplies, you will help provide a healthy environment for patients and staff alike. In this chapter, you'll learn about guidelines that direct safe medical facility practices. You'll also examine ways you can contribute to the health and well-being of your community by following the proper standards.

Healthcare workers must protect themselves when helping patients.

Basic Safety Regulations

If you read the newspaper or watch the news, it seems that health threats are all around. Do you eat tuna? You may have been exposed to mercury. Do you enjoy fishing or boating? Then you've been around mosquitoes—possible carriers of West Nile virus. In addition, E. coli bacteria seem to be in everything from spinach to fast food burgers. These threats to your safety, or **hazards**, are a part of life. You live with a certain amount of risk every day, unless you want to live your life in a NASA space suit and eat sterilized, dehydrated meals. Fortunately, your body's immune systems help fend off these hazards, and you can do your own part by practicing safe procedures and following basic safety regulations.

Basic safety regulations have been put in place to monitor the medical field. Along with many other industries, the medical profession has an obligation to protect the public from unsafe practices. It must also protect employees and help them maintain good health. Let's learn more about the agencies in charge of managing these regulations.

Regulatory Organizations and Legislation

The main agencies that govern regulations for the medical field include: Occupational Safety and Health Administration, the Centers for Disease Control and Prevention and the Joint Commission. In addition, a major piece of legislation, the Americans with Disabilities Act, greatly impacts health care. Individually, each organization or law has specific aims and standards. As a whole, they represent the importance of safe medical facilities to the community. These organizations work closely with the medical industry, as well as state and local government, to protect against the spread of infectious diseases. They promote infection control to guard the staff, patients and general public from devastating outbreaks.

Together with healthcare providers, these agencies control diseases, infections and safety. They also promote accident prevention and technological advances aimed at increasing safety. Injuries to staff or clients are costly and can have terrible effects on productivity and morale. The benefits of such regulations are numerous.

Regulatory Benefits

Regulatory agencies work closely with the medical field to provide:

- Enhanced environment of care and quality assurance
- Reduced insurance costs and premiums
- Control of medical payments and workers' compensation costs
- Improved employee morale and retention
- Reduced time lost due to absences
- Increased productivity and efficiency
- Improved facility aesthetics
- A safe environment for workers, patients and visitors
- Compliance with safety and health regulations

Healthcare Topics Governed by Regulatory Agencies

Areas overseen by regulatory agencies include emergency planning and fire safety; managing hazardous materials and wastes; infection control and biohazard safety; safety in patient care areas and medical facility environment; and laboratory and radiation safety.

Let's learn more about the regulatory agencies themselves.

- Occupational Safety and Health Administration
- Centers for Disease Control and Prevention
- The Joint Commission
- Americans with Disabilities Act

Occupational Safety and Health Administration

The **Occupational Safety and Health Administration** (**OSHA**) is a federal agency that regulates safe and healthy work environments for many industries. This organization applies specific standards directly to the medical field. The **Hazard Communication Standard** requires that employers fully disclose all hazardous materials that staff may encounter while performing their duties. Training for employees who may be exposed to infection through blood or bodily fluids and infection control plans are regulated by the **Bloodborne Pathogens Standard**.[3] This standard provides guidelines for proper disposal of specimens and **sharps**, which include items such as needles and scalpels.

OSHA regulations mandate that medical practices have specific safety plans in place when dealing with hazardous chemicals. The **Chemical Hygiene Plan** (**CHP**) dictates exactly how to handle certain hazardous chemicals encountered at work. In a medical facility, such substances include formaldehyde, lead and ethylene oxide. Knowing how to react to an emergency situation is essential.

ONLINE LEARNING

Build on what you are learning by reading the OSHA Fact Sheet on Laboratory Safety Chemical Hygiene Plan at https://www.osha.gov/sites/default/files/publications/OSHAfactsheet-laboratory-safety-chemical-hygiene-plan.pdf.

OSHA also requires that a worksite analysis be performed on a regular basis to guard against preventable accidents. Surveys of known hazards are taken and changes are implemented as needed. Hazard control and prevention are very important aspects of maintaining the safety of a healthcare facility. Employers must provide ample employee training that focuses on exposure risks and preventative methods that can protect staff and patients.

Centers for Disease Control and Prevention

The **Centers for Disease Control and Prevention** (**CDC**) is based in Atlanta, Georgia and is a division of the United States Public Health Department. Its main focus is the study of infectious diseases and how to control the spread of such diseases. The CDC plays a major role in large healthcare studies, and they research how infections spread from person to person. From the information it gathers, the CDC creates guidelines regulating how to properly store, clean and disinfect potentially contaminated medical tools and waste.

The Occupational Safety and Health Act of 1970 established the **National Institute for Occupational Safety and Health** (**NIOSH**) as a research agency focused on the study of worker safety and health, and empowering employers and workers to create safe and healthy workplaces. NIOSH is part of the CDC. It has the mandate to assure every person in the nation safe and healthful working conditions.

The Joint Commission

The Joint Commission (formerly known as the Joint Commission on Accreditation of Healthcare Organizations, or JCAHO) played a major part in regulating safety hazard control when it published its **Environment of Care Standards**. These standards implement a systems safety approach, which integrates safety into the philosophy of the entire business. Safety should be a top priority for every member of the staff, regardless of job title.

The Joint Commission considers the following areas crucial to the safety of a medical practice:

- Safety management
- Security management
- Hazardous materials and waste management
- Emergency preparedness
- Life safety
- Medical equipment management
- Utility systems management

ONLINE LEARNING

Build on what you are learning by reading the content provided by the Joint Commission regarding Environment of Care at http://www.jointcommission.org/topics/hai_environment_of_care.aspx.

Key elements of a Joint Commission hazard control plan include:

- Comprehensive safety orientation program for new employees
- Published accident, injury and incident reporting procedures
- Documentation and follow-up on all safety-related problems
- Medical device safety, recall and reporting procedures
- Reporting system to inform all levels of management
- Hazard surveillance and written safety programs for all departments
- Recurring safety training provided to all workers

Americans with Disabilities Act

The **Americans with Disabilities Act** (**ADA**) was passed in 1990 to ensure all Americans universal access to all publicly offered goods and services, and is regulated by the U.S. Department of Justice. **Universal access** means that accommodations must be made so that individuals of varied abilities can easily go to the supermarket, the movies and, you guessed it, the doctor's office!

Americans with Disabilities Act[4]

> Today, America welcomes into the mainstream of life all of our fellow citizens with disabilities. We embrace you for your abilities and for your disabilities, for our similarities and indeed for our differences, for your past courage and your future dreams. . . . And now I sign legislation which takes a sledgehammer to another wall, one which has for too many generations separated Americans with disabilities from the freedom they could glimpse, but not grasp. Once again, we rejoice as this barrier falls for claiming together we will not accept, we will not excuse, we will not tolerate discrimination in America. . . . And on your behalf, as well as the behalf of this entire country, I now lift my pen to sign this Americans with Disabilities Act and say: Let the shameful wall of exclusion finally come tumbling down.
>
> –George H. W. Bush

The ADA's **Title III** describes ways that a medical provider can comply with the guidelines required by the act. If an organization doesn't properly meet the criteria set forth by the ADA, the Department of Justice can sue the organization for acting in a discriminatory manner. There are many ways to ensure that a practice welcomes and accommodates all people. Let's take a look at some areas of particular interest.

The Americans with Disabilities Act requires that public buildings be equipped to allow all individuals an opportunity to receive entry. Parking lots, sidewalks and entryways must accommodate a person's need to get into the building. Once inside, an appropriately wide and obstacle-free path must be available to access areas where services are provided, such as treatment rooms. The ADA also calls for accessible restrooms in buildings where such facilities are offered for the general public.

Certain policy and design modifications may be necessary to enhance the accessibility of some buildings. For instance, though your facility may have rules against animals being in the building, you must make an exception for service dogs that assist patients with disabilities. Also, certain building features, such as handrails and drinking fountains, can be adjusted so that people of various heights and abilities can use them easily. These are easy modifications to make and are the least a healthcare provider should do to make the building safe and functional for all patients. Modifications that exceed the standards set by the ADA are encouraged but not legally required.

Reception Area

A medical practice's reception area must also meet accessibility standards set by the ADA. Aisles must be wide enough and countertops high and deep enough to accommodate a person in a wheelchair. Clear and easy-to-understand signs, as well as a Braille version, should be near doors and patient areas. The reception area should be either free from floor level changes or provide ramps and elevators to ease the transition. Healthcare professionals must anticipate the needs of disabled clients and recognize the hazards that they may encounter.

Reception areas must meet ADA standards.

The patient might need a clipboard and table to complete paperwork more comfortably, though some patients require alternate means of communication. Printed materials, such as consent to treatment forms and insurance papers, can be translated into Braille or recorded onto audio files. At times, the medical staff may read the information to the patient. Large print copies help patients with limited vision.

Examination and Treatment Areas

Examination and treatment areas must also be designed with accessibility in mind. Again, the doors and rooms must accommodate a patient in a wheelchair. Most examination tables adjust in height, which helps you transfer the patient to the table, if necessary.

Some medical procedures may need to be modified to accommodate certain patients. For instance, most mammogram machines require the patient to stand upright or sit on a swivelling chair. Both of these positions pose possible hazards for a woman with a disability that restricts her mobility. Providing a sturdy chair is one modification option that could help keep this patient safe.

Now that you're familiar with the safety regulations required by regulatory agencies such as the CDC and OSHA, let's examine how those regulations affect your day-to-day work in a medical setting.

Safety Procedures

You may play a major role in following the safety procedures necessary to keep your workplace safe. From industry specific hazards to non-related emergencies, there are many dangers you need to be aware of and guard against!

Hazard Control

Hazard control is the process of minimizing the threat of harm by practicing preventative measures. As a healthcare professional, one of your duties may be to tour the facility routinely and inspect for any potentially hazardous situations. Your inspection should include the following:

Throughout the building	Report any structural flaws or defective furniture to the maintenance department immediately.
	Use proper cleaning techniques to discourage disease transmission.
Reception area	Provide a well-lit area with clearly marked exits.
	Sanitize children's toys on a regular basis.
Exam rooms	Ensure documented inspections are performed on all medical equipment on a regular basis.
	Inspect instruments with each use and sterilize properly.
	Store supplies in the exam room so that they remain clean and germ-free.
Supply closet	Lock medications and drug samples, as well as any other items that may be prone to theft, in a secure place.
	Lock gas cylinders in a safe place.
Emergency preparation	Keep medical first-aid kits and battery-powered flashlights readily accessible.
	Post evacuation plans and alternate escape routes on the back of every door and in all patient areas.
	Inspect fire extinguishers periodically to ensure proper functioning.

Hazard Control Procedure

OSHA requirements state that medical providers must have a hazard control procedure in place at all times. This procedure carefully outlines specific areas of hazard control importance. It focuses on the appropriate actions to take in case of a hazardous situation. The medical practice is legally obligated to ensure the safety of all who enter the office. A **hazard control procedure** documents actions taken by the practice to reduce accidents and injuries. Knowing how to accurately respond to hazards can save lives. The plan also provides guidelines for personal safety, such as use of personal protective equipment and employee training.

Employee Health Programs

Many practices follow an employee health program. This program encourages healthy habits by the medical staff. Recommendations can include a better diet, more exercise and more rest. The program may also include work-related information, such as how to investigate infectious exposure among coworkers and how to care for work-related illnesses.

Significant Exposures

Employee health programs include policies to prevent exposure and contraction of infectious diseases. Later in this chapter, you will discover how the medical practice must respond to significant exposures. A **significant exposure** leaves the victim at a greater risk of infection. Investigation into the matter involves determining the type and duration of the exposure. How the infection was transmitted must be documented as well. Appropriate precautions need to be taken and recorded. In addition, the local health department must be notified. As you can see, when a hazardous situation occurs, everyone involved has their work cut out for them. It is much more cost effective and pleasant to avoid the exposure entirely!

Common Infection Investigations

Medical employees are at greater risk of exposure to infectious disease. Upon hire, most employers in the medical field will check for immunity to hepatitis B, rubella, measles, mumps and varicella. In addition, screening and testing for tuberculosis is common. Vaccinations such as hepatitis B, MMR, varicella, meningococcal and influenza may be offered for your protection. To ensure your own health and that of those around you, it is essential that you follow the safety guidelines of your employer.

Ergonomics

Ergonomics is the study of body mechanics and how to reduce physical stress. Working in a medical facility is hard on the body! Buildings are now often designed with this in mind. There are also ways that you can control stress on your body by following certain practices. One important technique involves proper bending and lifting. Instead of bending at the waist and using your back muscles, you should use your leg muscles. Keep the object close to your body and do not lift it above your shoulders. If a patient is not able to easily transfer or move, it's wise to ask for a second healthcare professional or mechanical lift device to help transfer the patient rather than straining your back.

The computer station is one of the most common causes of physical stress in the form of carpal tunnel syndrome, as well as neck or back pain. Proper support systems can reduce these ailments. Keep your arms level with the computer keyboard and support under your wrists to guard against carpal tunnel syndrome. Comfortable desk chairs with back supports and footrests also help protect against muscle strain. If possible, rotate tasks to minimize repetitive movements.

Virtual Lab: Body Mechanics

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Proper Body Mechanics* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

1. Keep the back straight and feet shoulder-width apart.
2. Bend from the hips and knees, not the waist.
3. Turn the entire body. Don't twist.
4. Hold heavy objects close to the body.
5. Use your body weight to push or pull heavy objects.
6. Ask for help when needed.
7. Make sure the area is clear of clutter where you are working.

Handle Hazardous Materials

As a healthcare professional, handling potentially hazardous materials is not a common part of your job duties. However, you may find yourself working with this type of material and it's important to be aware of the process to keep yourself safe. Every hazardous material located on the premises must have a corresponding **Safety Data Sheet** (**SDS**), which is a document that contains information on the potential hazards and how to work safely with the chemical product. This form is used all around the world in one form or another under various names. In general, the form should contain the following information:

1. Chemical Identity—Name of the product, including the common name if one exists.
2. Manufacturer's Information—Name, address, phone number and emergency phone number of the manufacturer.
3. Hazardous Ingredients/Identity Information—List of hazardous chemicals. Depending on the state, the list may contain all chemicals even if they are not hazardous, or only those chemicals that have OSHA standards. Since chemicals are often known by different names, all common/trade names should be listed.
4. Physical/Chemical Characteristics—Boiling point, vapor pressure and density, melting point, evaporation rate, etc.
5. Fire and Explosion Hazard Data—Flash point, flammability limits, ways to extinguish using special fire-fighting procedures, as well as unusual fire and explosion hazards.
6. Reactivity Data—How certain materials react with others when mixed or stored together.
7. Health Hazard Data—Health effects, how the hazard can enter the body, signs and symptoms of exposure, emergency and first-aid procedures, as well as any medical conditions which are generally recognized as being aggravated by exposure to the chemical.

8. Precautions of Safe Handling and Use—What to do in case materials spill or leak, how to dispose of waste safely, how to handle and store materials in a safe manner, appropriate hygienic practices and protective measures to be used during the repair and maintenance of contaminated equipment.
9. Control Measures—Ventilation (local, general, etc.), type of respirator/filter to use, other appropriate engineering controls, work practices or personal protective equipment such as gloves, safety glasses or goggles, face shields, aprons, etc.
10. Emergency and First-Aid Procedures—Flushing with water, removal to fresh air, etc.

OSHA and the CDC both list information regarding hazardous materials on their websites. The regulations call for proper employee training, proper labeling of hazardous materials and safe storage areas. The hazardous materials are placed in classes that represent their make-up, such as chemicals and disinfectants, medical wastes and sharps, chemotherapeutic substances and radioactive materials. Each material has different properties and characteristics including corrosivity, ignitability, reactivity and toxicity. These terms describe how the material will react to its environment. For instance, corrosive materials have the ability to eat away at surfaces while ignitable substances are prone to causing fires. The SDS relays all of this important information and is an essential tools for managing hazardous materials safely.

Communication of Hazards to Employees

The universal biohazard label communicates clearly that the marked container or area is potentially dangerous. All contaminated samples, sharps and waste storage areas must be properly marked in order to warn all individuals of the risk. Red bags with biohazard labels signify to all employees the need for extra precautions.

Biohazard waste bag or container

Container Labels

A hazardous material's SDS illustrates how to label containers holding particular substances. For the safety of all, it is important that the label be accurate and easy to understand.

According to OSHA standards, container labels should contain a description of the substance, its main ingredients, the type of personal protective equipment to wear while handling it, a list of hazard warnings, directions for use, steps to take if the substance spills or comes in contact with eyes or skin, the manufacturer's name and address, as well as disposal and storage procedures.

Fire Prevention

Annual training sessions and fire safety techniques must be provided for all employees. The better prepared a medical practice is, the faster the office can be evacuated. Evacuation routes should be well marked and kept free from obstacles. Fire extinguishers should be placed near all exits. Also, any rooms where oxygen tanks are located must have an extinguisher present.

Before attempting to exhausting any fire, you must follow the RACE fire procedure.

R	Rescue or remove any persons from the immediate scene
A	Alert or activate the nearest alarm and contact 911
C	Confine the area by closing all doors to the hazard or fire area
E	Extinguish and evacuate by using the closest fire extinguisher if the fire impedes your evacuation to your designated meeting location

Fire extinguisher

Virtual Lab: PASS Technique

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *PASS Technique* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

1. P: Pull the pin to break the seal.
2. A: Aim low, pointing the nozzle at the base of the fire.
3. S: Squeeze the handle to release the extinguishing agent.
4. S: Sweep from side to side at the base of the fire until it appears to be out.
5. If you have any doubt about your ability to fight a fire, evacuate immediately!

Electrical Safety

Many fires are caused by electrical malfunctions. Proper use and maintenance of electrical devices can reduce the chance of electrical fires.

OSHA recommends that devices be unplugged from the wall by the actual plug, not by yanking on the cord! The agency also advises that equipment be turned off before being plugged in or unplugged. Replacing damaged cords and equipment, while avoiding unnecessary adapters and extension cords, can also minimize the risk of fires. Documentation ensures electrical equipment is inspected on a regular basis.

Practice Exercise 2-1

Select the best answer from the choices provided.

1. **There are agencies that regulate the medical field's safety and accessibility guidelines.**
   a. True
   b. False

2. **_____ requires employers to disclose all hazardous materials that staff may encounter while performing their duties.**
   a. OSHA
   b. The CDC
   c. The Joint Commission
   d. The Department of Justice

3. **This requires that public buildings be equipped to allow all individuals an opportunity to receive entry.**
   a. ADA
   b. CDC
   c. OSHA
   d. The Joint Commission

4. **Involvement in larger healthcare studies and the study of infectious diseases are two characteristics of _____.**
   a. OSHA
   b. the ADA
   c. the Joint Commission
   d. the CDC

5. **National Institute for Occupational Safety and Health (NIOSH) is part of _____.**
   a. the CDC
   b. the Joint Commission
   c. the ADA
   d. OSHA

6. **_____ plays a major part in regulating safety hazard control with its Environment of Care Standards.**
   a. The CDC
   b. OSHA
   c. The ADA
   d. The Joint Commission

7. **Employee training for staff who may be exposed to infections through blood or bodily fluids is regulated by OSHA's _____.**
   a. Bloodborne Pathogens Standard
   b. Employee Safety Standard
   c. Hazard Communication Standard
   d. Chemical Hygiene Plan

8. **Refer to _____ for information regarding a chemical's hazardous properties.**
   a. OSHA
   b. the SDS
   c. the CDC
   d. the Chemical Hygiene Plan

Answer as directed in your own words.

9. **Discuss how the Americans with Disabilities Act of 1990 relates to public facilities.**

10. **Imagine you must design a medical office. Keeping in mind those with physical disabilities, describe the various amenities and provisions you would build or utilize in your office design.**

11. **Outline common safety procedures in the medical office.**

12. **Explain the importance of the SDS in handling hazardous materials.**

Review Practice Exercise 2-1

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Emergencies

Similar to fire prevention and Chemical Hygiene Plans, emergency plans are in place to save lives and reduce injuries. Medical staff must remain calm and follow proper procedures. Internal emergencies, such as a negative reaction to medication and external disasters, such as a tornado, both require quick thinking and prompt responses.

Your workplace will outline the emergency procedures to follow in the office emergency policy manual. What exactly is in the manual? Read the following list of guidelines that your office's emergency manual will contain. Standard emergency plans often include:

- Defined roles for specific personnel
- Current listing of personnel to contact for additional support
- Communication and coordination plan with detailed procedures to follow in an emergency
- Coordination with qualified fire, safety and other professional personnel
- Transferal of casualties and records
- Triage and assessment guidelines
- Procurement plans for food, water, electrical power and medical supplies
- Detailed procedures and personnel responsibilities regarding moving patients in and out of the facility during a variety of situations

Read your employer's Emergency Manual as soon as you begin your new job. Read it cover to cover, and review it as many times as you need to, so you can act quickly and confidently if an emergency occurs. If an event like a bomb scare happens at your clinic one afternoon, you won't have time to pull out the manual and start studying!

Other than the medical emergencies that require treatment by doctors and nurses, what other kinds of emergencies can befall the medical staff in your office? Although rare, the following situations should be kept in mind. You will notice that most require you to alert the authorities by calling 911.

Hazardous Chemical Spill

When a hazardous chemical spill occurs, call 911 and contain the spill to one area. Close windows and fire doors, while instructing others to remain seated in secure areas. Evacuation routes must be clear and ready for use at all times. In such an instance, follow your employer's emergency plan and await further instructions.

Radiation Accidents

Isolate radiation accident areas immediately and call 911. Allow ***no one*** to enter the contaminated room. Document the incident and notify the proper personnel. Again, staff must wait for more instructions prior to taking further action.

External/Internal Disaster

Sometimes, a disaster outside of the building can prompt an internal emergency, and the first thing to do is call 911. An explosion near your office will require you to prepare for an emergency triage situation until EMTs arrive. Keep adequate quantities of essential supplies and medications to ensure that the practice is ready for a high volume of victims if the need arises. Also, designate a clear chain of command to reduce confusion and enable your team to respond quickly.

Violent Activity

Should a perilous situation, such as a gunman entering the building or a riot occur, call 911 immediately. Follow the instructions of the perpetrator and do not risk your life to save property. In addition, follow the tips provided by the National Crime Prevention Council.[5]

- Keep your purse, wallet, keys or other valuables with you at all times or locked in a drawer or closet.
- Check the identity of any strangers in your office. If anyone makes you uncomfortable, inform security or management immediately.
- Don't stay late if you'll be alone in the office. Create a buddy system for walking to parking lots or public transportation after hours, or ask a security guard to escort you.
- Report any broken or flickering lights, dimly lit corridors, broken windows or doors that don't lock properly.

Your employer must make sure that his employees are safe not only from unauthorized "visitors" or angry patients but, at times, from each other. Always make sure you are positioned between the patient and the door so you can escape if a patient becomes unsafe. Never position yourself between the patient and a wall or corner. Care must be taken when hiring new employees; verify references and credentials; and perform background checks when appropriate. If you notice signs of potential violence in a fellow employee, report this to the appropriate person, such as a human resources manager. Immediately report any incidents of sexual harassment.[6]

Bomb Threat Procedures

Should someone make a bomb threat to your workplace, ask the following questions of the caller: who, what, where, when and why. Get as much information as possible and then call security or 911 (better yet, have a signal so someone else can call while you gather the information). While waiting for a search to be completed, make sure that no one touches anything unfamiliar. The incident must be documented.

Infant/Pediatric Abduction

Unfortunately, medical facilities can be, at times, places where abductors plan their next attack. The hustle and bustle of a busy practice can give the appearance that someone might not notice such a horrendous crime. Be aware of suspicious or hurried individuals. Note people with oversized bags and report strange activity to the proper authorities. Many medical facilities use the term, "Code Pink" when investigating a suspected abduction.

Code Pink[7]

Something didn't seem quite right. The person in the hooded sweatshirt standing near the entrance looked suspicious to respiratory therapist Betty Collins as she entered the newborn nursery on the evening of January 12, 2006, during her shift at Ouachita County Medical Center in Camden, Arkansas. Perhaps this is why she shielded her fingers as she punched in the combination to the lock on the nursery door before entering to check on a baby inside.

Leaving minutes later, her work done, Collins' suspicions were confirmed when Nikenya Washington, 18, shoved her way into the nursery yelling, "Move out of my way, I'll shoot you!"

Collins and the other nurse in the unit bravely wrestled with the would-be abductor. A Code Pink was called.

It is notable that January's Ouachita Hospital case is unique as the first reported case of physical violence during an in-hospital abduction.

Code Pink is of particular concern to pediatric hospitalists because about half of these events occur within the hospital setting.

This frightening episode is one example of the phenomenon of infant abduction, and according to Cathy Nahirny of the National Center for Missing and Exploited Children (NCMEC), it is the first reported case in 2006.

Infant abduction is defined as the act of kidnapping an infant less than six months of age by a non-family member. Code Pink is the almost universally adopted code word signaling that an abduction is taking place. Though infrequent by comparison to other types of kidnapping or exploitation of children, infant abduction—like many pediatric situations—is quite dramatic.

Natural Disasters

Natural disasters have the potential to cause havoc in the medical setting. To ensure everyone stays safe and calm, use the building's communications system to inform patients and staff of how to handle the situation. Use the following tips provided by the American Red Cross to prepare for common severe natural disasters.

Earthquakes

An **earthquake** is a sudden and violent shaking of the ground, sometimes causing great destruction. When the shaking begins, drop, cover and hold on! Move only a few steps to a nearby safe place. Stay indoors, and away from windows, until the shaking stops and you're sure it's safe to exit. In a high-rise building, expect the fire alarms and sprinklers to go off during a quake. After the shaking stops, check yourself for injuries. Protect yourself from further danger by putting on long pants, a long-sleeved shirt, sturdy shoes and work gloves, if possible. Then, check others for injuries, giving first aid for serious injuries.

Look for and extinguish small fires; eliminate fire hazards; and turn off the gas if you smell gas or think it's leaking. Keep in mind that only a professional should turn the gas back on. If possible, turn on a radio for instructions. Expect aftershocks, and each time you feel one, drop, cover and hold on. Inspect the workplace for damage, getting everyone out if the building is unsafe. Report life-threatening emergencies to get help.

Floods

If it has been raining hard for several hours, or steadily raining for several days, be alert to the possibility of a flood. Listen to local radio or TV stations for flood information. Floods may take only a few minutes to develop; however, it could take several hours or days to develop as well. Keep in mind that a **flood watch** means a flood is possible in your area, while a **flood warning** means flooding is already occurring or will occur soon in your area.

When a flood watch is issued, move furniture and equipment to higher floors of the building if possible. Fill your car's gas tank in case an evacuation notice is issued. Be alert to signs of flash flooding and be ready to evacuate on a moment's notice.

When a flood warning is issued, listen to the National Weather Service for information and advice. If told to evacuate, do so as quickly as possible. If you think flooding has already started, evacuate patients immediately. You may have only seconds to escape. Act quickly! Move to higher ground away from rivers, streams, creeks and storm drains. Do not drive around barricades—they are there for your safety.

If your car stalls in rapidly rising waters, abandon it immediately and climb to higher ground.

Flood waters

Hurricanes

A **hurricane** is a storm with a violent wind called a tropical cyclone, which forms over tropical or subtropical waters. Hurricanes originate in the Atlantic basin, which includes the Atlantic Ocean, Caribbean Sea, the Gulf of Mexico, the eastern North Pacific Ocean and, less frequently, the central North Pacific Ocean.[8] It's important to know the difference between a hurricane watch and warning. A **hurricane watch** means hurricane conditions are possible in the specified area of the watch, usually within 36 hours. Alternatively, a **hurricane warning** means hurricane conditions are expected in the specified area of the warning, usually within 24 hours.

When a hurricane watch is issued, listen to National Oceanic and Atmospheric Administration (NOAA) Weather Radio or national weather service for up-to-date storm information. Prepare to bring inside any outdoor decorations or trash cans, hanging plants and anything else that can be picked up by the wind. Prepare to cover all windows of your building. Fill your car's gas tank. Check batteries and stock up on first-aid supplies, drinking water and medications.

When a hurricane warning is issued, listen to the advice of local officials. Leave if they tell you to do so. Complete preparation activities. If you are not advised to evacuate, keep patients in the building, away from windows. Be aware that the calm "eye" is deceptive; the storm is not over. The worst part of the storm happens once the eye passes over and the winds blow from the opposite direction. Trees, shrubs, buildings and other objects damaged by the first winds can be broken or destroyed by the second winds. Be alert for tornadoes, as tornadoes can happen during a hurricane and after it passes over. Remain indoors, in the center of the building, in a closet or bathroom without windows.

After a hurricane is over, keep listening to NOAA Weather Radio or the national weather service for instructions. Inspect the building for damage. Use flashlights in the dark; do not use candles.

ONLINE LEARNING

Build on what you are learning by watching the video at https://oceanservice.noaa.gov/facts/hurricane.html.

Thunderstorms

Lightning is a leading cause of injury and death from weather-related hazards. Although most lightning victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms. **Thunderstorms** are dangerous storms that include lightning and can include powerful winds over 50 mph, create hail and cause flash flooding and tornadoes.

Lightning strike

During a thunderstorm, it's important to stay in the building. Patients should not attempt to drive home during a severe thunderstorm. Telephone lines and metal pipes can conduct electricity; therefore, you should unplug appliances and equipment; avoid using the telephone or any electrical appliances or equipment; and turn off the air conditioner as power surges from lightning can overload the compressor, resulting in a costly repair job! Although it's alright to leave electric lights on, you should avoid running water for any purpose. Draw blinds and shades over windows. If windows break due to objects blown by the wind, the shades will minimize glass shattering into the building.

Steps to Take: Lightning Strike

1. Call 911.
2. The injured person has received an electrical shock and may be burned, both where he was struck and where the electricity left his body. Check for burns in both places. Being struck by lightning can also cause nervous system damage, broken bones and loss of hearing or eyesight.
3. Give first aid.
4. If the heart has stopped beating, start CPR.
5. If the person has a pulse and is breathing, look and care for other possible injuries.

Tornadoes

Tornadoes are violently rotating columns of air that extend from a thunderstorm to the ground. They can destroy buildings, flip cars and create deadly flying debris. As you know, tornadoes can accompany hurricanes and thunderstorms.

Tornado

When a tornado watch is issued, it's important to listen to NOAA Weather Radio or the national weather service for further updates. Stay alert to changing weather conditions. Blowing debris or the sound of an approaching tornado may alert you. Many people say it sounds like a freight train.

When a tornado warning is issued, direct patients to the center of the building, in a closet or bathroom without windows. After the tornado passes, watch out for fallen power lines and stay out of the damaged area. Listen to the radio for information and instructions. Use a flashlight to inspect the building for damage; do not use candles at any time.

Practice Exercise 2-2

Select the best answer from the choices provided.

1. **It is essential that you read your employer's emergency manual _____.**
   a. as soon as disaster strikes
   b. once you receive any indication that an emergency may occur
   c. as soon as possible after you start your new job, and review it often
   d. only during your job orientation

2. **To prevent _____, take note of suspicious or hurried individuals and keep an eye out for people with oversized bags. Report strange activity to the proper authorities.**
   a. radiation accidents
   b. thunderstorms
   c. noise in the office
   d. child abductions

3. **In the event of a(n) _____, move furniture and equipment to higher floors if possible and fill your car's gas tank in case you need to evacuate.**
   a. flood watch
   b. earthquake
   c. hurricane warning
   d. thunderstorm

4. **In the event of a(n) _____, stay inside, unplug appliances, avoid running water and draw the blinds and shades over windows.**
   a. earthquake
   b. hurricane
   c. thunderstorm
   d. tornado

5. **When a(n) _____ is issued, you should direct patients or residents to the center of the building, in a windowless closet or bathroom.**
   a. earthquake alert
   b. hurricane warning
   c. flood warning
   d. tornado warning

Answer as directed in your own words.

6. **Describe the contents of a typical office emergency policy manual.**

7. **Outline the steps you should take to prevent a violent act in your work environment.**

8. **Outline the steps to take when a hurricane warning is issued.**

Review Practice Exercise 2-2

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Infection Control

Infectious diseases affect society in much different ways than they did a century ago. Technological advances in the medical field have prevented many deaths and changed how humans manage the control of infection.

The medical field focuses on controlling **pathogens**, which are microorganisms that contribute to the spread of diseases. The first, **viruses**, live inside of cells and are resistant to treatment. **Bacteria** are one-celled organisms that can be dangerous by causing infection, but can be beneficial as well. **Nonpathogenic bacteria**, called normal flora, protect the host. **Pathogenic bacteria** fight for resources and lower the number of normal flora. **Pathogenic fungi** are related to mushrooms and can cause problems such as athlete's foot. Parasites make up the fourth major class of infectious agents. **Parasites** are organisms that can reside either inside or outside of a host. Malaria is a kind of parasite that lives inside its host, while lice is a parasite found on the outside of its host.

Bloodborne Pathogens

Many pathogens reside in the blood. **Bloodborne pathogens** are infectious microorganisms transmitted through contact with contaminated blood or equipment. OSHA regulations try to minimize the contact medical employees have with such pathogens. Be very careful when you handle any object that can penetrate the skin or medical gloves.

Other Body Fluid Pathogens

Other body fluids may also contain pathogens. Exposure to any of the following laboratory specimens is considered potentially hazardous and should be managed carefully. These include cerebrospinal fluid, semen, vaginal secretions, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid and saliva.

Tuberculosis

Special mention must be made of tuberculosis. **Tuberculosis** (**TB**) is an infectious disease that the genus *Mycobacterium* causes. At one time, tuberculosis was one of society's most deadly diseases, but the invention of new drugs has steadily decreased the spread of this disease since the 1950s. Nevertheless, TB cases are still reported in the United States every year. Small, rounded lesions (tubercles) and tissues that begin to resemble cheese are characteristics of the disease. Tuberculosis can affect any organ, although it usually occurs in the lungs.

Unfortunately, the incidence of TB is rising in the developed world as well, due to a sharp increase in the population of people with compromised immune systems. While education and employee training have reduced the number of deaths, it is still considered a dangerous threat to medical workers.

Symptoms of pulmonary TB include cough (often productive and may contain blood), fatigue, fever, night sweats and unexplained weight loss. Individuals with an active infection can transmit the disease to others. Individuals with a latent infection are not contagious and may not display the usual symptoms. If the carrier's immune system becomes compromised, the latent infection can progress into an active one, and if left untreated, can kill up to 50 percent of its victims.

Education and Training

Thankfully, TB is easy to screen for and can be cured with the proper medication. A TB skin test requires that a testing fluid, called tuberculin or PPD, be injected into the patient's forearm. The induration (palpable, raised, hardened area or swelling) is measured at the site of injection. This measurement, along with the patient's risk of being infected and progression to disease if infected, are used to determine if the result is positive or negative. Patients infected with TB receive a schedule of medications that include isoniazid, rifampin, ethambutol and pyrazinamide. The variety of medicines ensure that all of the bacteria is killed. Each medication absolutely must be taken as directed.

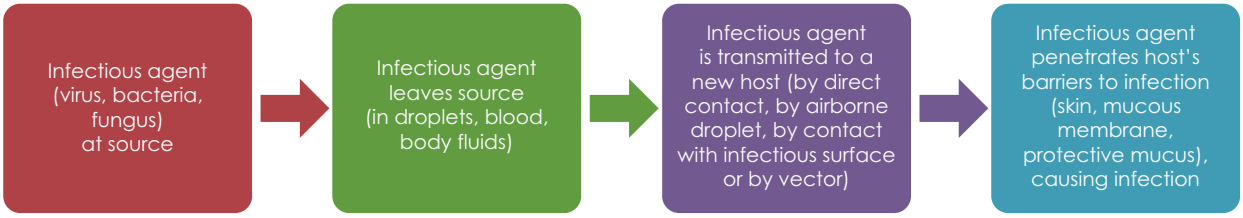
Tuberculosis is transmitted through the air. Respirators (including N95 respirator masks) and ventilation systems are required when working with an infected patient. If a patient has TB, she should be put on airborne precautions and isolated in a negative pressure room with the door to the hallway shut as much as possible. It is important to gown and glove up and wear a respirator mask when caring for these patients to prevent the spread of infection. It is also crucial that staff wash their hands when leaving the patient's room to prevent the spread of infection. The patient must be isolated from others and should wear a surgical mask if being transported.

The Chain of Infection

Before a person can become infected the pathogen has to break through the body's barriers. That's not as easy as it sounds! The process by which a pathogen gains entry into the human body is called the **chain of infection**.

As you might expect, the chain begins with the infectious agent itself. Before infection occurs, the pathogen is located on or in its source, also known as a **carrier**. The carrier is often another person—who may or may not be ill himself. Some infections are also carried by birds and animals.

The second link in the chain of infection occurs when the infectious agent leaves the body of the carrier and comes in contact with the person who becomes infected—the **host**. This can happen in a number of ways. It can pass from the carrier to the host by direct contact, such as a handshake. It can enter the host's nose, mouth or lungs in droplets of mucus added to the air by coughs and sneezes. It can be deposited, in blood or body fluids, on surfaces such as a bedside table or telephone receivers that the host handles. Sometimes, pathogens are **vector-borne**, or transmitted from the carrier to the host by the bite of an insect or other animal.



Chain of infection

After the infectious agent has been transmitted to another host, it needs to penetrate the host's defensive barriers. Broken skin, mucous membranes and organ systems which provide access within the body, such as the reproductive, gastrointestinal and respiratory systems, are the usual entry points. Once the pathogen has found its way into the host, the host becomes a carrier as well.

Some individuals are especially vulnerable to pathogens and must take extra precautions to prevent becoming a host. These patients include the very young, the elderly, the chronically ill, those with compromised immune systems and patients recuperating from surgery.[12]

Nosocomial Infections

Nosocomial infections are a major concern to the medical industry. **Nosocomial infections** are infections that are secondary to the patient's initial ailment. These patients are actually infected *while* they are at the doctor's office or hospital. The high volume of sick people in a clinic, combined with the fact that many of the patients have weakened immune systems, contribute to the spread of infections such as pneumonia and urinary tract infections. Healthcare professionals encounter many individuals and must ensure that they do not add to the problem. One way to do this is with consistent hand hygiene.

Hand Hygiene

Hand washing is considered the single most important means of preventing the spread of infection. There are many germs on your hands, and they can cause disease if infection controls are not in place. Proper hand washing is an easy and effective way to reduce the transmission of disease. Here, you will review proper hand washing with soap and water. Note that performing hand hygiene should be done for at least 20 seconds.

All healthcare facilities must provide multiple sinks, each supplied with antiseptic hand cleanser, paper towels and antiseptic towelettes or hand-sanitizer gel dispensers. Antiseptic cleansing agents, nail files or sticks and antiseptic-impregnated scrub brushes are often placed by every hand sink, particularly in clinical areas where patients are especially vulnerable to infection, such as newborn nurseries and operating suites. It is also important to keep fingernails clipped and free of polish.

To minimize the negative effects of frequent hand washing, use skin lotion, switch hand cleansers and lessen hand drying.

When to Wash

Since hand hygiene is so important, there are numerous times that require hand washing. These include:

- Before and after touching each client, even when gloves are worn
- At the beginning of a shift
- Between contacts with different clients
- Before and after contact with dressings, specimens and bedclothes
- Before any invasive procedure or medication administration
- After contact with client secretions or excretions

- Before and after using the bathroom
- After sneezing, coughing or blowing nose
- After removing gloves
- Before and after eating
- When there is visual soiling of hands

Even when wearing gloves, it's still important to wash your hands. When washing, use warm, running water and remove all rings other than a plain wedding band. Move wristwatches to at least four inches above the wrist. Jewelry provides a wonderful home for hiding bacteria! When scrubbing, use ample pressure. The friction created increases the effectiveness of the procedure.

Steps to Take: Hand Washing

1. Begin by removing all jewelry, turning on the water and wetting your hands.
2. Apply hand soap to your hands.
3. Rub the palm of your hands together.
4. Next, rub the palm of your hand across the back of your other hand and interlace your fingers.
5. Repeat this action for the other hand and then place your hands together and rub palm to palm with interlaced fingers.
6. Then, place your cupped hand into your palm and rub the back of your fingers.
7. Repeat for the opposite hand.
8. Rub the tips of your fingers into the palm of your hand and repeat for the other hand.
9. Next, rub each thumb in the palm of your hand.
10. Finish applying soap to all surfaces by rubbing each wrist in a rotational manner.
11. Rinse your hands thoroughly.
12. Retrieve a paper towel and dry your hands.
13. Then, using the paper towel, turn off the water and dispose of the paper towel.

Sterile procedures are required before and during specific patient care activities to maintain an area free from microorganisms and to prevent infection. Performing a surgical hand scrub and applying sterile gloves are ways to prevent and minimize infection during surgeries or invasive procedures.

A **surgical hand scrub** refers to a thorough method of hand washing to reduce microorganisms to a minimum. The scrub should include both the hands and arms, up to the elbow. During and after the scrub, hands should be kept upright, bent at the elbow and above waist level, to prevent water running from the unscrubbed, non-sterile area down to the hands. In addition, the fingernails should also be cleaned with a file, as the undersides of fingernails are a common source of bacteria. A sterile towel is used to dry the hands and arms afterwards.

Sterile gloves are free from all microorganisms. They are required for any invasive procedure and when contact with any sterile site, tissue or body cavity is expected. Sterile gloves help prevent surgical site infections and reduce the risk of exposure to blood and body fluid pathogens for the healthcare professionals.

Surgical hand scrub

Work Restrictions

Just as clients can spread infectious agents, so can you. If you are sick, certain employee work restrictions will prevent you from spreading it to others. You may be required to stay at home to reduce the risk of infecting others. Other times you may be able to perform jobs that do not involve direct contact with patients.

Waste Disposal

Proper medical waste disposal procedures are very important in controlling infectious diseases. If handled improperly, medical waste can wreak havoc on an unsuspecting community. State and federal regulations stipulate the specific means of disposal. Department of Health offices can provide information listing local certified waste disposal companies. These companies follow strict guidelines and help curb the spread of diseases.

There are three main categories of institutional waste. **Infectious waste** includes blood, pathology and laboratory specimens and contaminated equipment. **Injurious waste** refers to needles, scalpel blades, lancets, broken glass and broken pipettes. Caustic chemicals, radioactive materials, chemotherapy solutions and their containers qualify as **hazardous waste**. Each waste group must be disposed of correctly.

Avoid Needlestick Injuries

Needlestick injuries were more common when recapping the needle with two hands was a popular procedure. An easy way to become infected with a disease is by poking yourself with a contaminated needle. Here, you'll learn about proper disposal of needles and the prevention of needlestick injuries.

Sharps Disposal

After using a needle, apply the safety and dispose of it immediately. Sharps disposal containers should be clearly marked and located in appropriate locations to minimize accidents. They should also be emptied often. Overflowing containers lead to injuries.

Sharps container

Needlestick Prevention Devices

Needlestick prevention devices reduce the number of needlestick injuries. These systems have built-in safety features that minimize the chance of accidents. They are practical, reliable and do not affect the care a patient receives. Retractable needles, self-sheathing needles and self-blunting needles all reduce the chances of poking yourself or others.

ONLINE LEARNING

Build on what you are learning by watching the video at https://www.youtube.com/watch?v=pXqwDAFfwxk.

Practice Exercise 2-3

Select the best answer from the choices provided.

1. **The chain of infection requires a host, a pathogen and a _____.**
   a. means of transmission
   b. microorganism
   c. healthy immune system
   d. parasite

2. **Infectious agents are not transmitted by _____.**
   a. insects
   b. direct contact
   c. airborne exposure
   d. properly sterilized instruments

3. **Broken skin is considered a(n) _____.**
   a. entry point
   b. job hazard
   c. minor injury
   d. reason for work restriction

4. **The elderly are more susceptible to infections.**
   a. True
   b. False

5. **_____ infections are contracted at the office and are secondary to the patient's original ailments.**
   a. TB
   b. Latent
   c. Nosocomial
   d. Parasitic

6. **The most effective way to prevent the spread of infection is to _____.**
   a. wear gloves
   b. wash hands frequently with warm water
   c. sneeze into the crook of your elbow
   d. use hand sanitizer

7. **Hands need to be washed only before attending to a new patient.**
   a. True
   b. False

8. **After a needle is used, apply the safety and _____.**
   a. sanitize it immediately
   b. wash your hands
   c. dispose of it immediately in a sharps container
   d. wrap it carefully and throw it in the trash

Answer as directed in your own words.

9. **What pathogens does the medical field focus on to control the spread of disease?**

Review Practice Exercise 2-3

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Aseptic Technique

Aseptic techniques help control the spread of infection. The word **asepsis** means sterile. In the medical field, aseptic techniques control infection to the greatest amount possible. Let's look at different techniques.

Medical asepsis, or infection control, guards the staff, patients and general public from devastating outbreaks. Pathogens are removed by cleaning any area or item in contact with potentially infectious materials.

Surgical asepsis is different because it removes *all* microorganisms, not just the pathogens. This technique is used any time a patient's skin is broken for a procedure. It is a means to reduce introduction of outside microorganisms into the body.

Surgical aseptic technique is required for the following:

- Surgical procedures
- Bloodstream invasive procedures
- Complex dressing changes and wound care
- Catheter insertion
- When dealing with high-risk groups

Healthcare professionals in operating rooms or sterile procedure rooms should be aware of the specific guidelines for use. It's important to avoid touching sterile equipment and refrain from wearing jewelry in a aseptic environment.

Sanitization, Disinfection and Sterilization

Sanitization, disinfection and sterilization are similar techniques used to clean equipment in the medical setting. Washing with soap and water is considered **sanitizing**, while **disinfecting** requires the use of harsh chemicals or heat. Common disinfectants include chlorine, formaldehyde, iodine and alcohol. **Sterilization** kills *all* microorganisms and is required for surgical aseptic technique.

There are various ways to properly sterilize an object. **Chemical sterilization** requires a soaking time of 12-24 hours. **Gas sterilization** utilizes ethylene oxide gas and is usually too expensive and dangerous for medical office use. **Dry heat**, which uses hot air free from water vapor, can also be used to sterilize. However, the most popular means of sterilization is the use of steam in a piece of equipment called the autoclave.

Front loading autoclaves

Sterilization by ionizing radiation is a low-temperature sterilization method that has been used for a number of medical products. These machines are used to clean patient rooms as well as medical equipment.

Barriers and Personal Protective Equipment

Aseptic barriers and personal protective equipment help to prevent the transmission of pathogens between people. An **aseptic barrier** may be defined as a material placed between an aseptic area, such as an operative incision, and areas which harbor microorganisms with the purpose of preventing the spread of bacteria into the sterile zone. **Personal protective equipment** (**PPE**) is protective clothing, helmets, goggles or other garments or equipment designed to protect the wearer's body from injury or infection. These provide additional protection to the healthcare professional and the patient but should not be considered as absolute remedies to the spread of infection. However, when used in conjunction with other aseptic techniques, barriers and PPE are highly effective ways to minimize risk of disease.

Masks

Masks and particulate respirators protect against transmission of disease through the mucous membranes of the mouth, nose and eyes. They should be put on before entering the room of an infectious patient. Proper fitting increases the effectiveness of such devices. Healthcare professionals may be required to wear them if they have been exposed to or contracted an infection. The devices must be disposed of after each use. Be sure to check with your state, local and employer guidelines in regards to the use of masks in your future career.

Steps to Take: Put on a Mask and Goggles

1. Wash hands.
2. Pick up mask by the top string or elastic strap. Do not touch the mask where it touches your face.
3. Adjust the mask over your nose and mouth. Pull elastic strap over your head, or if mask has strings, tie the top strings before the bottom strings. Do not wear a mask hanging from only the bottom tie or strap.
4. Pinch the metal strip, if present, at the top of the mask tightly around your nose until it feels snug.
5. Put goggles on over eyes or glasses. Use the headband to secure them to your head, and make sure they are on snugly.

Gowns

Gowns are worn in situations that require close contact with patients. However, the gown should be removed before leaving the treatment room. It should be removed carefully to prevent cross-contamination by untying the waist and the neck straps, then removing the gown by pulling on the inside of the sleeve; avoid touching any of the exposed fabric. Instead, roll the gown into a ball, keeping the contaminated side on the inside. Place the gown in the appropriate container immediately. When done, wash hands thoroughly.

Personal protective equipment

Steps to Take: Put on a Gown[9]

To put on:

1. Wash hands.
2. Open the gown, holding it in front of you to allow it to unfold. Do not shake it or allow it to touch the floor. Facing the back opening of the gown, put your arms into each sleeve.
3. Fasten the neck.
4. Reach behind you and pull the gown until it completely covers your clothes. Fasten the gown at the waist.

To take off:

1. Untie the waist and the neck straps, and then remove the gown by pulling on the inside of the sleeve.
2. Do not touch the outside of the gown. Instead, roll the gown into a ball, keeping the contaminated side on the inside.
3. Dispose of properly.
4. Wash hands thoroughly.

Caps and Shoe Coverings

Caps and shoe coverings must fit properly in order to be effective. All hair should be contained and shoes need to be completely covered. When removing, use the uncontaminated inside of the coverings to turn them inside out before disposal.

ONLINE LEARNING

Build on what you are learning by reading the article at https://cleanroomsuppliesltd.com/blog/shoe-covers-cleanrooms/.

Gloves

When gloves are used in conjunction with proper hand washing techniques, they provide a highly effective barrier against the spread of infection. Wash hands both before and after using gloves. One important note: Gloves will not protect against needlestick injuries!

Virtual Lab: Proper Gloving

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Proper Gloving* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Sink; soap (preferably liquid); antibacterial lotion; disposable paper towels; nail brush; disposable, non-sterile latex or vinyl gloves

To put on:

1. Wash hands.
2. Grasp the gloves by the cuff and slip them on without any special technique.

To take off:

1. Grasp the palm of a used glove with one hand to begin removing the first glove.
2. Keep your hands away from the body and pointed downward.
3. Turn the used first glove inside out and hold it in the other hand.
4. Holding the removed glove in the palm of the still-gloved hand, insert two fingers of the ungloved hand inside the dirty glove.
5. Peel the dirty glove downward, turning it inside out over the balled glove in your palm.
6. Note that one glove is inside the other with all contaminated surfaces inside.
7. Throw the gloves away.
8. Wash hands.

Removing gloves

ONLINE LEARNING

Build on what you are learning by watching the video at http://www.nejm.org/doi/full/10.1056/NEJMvcm1412105.

Private Rooms

There will be times when a patient is placed in a private room to limit the possibility of infecting other patients and staff. Private rooms provide an extra barrier against the spread of pathogens by blocking contact and limiting exposure to contaminated air particles.

Isolation Systems

Some patients are too highly contagious even for a private room. In this situation, the patient will be placed in an isolation system. The **isolation system** is a form of quarantine and inhibits all contact and shared air space with staff, visitors or other patients.

Universal Precautions

In 1987, the CDC released its recommendation of **Universal Precautions** that mainly focused on avoiding contact with blood. Since that time, the CDC expanded the scope of its recommendations to include all bodily fluids. In 1996, the CDC released the more comprehensive Standard Precautions.

It is believed that as your knowledge of the Standard Precautions against infectious diseases grows, your perception of risk in treating patients with these diseases diminishes. That sounds pretty reasonable—the more you learn about driving a car, the less likely you'll have an accident. Review the following Standard Precautions carefully and take them to heart. You'll be an expert at infection control in no time!

Standard Precautions

The CDC spent several years studying how to better protect medical workers against infectious diseases. Utilize these **Standard Precautions** with all patients:[10]

- Perform hand hygiene
- Use PPE whenever there is an expectation of possible exposure to infectious material
- Follow respiratory hygiene/cough etiquette principles
- Ensure appropriate patient placement
- Properly handle, clean and disinfect patient care equipment and instruments/devices
- Handle textiles and laundry carefully
- Follow safe injection practices
- Ensure healthcare worker safety including proper handing of needles and other sharps

The CDC maintains a valuable and fascinating website that you may want to explore at https://www.cdc.gov/. Advances in infection control are being made every day, and the CDC website is a great way to keep on top of the latest information.

Transmission-Based Precautions

Patients with known or suspected infectious diseases require additional methods of infection control beyond the Standard Precautions. The CDC developed **Transmission-Based Precautions** to limit airborne, droplet and contact transmissions. **Airborne Precautions** include placing the patient in a private room, using a fitted respirator and, if transporting the patient, making sure that he is wearing a surgical mask. **Droplet Precautions** are similar to airborne, requiring masks when within three feet of the patient. **Contact Precautions** include proper use of PPE and the autoclaving of equipment.[11]

Now that you know the basics of the precautions, let's look into each type.

Airborne precautions are required when a pathogen can spread through tiny air particles like TB. The patient must be placed on airborne isolation status and in a negative pressure room with a sign on the patient's door. Staff and visitors must wear gloves, gowns and N95 masks or respirators when caring for or visiting a patient on airborne precautions. Proper handwashing must also be practiced before and after entering these isolation rooms.

Droplet precautions are required for diseases that can be spread through droplets when a patient coughs or sneezes, as with the flu, bacterial meningitis or pertussis. The patient must be placed on droplet isolation status, and a sign must be placed on the door. Staff and visitors must wear gloves, gowns and surgical masks when caring for or visiting a patient on droplet precautions. Proper handwashing must also be practiced before and after entering these isolation rooms.

Contact precautions are needed when a disease such as Clostridium difficile (C. diff) or Methicillin Resistant Staphylococcus Aureus (MRSA) can spread through contact with the pathogen. The patient must be placed on contact isolation status with a sign placed on the patient's door. Staff and visitors must wear gloves and gowns when caring for or visiting a patient on contact precautions. Proper handwashing must also be practiced before and after entering these isolation rooms.

Protective Isolation Precautions

To assist hospitals in maintaining up-to-date isolation practices, the CDC and the **Hospital Infection Control Practices Advisory Committee** (**HICPAC**) have revised the "CDC Guideline for Isolation Precautions." HICPAC was established in 1991 to provide advice and guidance regarding the practice of hospital infection control and strategies for surveillance, prevention and control of nosocomial infections in U.S. hospitals. The revised guideline contains two parts. The information in this guide is based on the latest epidemiologic information on transmission of infection in hospitals.[12]

ONLINE LEARNING

Learn more about the HICPAC at https://www.cdc.gov/hicpac/php/about/?CDC_AAref_Val=https://www.cdc.gov/hicpac/about.html.

Protective isolation differs from isolation in the fact that it is to protect the patient from others' germs. Individuals with compromised immune systems may require this added barrier against infection.

Other Precautions

The CDC website offers an Infection Control A-Z index, covering topics from Antimicrobial Resistance to Ventilator-Associated Pneumonia. Each topic contains an overview, recommendations for prevention and control, as well as data and statistics on the topic. So any infection control questions that you may have can be answered on this amazing website.

Practice Exercise 2-4

Select the best answer from the choices provided.

1. **This guards the general public from devastating outbreaks.**
   a. Medical asepsis
   b. Blood
   c. Disinfecting
   d. Personal protective equipment

2. **Which requires the use of chemicals or heat?**
   a. Medical asepsis
   b. Blood
   c. Disinfecting
   d. Personal protective equipment

3. **Masks, gowns and gloves are examples of _____.**
   a. medical asepsis
   b. blood
   c. disinfecting
   d. personal protective equipment

4. **In 1987, the Universal Precautions mainly focused on avoiding contact with _____.**
   a. medical asepsis
   b. blood
   c. disinfecting
   d. personal protective equipment

5. **Droplet Precautions require masks when within three feet of the patient.**
   a. True
   b. False

Review Practice Exercise 2-4

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Summary

Great job soaking up the information in this chapter! This chapter discussed the importance of infection control to the health of a medical staff, its patients and the community. Agencies regulate procedures and establish guidelines to protect against the devastating effects of epidemics and infectious diseases. You've also learned the major causes of infections, the chain of infection and how to break this chain by using aseptic techniques and Standard Precautions.

Critical Thinking

As you move through this course, it is important that you take the time to think critically about what you're learning. Topics here will allow you to reflect on course material through discussions you may have with other students, instructors or even family and friends. Be sure to read the questions and discuss them with others whenever possible as you work through the chapters. Doing so will further enhance your academic experience.

1. Do some online research on the ADA. What is an interesting fact you learned?
2. The text references the NOAA several times when discussing severe weather alerts. Visit the NOAA site: http://www.legislative.noaa.gov/NIYS/. Research information in your state. Then locate a weather emergency service or program in your area. Will knowing this information help you should you ever encounter an emergency?
3. Do some online research on infectious diseases. What is an interesting fact you learned about disease transmission? Why are Standard Precautions in the healthcare field important?

Endnotes

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Chapter 3
First-Aid Procedures

Learning Objectives

When you complete the instruction in this chapter, you will be trained to:

- Explain what a medical emergency is and describe the equipment used in an emergency, including the universal medical ID and the enhanced 911 system.
- Define the role of a healthcare professional in an emergency situation.
- Illustrate how to prevent disease transmission when providing first aid.

Introduction

Individuals working in health care expect to encounter many types of emergencies. On the job, you will often encounter a patient, client or resident experiencing a medical crisis. It is important for you to acquire first-aid skills and have a working knowledge of appropriate actions to take in common accident or illness situations.

This chapter explores several of the most common medical emergencies you could encounter as a healthcare professional. You will learn how to react and how you can help. There is a lot of information here, but this chapter alone is not enough to prepare you to deal with emergencies. You will not be qualified to take any action in a medical emergency situation until you take two certification courses—Basic Life Support and First Aid by the Red Cross or the American Heart Association (AHA).

These first-aid courses also teach cardiopulmonary resuscitation (CPR). You must complete the courses before you perform any resuscitation efforts. Incorrect CPR can cause serious damage. You could, for example, puncture a lung or lacerate a liver or spleen. These can have fatal consequences. Fractured ribs are another common result of bad CPR.

Important Note: In 2010, the American Heart Association made a change in the sequence of steps for CPR. Recertification is required every two years, so if you haven't learned this yet—you will!

As a healthcare professional, with the knowledge and skills gained from this chapter and your certification classes, you will be able to help in case of emergency.

What Is a Medical Emergency?

An **emergency** describes any instance in which someone becomes ill or injured suddenly and requires immediate attention. In this chapter, you will learn the basics of providing **emergency medical care**, which refers to the immediate care given to a sick or injured person. When properly applied, it can mean the difference between life and death, or a quick recovery instead of a long hospital stay or rehabilitation in a long-term care facility. Your assistance could even help the patient to recover with only a temporary disability instead of a permanent injury! If an emergency occurs in your medical facility, it will be the responsibility of your team of healthcare professionals to help the patient recover, or to care for the patient until an ambulance or rescue squad arrives.

This is a lot of responsibility, but don't worry! When you complete this chapter and your CPR certification, you will know how to perform the lifesaving skills that make you such a valuable member of the healthcare team. So let's look at the steps you'll take to respond to an emergency.

Basic Life Support Measures

Basic Life Support (**BLS**) measures help a person who is at risk for respiratory arrest, cardiac arrest or both. It includes methods such as **CPR**, which stands for **cardiopulmonary resuscitation**; the primary method used to support blood flow to the heart and brain in cardiac arrest victims. BLS is used to keep a person alive until advanced medical assistance arrives. It is *not* a substitute for a doctor's care.

You may have heard of the ABC's of an emergency; however, in 2010, the American Heart Association updated their guidelines in the BLS sequence. The old method of the ABC's—Airway, Breathing, Chest compressions—focused on providing rescue breathing. The new method, CAB—Chest compressions, Airway, Breathing—focuses on giving the victim chest compressions first and foremost. Research shows that chest compressions are more critical initially than the timing of the first breath provided.

The CAB steps of an emergency are as follows:

C	Chest compressions
A	Airway
B	Breathing

The reason for the change from A-B-C to C-A-B is that chest compressions were delayed while the responder opened the victim's airway to administer mouth-to-mouth. The change to C-A-B allows chest compressions to be administered much sooner, with minor delay of ventilation. This immediate administration of chest compressions provides rapid blood flow and oxygen to the heart and brain.

Training Programs

There are many types of training programs available to teach you how to react in case of an emergency. Again, even if you've taken a CPR class in the past, you must retake this training every two years. This training is available at hospitals, the YMCA and community colleges. Most healthcare facilities require CPR certification as a condition for employment. The American Heart Association BLS is the course most commonly required for healthcare professionals and other staff that may need to perform CPR in the workplace.

AED

Some CPR certification courses also include training on using automated external defibrillators. An **automated external defibrillator** (**AED**) is a portable device that delivers an electric shock through the chest to the heart. The shock may stop an irregular heart beat (arrhythmia) and allow a normal rhythm to resume following sudden cardiac arrest.

ONLINE LEARNING

Build on what you are learning by locating local training centers. The AHA website has a list of local training centers that offer BLS courses in your zip code.

Your Role in an Emergency

As a healthcare professional, you will interact with patients, clients or residents in a number of ways and you'll get to know them fairly well. That gives you a unique insight into what is "normal" in their personalities and habits. When a change occurs in the patient, you will likely be one of the first to notice. For example, when a patient becomes suddenly disoriented, you know something is wrong. Your first responsibility is to report to the physician or nurse any signs of unusual behavior that give you cause for alarm.

Your responsibilities in an emergency are clear. They boil down to five basic steps:

1. Recognize that there is an emergency. You can detect changes in behavior or physical condition through observation.
2. Decide to act. Determine if any danger exists for you or other healthcare workers before entering a situation. Then take appropriate action.
3. Determine if the person is conscious. If you feel it is safe, gently shake the person and call to her. If she has merely fainted, she will come around quickly, and you simply need to call the physician or nurse for help. If not, the situation is more serious. Proceed to the next steps.

4. Activate the emergency medical services (EMS) system. The EMS system is a network of resources that is organized to respond to an emergency. Hospitals have their own EMS systems and a code or procedure for calling EMS assistance within the facility. Other healthcare facilities such as assisted living and long-term care facilities usually require you to call 911. The quicker you activate the EMS system, the more likely your patient will have a good outcome. When you call, provide an accurate location first, then describe the patient's condition.
5. Provide appropriate care until EMS or other qualified medical personnel arrive. Start first aid or BLS measures as necessary. Perform only those procedures for which you have been trained and that are within the scope of your work as a healthcare professional. Keep your patient calm by speaking gently. Reassure her that help is on the way.

Emergency Procedure in a Medical Facility

More than likely, you already know the drill to get yourself and your family out of your house safely if it catches fire. You crawl through the house to avoid breathing the smoke, you follow your alternate exits and you call 911 from a neighbor's house—not your own. You could probably think through the steps while the house is burning, but by then your house may be gone! The knowledge must be there already so that you can react quickly and appropriately. You don't have time to think about the procedure, you just need to do it. The same is true for an emergency in a medical setting. There's no time to debate who should assess the patient, when to perform CPR and who should call 911.

Every medical facility follows a procedure to handle the emergencies that occasionally arise. From the doctors to the patient care technicians, each staff member has a role during such a crisis. It is critical that each person knows what that job is. In this section, you'll learn about the equipment and procedures involved in responding to emergencies.

Emergency Kit

As part of your preparation for emergency care, you and the facility where you work should have an emergency kit. A good **emergency kit** contains all the supplies and equipment necessary to handle most common emergencies. Your facility will provide a pre-assembled kit with standard equipment. However, you can also put together your own kit.

An emergency kit is a large, sturdy box containing the equipment and supplies to treat emergency victims.

Here is a list of supplies your emergency kit might include:

- Gloves
- Alcohol wipes
- Blood pressure cuff
- Stethoscope
- Easily activated hot and cold packs
- Tubing
- Sterile dressings
- Bandage material
- Adhesive tape
- Face shield for rescue breathing
- Bandage scissors
- Sterile water
- Penlight
- Paper and pen

The Universal Emergency Medical Identification Tag

A **universal medical identification tag** is a small tag that identifies the wearer's medical condition. It has the universal emergency medical identification symbol printed on it and is worn on a bracelet, neck chain or on the clothing to make it immediately recognizable. The tag alerts anyone of the person's medical condition even if the wearer is unconscious or unable to explain. It might tell you, for example, if the person is diabetic.

Universal medical ID

Some people prefer to carry a wallet card with the same information. In addition to identifying a medical condition, the tag may have a telephone number that medical personnel can call for more information such as specific medications and the phone number of the patient's physician.

Emergency Policy Manual

Your facility will have a manual with guidelines to follow when an emergency occurs. An emergency plan with assigned responsibilities should be developed and available to all employees. This is part of the facility's emergency procedure. You must become very familiar with these policies so that when an emergency occurs, you know immediately just what to do. Knowing and being able to perform first aid and CPR is essential. Many facilities offer an annual renewal course of CPR/First Aid as a benefit. Some will even hire an instructor to come to the facility to provide the recertification. It's that important!

Call Emergency Services

In every emergency situation, call a nurse, your supervisor or EMS. Again, hospitals have their own EMS systems, but other facilities require you to call 911.

Make sure you clearly and fully describe the emergency situation to the communications operator when you make the initial call. The operator will then know what level of emergency personnel and rescue equipment to send.

Some communities have what is called an enhanced 911 system. The **enhanced 911 system** automatically identifies the caller's telephone number and location. If the telephone is disconnected or the patient loses consciousness, the communications operator can still send emergency personnel to the scene.

Document an Emergency Procedure

Every medical facility has staff members who are responsible for recording the information regarding an emergency situation and its handling. This could be the charge nurse or another supervisor. The accident report, or **incident report**, is a detailed account of the emergency and how it was managed. This becomes part of a patient's record. All patient records can be used in court, so the form must be complete and accurate. Although in most cases you will not be responsible for writing an incident report, your actions will be included in the report.

Practice Exercise 3-1

Select the best answer from the choices provided.

1. **A(n) _____ is considered any instance in which someone becomes suddenly ill or injured and requires immediate attention.**
   a. emergency
   b. emergency medical care
   c. injury
   d. life-threatening occurrence

2. **CPR stands for _____.**
   a. cardiac resistance
   b. common pulmonary resuscitation
   c. central patient rehabilitation
   d. cardiopulmonary resuscitation

3. **Your quick actions could save a patient's life. As a healthcare professional in an emergency situation, you can _____.**
   a. diagnose the problem
   b. treat the patient until EMS arrives
   c. help your patient until EMS arrives
   d. make medical decisions

4. **The _____ is a small tag worn on a bracelet, neck chain or on the clothing bearing a message that the wearer has an important medical condition that might require immediate attention.**
   a. universal medical identification tag
   b. medical tag
   c. ID tag
   d. enhanced 911 system

5. **In your role as a healthcare professional, once you recognize that there is an emergency and decide to act, your next step is to _____.**
   a. call for the supervisor
   b. check for consciousness
   c. start a new chart
   d. call EMS

6. **_____ measures help a person who is at risk for respiratory arrest, cardiac arrest or both.**
   a. CPR
   b. First-aid
   c. Emergency
   d. Basic Life Support

7. **Caroline is stung by a bee and has an allergic reaction. Her throat begins to swell as she calls 911. In the middle of telling the operator about her emergency, Caroline faints. Caroline's town has an enhanced 911 system; therefore, _____.**
   a. Caroline will need to regain consciousness and call 911 again
   b. the system will have Caroline's phone number, and the operator can call her back
   c. the enhanced system can immediately pull Caroline's medical record and check for any allergies or health history concerns
   d. the system automatically identifies Caroline's location and can still send help to the scene

Review Practice Exercise 3-1

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Emergency Situations

As you experience different incidents, you will begin to learn when you can handle them with simple first aid and when you need the assistance of a physician or advanced EMS. In this section, you will explore the cause, symptoms and treatments for various emergency situations. Then, the steps to assist the patient with the condition are provided.

Seizures

Seizures are also known as convulsions. They occur when brain activity is interrupted. Seizures can result from high body temperature (fever), head injuries, infections, brain tumors and epilepsy.

Terms used to describe and classify seizures increase the accuracy, decrease the confusion and is more descriptive of what is happening.

1. **The onset or beginning of a seizure**: Where seizures start in the brain tells a lot about what may occur during a seizure, what other conditions or symptoms may be seen, how they may affect someone and, most importantly, what treatment may be best for that seizure type. When the onset of a seizure is unknown, the wrong treatment may be used. Alternatively, a person may not be offered a treatment that has the best chance of helping.
2. **A person's level of awareness during a seizure**: Whether a person is aware or not tells a lot about the type of seizure. It's also very important to know for a person's safety.
3. **Whether movements happen during a seizure**: Seizures can also be described by whether motor symptoms occur. When no motor symptoms happen, it can be called a non-motor seizure. This level of description does not need to be used all the time, especially when generally describing or talking about seizures.

The three major groups of seizures are unknown onset, generalized onset and focal onset. Within each major group, the symptoms may be classified as motor or non-motor. Symptoms include sustained rhythmical jerking movements (**clonic**), muscles becoming weak or limp (**atonic**), muscles becoming tense or rigid (**tonic**), brief muscle twitching (**myoclonus**) or the body may flex and extend repeatedly (**epileptic spasms**).

When the beginning of a seizure is not known, it is called an **unknown onset seizure**. Typically, this type is identified when a seizure happens at night or the patient lives alone. This type of seizure may be described as motor or non-motor. Motor seizures are described as tonic-clonic or epileptic spasms. Non-motorized seizures usually include behavior arrests, which means that movement stops. Here, the patient may just stare and not make any other movements.

Seizures that affect both sides of the brain or groups of cells on both sides of the brain at the same time are known as **generalized onset seizures**. Motor symptoms for this type of seizure include clonic, atonic, tonic, myoclonus and epileptic spasms. Non-motor symptoms are usually called absence seizures, which may be typical or atypical.

Once known as partial seizures, **focal onset seizures** can start in one area or group of cells in one side of the brain. This type has the same motor symptoms, clonic, atonic, tonic, myoclonus and epileptic spasms, but they may be automatisms, or repeated automatic movements. This may be seen as clapping or rubbing of the hands, lip-smacking or chewing. Non-motor symptoms include changes in sensation, emotions, thinking or cognition, automatic functions or lack of movement.

Steps to Take: Seizures

1. Ease the person to the floor. If the person is already in bed, make sure the side rails are padded to prevent head injury.
2. Turn the person gently onto one side. This will help him breathe.
3. Clear the area around the person of anything hard or sharp. This can prevent injury.
4. Put something soft and flat, like a folded jacket, under his head.
5. Remove eyeglasses, if worn.
6. Loosen ties or anything around the neck that may make it hard to breathe.
7. Time the seizure. Call 911 if the seizure lasts longer than five minutes.

Diabetes

Diabetes mellitus is a chronic syndrome of insufficient insulin production that leads to the body's inability to metabolize carbohydrates, protein and fat. The disease has a genetic component, but its development also depends on the individual's environment and lifestyle, including diet, weight and exercise habits. Diabetes can cause serious health complications, including heart disease, blindness, kidney failure and lower extremity necrosis, resulting in amputations. Diabetes mellitus occurs as type 1 and type 2 diabetes.

Type 1 diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin to properly control blood sugar levels. In type 1 diabetes, the body cannot make its own insulin; therefore, the patient must take insulin every day. For this reason, the condition is also known as insulin-dependent diabetes. In the past, type 1 diabetes was known as juvenile onset diabetes because, although it can affect any age, it is most often diagnosed in children, adolescents or young adults.

Type 2 diabetes is the result of a problem in the way the body produces or uses insulin. This is the most common form of diabetes. Family history and genetics play a large role in the development of type 2 diabetes. Low activity levels, poor diet and excess body weight—especially around the waist—significantly increase the risk for type 2 diabetes.

Secondary diabetes mellitus is defined as a diabetic condition that does not result from genetics or environmental conditions; it is always caused by another condition or event.

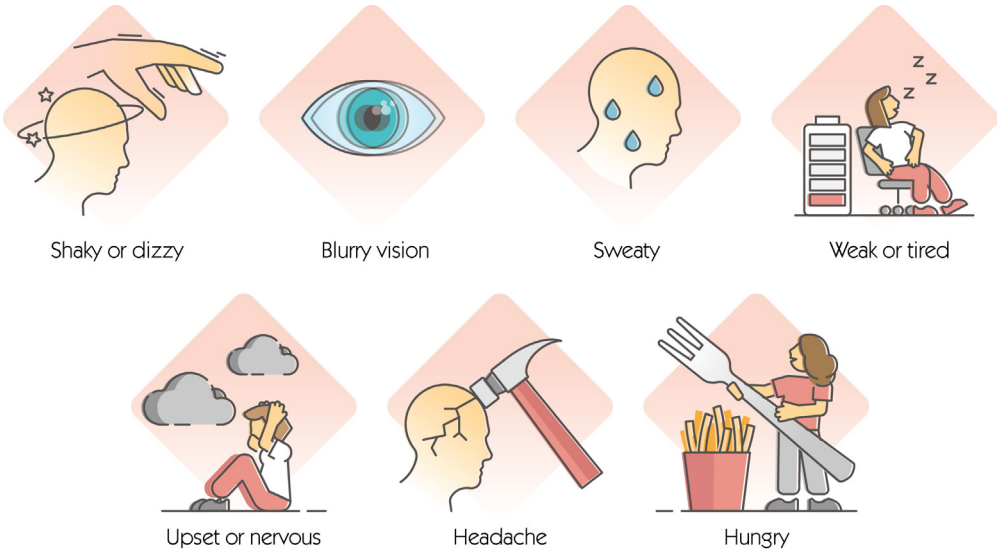
People who think they might have diabetes must visit a physician for diagnosis. They might have some of the following symptoms, or they may be asymptomatic.

Symptoms of diabetes
Frequent urination
Excessive thirst
Unexplained weight loss
Extreme hunger
Sudden vision changes
Frequent fatigue
Very dry skin
Sores that are slow to heal
More infections than usual

Nausea, vomiting or stomach pains may accompany some of these symptoms in the abrupt onset of type 1 diabetes. Diabetic patients may present emergency situations by becoming hyperglycemic or hypoglycemic. You will need to know how to respond to both situations. First, let's look at how to quickly distinguish the two, when possible.

1. Ask the patient questions. Can he talk? He may know his condition.
2. Ask the patient if insulin or food has been taken, and when.
3. Is the breath fruity or sweet-smelling? Fruity, sweet-smelling breath indicates hyperglycemia.
4. Are respirations deep or shallow? Deep breathing indicates hyperglycemia; shallow breathing indicates hypoglycemia.

If you cannot determine the condition, give the patient a little sugar—hypoglycemia is much more common and can cause irreversible brain damage. If the patient lapses into unconsciousness, he may die if not treated quickly.



Low blood sugar warning signs

Hyperglycemia

Hyperglycemia is caused by an increased amount of sugar in the blood. Eating too many carbohydrates, infection, fever, emotional stress or failing to take adequate insulin may trigger this response. If the condition remains untreated, the patient will fall into a **diabetic coma**. Before falling into a coma, the patient might experience the following symptoms:

Symptoms of hyperglycemia
Confusion
Excessive hunger or thirst
Dizziness
Frequent urination
Weakness
Nausea or vomiting
Rapid pulse
Deep, rapid breathing
Dry, warm skin
Very strong sweet, fruity breath odor
Gradual onset of symptoms

Steps to Take: Hyperglycemia

If the patient is conscious:

1. Have the patient check his insulin/glucose level.
2. If the patient is unable to confirm his insulin status, then give the patient a little sugar and see if his condition improves. Call 911 if the patient isn't able to accomplish these steps or the condition worsens.
3. The patient should self-administer insulin if his personal readings indicate that his blood sugar levels are too high.

If the patient is unconscious:

1. Call 911 immediately.
2. If a physician is present, she may administer insulin.
3. The patient should be transported to the nearest hospital.
4. The patient will be checked for positive diagnosis and reduction of blood sugar.

Hypoglycemia

Hypoglycemia may occur from an excess amount of insulin in the body. This can happen if the patient has not eaten in regularly measured amounts, if he vomits after taking insulin, if he is engaging in excessive exercise or if he takes too much insulin. Left untreated, the patient will eventually experience **insulin shock**, which is characterized by fainting, seizure or coma.

Symptoms of hypoglycemia
Muscle weakness
Headache
Anxiety
Dizziness
Mental confusion
Pounding heartbeat
Shallow, rapid breathing
Excessive hunger
Diaphoresis
Cold, pale and moist skin
Unconsciousness, with or without seizures
Rapid onset of symptoms

Steps to Take: Hypoglycemia

If the patient is conscious:

1. Give the patient sugar, such as candy or glucose tables until the patient is more alert and the blood sugars are stable.
2. Once stable, you can give the patient a fat such as peanut butter. The body will quickly absorb and burn the sugar causing dramatic swings in blood glucose. The fat will stabilize that swing.
3. Watch patient carefully for signs of improvement, if none then call 911.

If the patient lapses into unconsciousness:

1. Call 911 if no doctor is present. Follow any instructions from a physician.
2. A qualified healthcare professional should give the patient an intravenous form of glucose, either as an IV fluid or injectable.
3. Stay with the patient until he becomes conscious.

If the patient doesn't regain consciousness:

1. Call 911.
2. The patient must be transported at once to a hospital.

Fainting

If a patient in the healthcare facility "feels faint," she probably feels lightheaded and weak. **Fainting** occurs when the blood supply to the brain decreases and causes the patient to lose consciousness. It can result from hunger, pain, emotion, fatigue, excessive heat or standing for a long period of time. In addition, fainting can indicate a serious medical condition such as a heart problem, for example.

Symptoms of fainting
Skin is pale, perspiring, cold or clammy
Nausea
Lack of balance

Steps to Take: Fainting

Equipment Needed: Cold compress, stethoscope, watch, thermometer

1. Gradually lower the patient to a flat surface. If possible, slide the patient down your own body to support the transition without falling or injuring either the patient or yourself.
2. Loosen any tight clothing.
3. Check breathing.
4. Check for symptoms of a life-threatening emergency.
5. Elevate the legs if there is no back or head injury.
6. If vomiting occurs, roll the patient onto her side.
7. Activate ammonia salts and waved lightly over the patient to assist them in waking up.
8. Monitor vital signs to determine if she is stabilized before allowing her to leave. Fainting is not necessarily serious, but 911 or EMS may need to be called if vital signs are abnormal—the fainting could be a symptom of a more complex medical condition.

Heart Attack

A heart attack is the classic example of an emergency situation. It often occurs suddenly and without warning. A **heart attack** is the common term for a myocardial infarction (MI). The myocardium is the muscular wall of the heart. An infarction occurs when the blood supply to the myocardium is blocked and a part of the heart muscle dies. Since the area affected may be large or small, the severity of heart attacks vary. Treat any heart attack as a life threatening medical emergency that demands immediate attention.

ONLINE LEARNING

Build on what you are learning by reading the article at https://share.upmc.com/2018/07/am-i-having-a-heart-attack/.

The symptoms of a heart attack can vary greatly from one person to the next. In addition, men and women may experience very different symptoms. In general, heart attacks involve varying degrees of chest pain or discomfort, weakness, sweating, nausea, vomiting and irregular heartbeat, which sometimes causes loss of consciousness.

With any type of cardiac distress, the MA should get the provider to the patient as soon as possible so that the patient can be assessed. The provider might order nitroglycerin. The MA will get the medication and provide the patient with water to take it. Here are typical symptoms of a heart attack.[1]

Typical Symptoms of Heart Attack	
Males	**Females**
Nausea or vomiting	Nausea or vomiting
Jaw, neck or back pain	Jaw, neck or upper back pain
Squeezing chest pressure or pain	Chest pain (but not always)
Shortness of breath	Shortness of breath
	Fainting
	Indigestion
	Pain or pressure in the lower chest or upper abdomen
	Extreme fatigue

Time is critical! Prompt, appropriate treatment within the first hour of an attack can save a patient's life and reduce permanent damage. You must call 911 immediately, but you can also help until EMS arrives.

Steps to Take: Heart Attack

1. Call 911. Do not hesitate. Ask another staff member to call the physician.
2. If the patient has medication such as nitroglycerine, it should be given immediately.
3. Keep patient still. Do not waste time transferring the patient to an exam room.
4. Loosen patient's clothing and raise his head to make breathing easier. A cool cloth to the forehead or around the neck is soothing while you wait for assistance. Cover the patient with a blanket to treat shock.
5. Monitor vital signs until paramedics arrive. Write these down to report to the paramedics and for your own documentation.

Stroke

A **cerebrovascular accident** (**CVA**)—also known as apoplexy and stroke—is an acute neurological injury that interrupts the blood supply to a part of the brain and causes tissue to die. A stroke is commonly confused with a heart attack. Remember, a stroke interrupts blood supply to the brain, while a heart attack is blockage of blood to the heart.

The American Heart Association and American Stroke Association use F.A.S.T. as an easy way to remember the sudden signs of a stroke.[2]

- **F - Face drooping**. Does one side of the face droop or is it numb? Ask the person to smile. Is the person's smile uneven or lopsided?
- **A - Arm weakness**. Is one arm weak or numb? Ask the person to raise both arms. Does one arm drift downward?
- **S - Speech difficulty**. Is speech slurred, are they unable to speak or are they hard to understand? Ask the person to repeat a simple sentence.
- **T - Time to call 911**. If the person shows any of these symptoms, even if the symptoms go away, call 911 and get them to the hospital immediately.

Other symptoms include sudden numbness or weakness of the leg; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, loss of balance or coordination; and sudden severe headache with no known cause.

Anyone who exhibits any of the warning signs of stroke needs immediate emergency assistance to ensure quick recovery. According to the CDC, those who arrive at the emergency department within three hours of their first symptoms often have less disability three months after a stroke than those who received delayed care.[3] Quick, appropriate intervention can reverse damage caused by blood vessel blockage. Helping blood flow through arteries or veins again can restore a person to their prior state of health. The American Heart Association has adopted a series of actions for EMS and emergency personnel to evaluate and determine the appropriate reaction to strokes. It involves initial field evaluation criteria, rapid transportation, medical evaluation and CT scan interpretation.

The severity of strokes varies largely. A light stroke causes minimal damage. A more extensive stroke can cause immediate paralysis in the form of sagging muscles on one side of the face or the inability to use an arm or leg. One entire side of the body may be paralyzed. Keep in mind that anyone who appears to be unconscious or is unable to speak may be able to hear (and understand) what is being said.

Heat Exhaustion and Heat Stroke

Extreme heat causes heat exhaustion and heat stroke. Naturally, you will encounter these emergencies most often during the summer or in very warm climates.

Extreme heat

Heat Exhaustion

Heat exhaustion usually happens during heavy physical exertion. An athlete running a marathon on a hot day, for example, is a prime candidate for heat exhaustion. It occurs when there is dehydration, electrolyte depletion, lowered blood sugar levels and/or lactic acid build-up.

Symptoms of heat exhaustion
Headache
Fatigue
Dizziness
Moist, pale skin
Rapid pulse
Low blood pressure
Increased respiratory rate
Body temperature usually remains normal or only slightly above normal

Symptoms of heat exhaustion typically disappear soon after the affected person drinks an adequate amount of water or an electrolyte replacement drink (like Gatorade).

Heat Stroke

Heat stroke is a life-threatening condition that can result in brain damage and coma. It occurs when the body can no longer compensate for the rise in body temperature. Core body temperature threatens brain damage as it rises rapidly past 105 °F.

Symptoms of heat stroke
Seizures
Possible hot, flushed and dry skin
Rising, then falling vital signs

Heat stroke victims can deteriorate quickly to a coma, so it is imperative that you act fast.

Steps to Take: Heat Stroke

1. Call EMS.
2. Quickly move the patient to a cool area. Heat stroke demands rapid cooling.
3. Loosen clothing.
4. Place cold water or wet sheets on the patient's body.
5. Concentrate on cooling down the core surface areas: the scalp, neck, armpit and groin.
6. Transport the patient to the hospital as quickly as possible.
7. Continued cooling en route is required.
   Note: Ice should never be applied directly to skin—it must be in a wrap or towel of some kind.

Frostbite

Windy, subfreezing weather creates the greatest risk for frostbite. **Frostbite** occurs when skin is exposed to extreme cold and the tissue is damaged. Typically, frostbite affects small body parts with a high ratio of surface area or tissue mass such as fingers, toes, ears and the nose. Larger areas of the extremities are vulnerable, too, when temperatures drop dangerously low. This kind of extreme cold exposure causes tissues to freeze and cells eventually die. If the nerves and blood vessels are severely damaged, **gangrene** (death and decay of body tissue) may result and amputation may eventually be required.

Symptoms of frostbite
Skin discoloration
Burning and/or tingling sensations
Partial or complete numbness
Possibly intense pain

If left untreated, frostbitten skin gradually darkens after a few hours. Skin destroyed by frostbite turns completely black and looks loose and stripped, as if it was burnt.

Frostbite

Steps to Take: Frostbite

1. Move the victim to a warm, safe area.
2. If medical attention is easily reachable, wrap the affected areas with dressings and/or cloths.
3. If it is unlikely that the affected areas can be kept thawed, treatment should not be carried out—thawing followed by a second round of freezing can cause more extensive and severe damage to the frostbitten areas.
4. Place the affected areas in warm—NOT hot—water, until the areas are soft and sensation has returned.
5. Wrap the areas in clean, sterile dressings and attempt to reach medical help. If hypothermia has occurred, attend to the hypothermia first.

Hypothermia

Hypothermia occurs when the body loses more heat than it can generate. This typically happens when a person is exposed to the cold for an extended period of time. This may mean a person is not properly dressed for cold weather conditions or her clothes are wet. However, even indoor temperatures of 60 to 65 °F can cause hypothermia. Older people are at greater risk for hypothermia.

Symptoms of hypothermia
Confusion
Cold skin
Shivering

Hypothermia is a dangerous condition that can be fatal. Treatment involves raising the core body temperature of the victim. That sounds simple enough, but if the hypothermia becomes severe (the patient is incoherent or unconscious) re-warming *must* be done by trained professionals. Bystanders should only remove the patient from the cold environment and call emergency services to get advanced medical care as quickly as possible.

DO NOT:

1. Rub or massage the patient
2. Give alcohol
3. Give food or drink (this includes warm drinks)
4. Treat any frostbite

Any of these actions will divert blood from the critical internal organs and may make the situation worse.

Steps to Take: Hypothermia

1. Call EMS.
2. Get the patient to shelter and into dry clothes, if possible.
3. Wrap the patient in blankets.
4. Monitor the patient and be prepared to give cardiopulmonary resuscitation.
5. Transport to hospital ASAP!

Hemorrhage

When you encounter an emergency that involves bleeding, you must determine the source and the severity of the hemorrhage. **Bleeding** is the loss of blood from the body, but the term **hemorrhage** refers to excessive, uncontrolled bleeding. Bleeding is more dangerous for children because they have less blood to lose. The average adult human will be in medical danger after a loss of one liter (two pints) and could die of shock if more blood is lost. An average adult with a weight of 150 to 180 pounds will contain approximately 1.2 to 1.5 gallons (4.7 to 5.5 liters) of blood.[4]

External Bleeding

Arterial bleeding comes from arteries, the major blood vessels that carry oxygen-rich blood from the heart throughout the body. This type of bleeding is characterized by spurts with each beat of the heart, is bright red in color (although blood darkens when it meets the air) and is usually severe and hard to control. Arterial bleeding requires immediate attention. If the ruptured artery is a large branch, death can occur in three minutes or less!

Venous bleeding comes from veins, which are vessels that return the blood to the heart. Venous bleeding is characterized by a steady flow, and the blood is dark, almost maroon in color. Venous bleeding is easier to control than arterial bleeding.

Capillary bleeding comes from capillaries, which are the smallest of the body's blood vessels. It is usually slow and oozing. Capillary bleeding creates a higher risk of infection than other types of bleeding. However, it will often clot without first-aid measures being taken.

Steps to Take: Hemorrhage

1. Call EMS immediately.
2. Cover the wound with a clean cloth or pad of gauze squares.
3. Exert pressure directly on the bleeding area.
4. Elevate the body part that is bleeding.

Internal Bleeding

Internal bleeding occurs inside the body, so it is hard to detect by simple observation. Surgery is the only treatment for internal bleeding. If you suspect internal bleeding, call 911 immediately! Keep the patient in a recumbent or lying position with strictly limited movement until the surgery is performed.

Symptoms of internal bleeding	
Rapid, weak pulse	Faintness
Shallow breathing	Thirst
Cold clammy skin	Restlessness
Dilated pupils	A feeling of anxiety
Dizziness	

Vaginal Bleeding

Vaginal bleeding refers to bleeding in females that is either a physiologic response during menstruation or caused by hormonal or organic problems of the reproductive system. Vaginal bleeding may occur at any age, but always needs investigation when encountered in children or postmenopausal women.

Symptoms of (abnormal) vaginal bleeding
Heavy bleeding (soaking more than one pad per hour)
Passing something that looks like tissue (place the tissue in a container and take it with you to the hospital)
Severe cramping (like a menstrual period)
Cramping or bleeding accompanied by fever
Abdominal pain

Vaginal bleeding during pregnancy may indicate a pregnancy complication. During pregnancy, mild to moderate blood loss may be due to a rupture of a small vein on the outer rim of the placenta. It can also be a symptom of a miscarriage or ectopic pregnancy. Bleeding in early pregnancy may be a sign of a threatened or incomplete miscarriage. Any vaginal bleeding during pregnancy requires the physician be notified.

Nosebleeds

Nosebleed is the common term for **epistaxis**. It usually follows injury, either external or internal, such as a blow to the nose. Other common causes include breathing dry air, nose picking, putting a foreign body in the nose, chronic conditions such as a nasal or sinus infection as well as bleeding and inhalation of irritating substances. Other factors that can lead to nosebleeds are high blood pressure, anticoagulation drugs, chronic aspirin use and blood diseases such as anemia, hemophilia and leukemia.

Treatment for nosebleeds varies depending on the cause, location and severity. Even moderate bleeding is of concern if it persists longer than 20 minutes after pressure is applied.

Symptoms of serious nosebleed
Severe blood loss
Lightheadedness
A drop in blood pressure
Rapid pulse
Difficulty in breathing and pain
Pallor
Other indications of shock

Steps to Take: Nosebleeds

1. Keep patient upright or lying on her side with head elevated.
2. Pinch the bridge of the nose with fingers for 5-10 minutes.
3. Placing an ice pack wrapped in a towel on the bridge of the nose may also be helpful.
4. Ask the patient to avoid talking or blowing the nose.
5. Observe blood loss and watch for signs of shock.

Poisoning

Poison is a substance that causes injury, illness or death. Poisons can be eaten, drunk, inhaled, injected or absorbed through the skin. There are various causes and symptoms of poisoning.

Cause	Possible Substances	Symptoms
Food Poisoning	Spoiled food, such as meat, eggs, seafood, prepared dishes	Vomiting, diarrhea
Carbon Monoxide	Cigarette smoke, gas heaters, exhaust pipes from car	Headaches, dizziness, vomiting, chest pain, blurred vision, loss of consciousness
Bee Sting	Wasp, bee or yellow jacket sting	Difficulty breathing, swelling, high blood pressure

Steps to Take: General Poisoning

1. Notify nurse or EMS of the poisoning incident.
2. Call the Poison Control Center at 1-800-222-1222.
3. Ask the patient what was taken, how much and when. Give this information to the Poison Control Center.
4. If the poison is an inhalant, take the patient to an area with fresh air. The patient may require pulmonary resuscitation until help arrives.
5. If the poison is affecting the skin, remove the clothing. Wash the skin thoroughly unless you suspect that a dry powder is the cause of the poisoning. Some powders are safe to wash off with water, while others require different solvents for removal. Using the wrong liquid for rinsing can increase the damage. Follow directions from the Poison Control Center.
6. If the poison is in the eye, flush the eye thoroughly for at least 15 minutes.
7. If the poisoning was through ingestion, the Poison Control Center will tell you (depending on the type of poison) what to do.

Choking

A common cause of a blocked airway in adults is choking. **Choking** is most often caused by food caught in an air pocket while eating. This occurs when someone sucks partially chewed food into the windpipe when talking, laughing or coughing while eating. Children, on the other hand, can get toys, toy parts, buttons, candy and a variety of other objects caught in their throats and obstruct their airway. Pieces of food can also cause problems for children—especially raw carrots and hot dogs. Other common choking hazards for children include filmy plastic bags and latex balloons.

Symptoms of choking
Clutching the throat
Inability to speak, cough or breathe

You will use abdominal thrusts to relieve a blocked airway due to a foreign body in a conscious person. However, it is important that you learn this procedure in an approved BLS class before you perform the procedure. If done incorrectly, you could break a patient's rib or puncture a lung. If a patient is in an advanced stage of pregnancy or is very obese, abdominal thrusting will not be possible. Instead, you must use a chest thrust to dislodge the material. Only those trained in proper BLS measures should use chest thrusts.

Abdominal thrusts

Respiratory (breathing) emergencies occur for a variety of reasons including choking, shock, allergies, drowning or electrocution. When someone stops breathing, act quickly.

Artificial breathing is a technique where you blow air into the victim's mouth to breathe for the victim until she can breathe on her own again. You provide the victim with enough oxygen to maintain life until she resumes breathing or until help arrives. You can perform artificial breathing in several ways. In a medical facility, you will have a respirator or oxygen tank and mask. Elsewhere, you will probably rely on mouth-to-mouth resuscitation. This should only be performed after receiving proper BLS training.

Shock

A lack of oxygen to the individual cells of the body causes **shock**, which is an immediate response by the body tissues when they don't receive enough oxygen-rich blood.

The body initially adjusts for shock by increasing the strength of contractions of the heart, increasing the heart rate and constricting the blood vessels. As shock progresses, the body has difficulty trying to adjust and eventually tissues and body organs will sustain such severe damage that the shock becomes irreversible.

Shock is one of the leading causes of death in a critically ill person. There are several types of shock and they can be caused by various factors.

- **Hypovolemic shock** is caused by loss of blood or other body fluids. If hypovolemic shock occurs due to blood loss, it may also be called hemorrhagic shock. Dehydration caused by diarrhea, vomiting or heavy sweating can also lead to hypovolemic shock.
- **Cardiogenic shock** is the most extreme form of heart failure. It occurs when the function of the left ventricle is so compromised that the heart can no longer adequately pump blood to body tissues.
- **Neurogenic shock** is caused by a dysfunction of the nervous system. The diameter of the blood vessels in the body can no longer be controlled, which leads to a dilation of the blood vessels. Once the blood vessels are dilated, there is not enough blood in the circulation to supply the body with oxygen. The result is shock.
- **Anaphylactic shock** is an acute generalized reaction that occurs within minutes to hours after the body has been exposed to a foreign substance to which it is severely allergic (bee stings or peanuts, for example).
- **Septic shock** is caused by a generalized infection of the bloodstream. It may be associated with an infection such as pneumonia or meningitis. It may also occur without an apparent source of infection, especially in infants and children. The patient may have become ill suddenly or the illness may develop over several days.

Symptoms of shock
Sudden drop in blood pressure
Pale or discolored, cold, clammy skin
Weak or rapid pulse
Irregular, shallow or rapid breathing
General weakness
Dilated pupils
Anxiety or confusion
Reduced urination
Loss of consciousness

Steps to Take: Patient in Shock

Shock can be the result of many types of medical emergencies. The following should serve as a general guideline for managing a patient in shock.

1. Call EMS.
2. Keep the patient warm and dry.
3. Apply pressure to any bleeding.
4. Transport to the nearest hospital as soon as possible.

Insects

For a person who isn't sensitive to bee, wasp or hornet stings, the result is usually limited to a painful swelling with redness and itching. The stinger can be removed by scraping it with the straight edge of a thumbnail or a credit card. Never grasp the stinger with your fingers or a tweezers, as that would inject more of the venom.

Insect sting

A more sensitive person might want to take an antihistamine to lessen the reaction. An ice pack will reduce swelling, but be alert for breathing problems if the sting is in an area that may affect breathing.

When a patient is severely allergic to stings, the stings can cause acute illness. The severely allergic patient should always have a special emergency kit close at hand when there is a possibility of a sting.

Symptoms of allergic reaction to an insect sting
Restlessness
Headache
Shortness of breath
Skin is a mottled blue color
Shock
Severe nausea, vomiting and bloody diarrhea

As you know, anaphylactic shock is an acute generalized reaction that occurs within minutes to hours after the body has been exposed to a foreign substance to which it is severely allergic, such as bee stings. If the provider confirms this is the case, epinephrine will be administered intramuscularly. The MA will draw the medication and administer it to the patient.

Disease Transmission

As you know, pathogens are found in patients' blood and body fluids. Wherever you work in the medical field, whether it be in a medical clinic or a hospital, you might be surrounded by ill patients every day. You can imagine how easily pathogens are transmitted if you aren't following infection control procedures.

Consistent use and adherence to infection control measures significantly reduces the risk of disease transmission. The CDC recommends that healthcare providers consider each patient to be potentially infectious for AIDS, hepatitis B and other blood-borne pathogens.[5] It's also recommended that healthcare professionals routinely and conscientiously apply the techniques of standard precautions as a means of infection control.

Even in an emergency first-aid situation, you must take precautionary measures. When giving mouth-to-mouth resuscitation, use a barrier device if one is available. Use a CPR mask or even a handkerchief if that's all you have. Wash your hands as well as possible. Keep gloves with you—*and put them on*—so you are protected if you come into contact with any body fluids.

Knowing how a disease can be transmitted is important so that you can prevent the spread of infection. There are two types of disease transmission:

- **Direct transmission** requires direct contact with another person. Shaking hands, sexual contact, direct contact with blood or body fluids, inhaling contaminated air droplets or kissing can result in direct transmission of disease.
- **Indirect transmission** refers to situations where a susceptible person is infected from contact with a contaminated source. Examples include food, milk, water and disease-carrying insects such as mosquitoes or fleas. You can also get sick from contaminated inanimate objects. Examples include air, soil, instruments and drinking glasses.

Practice Exercise 3-2

Select the best answer from the choices provided.

1. **A patient waiting to see the doctor in your medical office suffers from a seizure. To assist this patient during the seizure, you should _____.**
   a. restrain her arms to prevent injury
   b. put a bite block in her mouth to prevent her from biting her tongue
   c. surround the patient with chairs from the waiting room to contain her movement
   d. move objects out of the way that might cause injury

2. **Diane works as a healthcare professional. The afternoon has been quiet. Suddenly, a man grabs his chest and falls to the floor. He is having a heart attack. Diane should _____.**
   a. see if the patient has nitroglycerine and give it to him immediately
   b. begin CPR right away
   c. immediately administer oxygen to the patient
   d. transfer the patient to the exam room right away and alert the physician

3. **Paul works construction and has been outdoors all day. He becomes severely dehydrated and begins to feel ill. His temperature reaches 106 °F, and his skin becomes dry and flushed. Paul likely suffers from _____.**
   a. heat cramps
   b. heat exhaustion
   c. heat stroke
   d. insulin shock

4. **Glenn suffers from hypothermia after falling through thin ice while ice fishing. The best thing you can do to assist him is to _____.**
   a. give him warm water to drink
   b. wrap his entire body in cloths
   c. move him to shelter
   d. soak his fingers and toes in hot water

5. **Ralph treats a hemorrhage victim who suffers from arterial bleeding. Ralph should _____.**
   a. apply pressure at the pressure point of the wound to stop blood flow to the area
   b. elevate the victim's head to reduce blood flow to the wounded area
   c. begin CPR immediately
   d. wrap the affected area in clean gauze squares

6. **Six-year-old Jenny ingested a large amount of kitchen cleaner that contains bleach. You should _____.**
   a. induce vomiting
   b. give the patient syrup of ipecac
   c. contact the Poison Control Center
   d. press the back of Jenny's tongue

7. **Kelli suffers from bleeding. Blood seeps out of her wound slowly. After several minutes, the blood clotted on its own. Kelli likely suffered from _____ bleeding.**
   a. arterial
   b. venous
   c. capillary
   d. internal

8. **Jake vomited up bright red blood. After visiting the emergency department, the doctors determine he has a bleeding ulcer. To treat this, the doctors will _____.**
   a. apply pressure to the ulcer
   b. elevate the affected area
   c. put pressure on his pressure points proximal to the injury
   d. perform surgery

9. **Madeline has a severe nut allergy. One day, she unknowingly eats a cookie that contains peanut butter. Only three minutes after eating the cookie, Madeline begins to have difficulty breathing. She is likely suffering from _____ shock.**
   a. hypovolemic
   b. cardiogenic
   c. neurogenic
   d. anaphylactic

10. **Martin assists Polly with a nosebleed. He tilts Polly's head forward and applies an ice pack wrapped in a towel to the bridge of her nose. He has her let the blood drip into a basin. After several minutes, he asks Polly to blow her nose to see if the bleeding has stopped. Martin _____.**
    a. followed the correct steps to stop Polly's nosebleed
    b. should not have Polly blow her nose. He should also observe for signs of shock
    c. should not have Polly tilt her head; rather she should put her head between her knees
    d. should apply a heat pad rather than ice to Polly's nose

11. **Calvin goes to school even though he's sick with pink eye. During art class, he rubs his eye, then passes the scissors to his classmate. The next day, the classmate also has pink eye. The pink eye was spread through ____ transmission.**
    a. direct
    b. indirect

Review Practice Exercise 3-2

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Summary

Wow! You've covered a lot in this chapter—your first taste of the life-saving procedures you'll be a part of as a healthcare professional. These basic techniques will provide a solid foundation for you to work from in upcoming chapters and in your career! From a fainting spell to a heart attack, you now have the knowledge to act with confidence, speed and accuracy until emergency help arrives.

Critical Thinking

As you move through this course, it is important that you take the time to think critically about what you're learning. Topics here will allow you to reflect on course material through discussions you may have with other students, instructors or even family and friends. Be sure to read the questions and discuss them with others whenever possible as you work through the chapters. Doing so will further enhance your academic experience.

1. The following video discusses accessing your medical information on your cellphone: https://www.youtube.com/watch?v=lSsxNOr6Alk. Do you see this type of application replacing the Universal Medical ID? Explain your thoughts.
2. Now that you have the skills to respond in an emergency, let's put your fears to rest so that when it's time to act, you're ready to respond. Take a look at the following video: http://www.procpr.org/en/training_video/five-fears-part-1. What concerns do you still have? Are you more comfortable with your skills and knowledge?
3. Hands Only CPR is an idea that has gained popularity with physicians and has also been endorsed by the American Heart Association: http://handsonlycpr.org/. What are the procedures of performing Hands Only CPR? What are your thoughts concerning Hands Only CPR? Why should it be done or not? Is performing Hands Only CPR better than doing nothing if you see an adult collapse?

HM110 Exam 2

Once you've mastered the course content, locate this Exam in your *Workbook*. Read and follow the Exam instructions carefully.

Endnotes

[1] "Get familiar with signs of a heart attack or stroke." *American Heart Association*, 21 January 2020. Accessed 11 August 2023. Web.

[2] "Stroke Symptoms." *American Stroke Association*. Accessed August 2, 2023. Web.

[3] "Stroke Facts." *Centers for Disease Control and Prevention*, 8 September 2020. Accessed August 2, 2023. Web.

[4] "Blood: How much do you actually have in your body?" *Split Rock Rehabilitation and Health Care Center*, 8 March 2020. Accessed August 2, 2023. Web.

[5] "Recommendations for Prevention of HIV Transmission in Healthcare Settings." *Centers for Disease Control and Prevention*, 21 August 1987. Accessed August 2, 2023. Web.

Chapter 4
Vital Signs

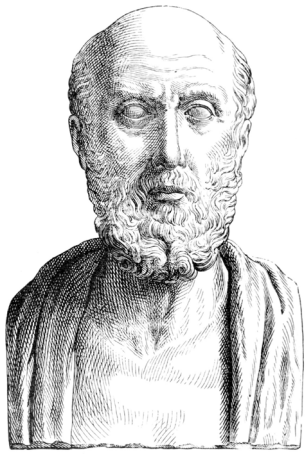
Learning Objectives

When you complete the instruction in this chapter, you will be trained to:

- Identify vital signs and the body functions they measure.
- Describe factors affecting body temperature, how the body controls it and the process to measure temperature.
- Explain normal pulse rates, the factors that affect the rate and properly take a pulse.
- Explain and measure respiration, identifying the normal rate and characteristics.
- Describe how the body maintains blood pressure, the tools used to measure it and the procedures to take blood pressure.
- Discuss the normal range of oxygen saturation and the use of a pulse oximetry.

Introduction

Virtually nothing is known of the first physician named Hippocrates, considered "The Father of Western Medicine." He lived around 400 BC and founded the famous medical school on the Mediterranean island of Cos. It was in the 5th century BC, however, that Hippocrates' name and image began to emerge as a leader in medical research and thought.



Hippocrates, the "father of western medicine," believed that people need to keep the body "in balance."

Hippocrates is generally credited with turning away from divine notions of medicine and using observation of the body as a basis for medical knowledge. Prayers and sacrifices to the gods did not hold a central place in his theories, but changes in diet, beneficial drugs and keeping the body "in balance" were the key.

Central to his philosophy and ideas on illness was the humoral theory of health, where four bodily fluids (or humors) of blood, phlegm, yellow bile and black bile needed to be kept in balance. Hippocrates believed illness was caused when these fluids became unbalanced, sometimes requiring the reduction in a body fluid through bloodletting or purging.[1]

Just as Hippocrates used four humors to determine health, historically there were four vital signs to examine and record while monitoring the patient's health. The four vital signs are temperature, pulse, respiration and blood pressure. In 1988, the fifth vital sign, oxygen saturation by pulse oximetry, was added. Vital signs help indicate a person's health status. Healthcare professionals measure vital signs to determine whether the patient's body is functioning within normal limits.

In this chapter, you will learn to define and describe the characteristics of each of the vital signs. You will also examine normal and abnormal value ranges for each. In addition, you'll explore factors that can affect each value, and you will determine correct procedures used to measure each vital sign. Finally, you'll discover how to correctly document a patient's vital signs.

Vital Signs

Vital signs are clinical measurements that indicate how well a patient's body is functioning. These measurements include temperature, pulse, respiration rate, blood pressure and oxygen saturation. As a healthcare professional, you might find yourself measuring and interpreting these vital signs.

- Temperature
- Pulse
- Respiration Rate
- Blood Pressure
- Oxygen Saturation

Vital signs are considered a routine component of healthcare delivery because they have significant implications for your patient's care. Physicians compare patient findings to normal ranges based on gender, age and other health factors. Variations from the normal ranges may indicate a problem. One-time vital signs, or **isolated vital signs**, are not as valuable as vital signs taken over a period of time, demonstrating trends and establishing a baseline to compare and evaluate treatments.

The skills needed to measure vital signs are simple and easy to learn. However, interpreting the measurements and incorporating them into patient care and assessment skills require knowledge, problem-solving abilities, critical thinking and direct experience. Keep in mind, asking permission and making clear statements regarding patient care prior to touching a patient is encouraged. Let the patient know you plan to take their vital signs and explain the process. Explaining what you are doing beforehand is important and can ease difficult patients.

Very ill or hospitalized patients must have their vital signs monitored frequently or even continuously. Most patient care settings use established guidelines to measure vital signs. However, under a physician's direction, a patient's vital signs might be taken several times as part of an ongoing management of a particular illness or condition.

Once you take the vital signs, what happens to them? You have to document them, so let's learn more about documentation.

Document Vital Signs

Unless measuring only a single vital sign, all vital signs are documented in sequence in the patient's chart. The date and time should be noted for all vital signs. The sequence is temperature, pulse, respirations, blood pressure and oxygen saturation.

Notations in medical records are usually recorded in military time. **Military time** uses a 24-hour clock, which uses 4 numbers. Noon is expressed as 1200 (twelve hundred hours) and midnight as 0000 (zero hundred hours). For instance, 2:15 p.m. is calculated by adding 2 hours and 15 minutes to 1200, resulting in 1415.

ONLINE LEARNING

Build on what you are learning by watching the video at https://www.youtube.com/watch?v=d0qMVNBmrcw.

When recording vital signs, document them as they are taken to reduce the opportunity for errors. In some cases, patients may have vital signs recorded on a flow sheet over time, and the values are graphed to show trends. These trends can help physicians to track changes in patient conditions. Any vital signs reading outside of the normal ranges for the patient's age should be noted and reported to the physician. You will review correct documentation of each vital sign as you move through the chapter.

Let's learn more about the vital signs, beginning with temperature.

Temperature

You have had your temperature taken at some time during your life. Did you ever wonder why temperature is referred to as *degrees Fahrenheit*? The mercury thermometer was invented by Daniel Gabriel Fahrenheit, a German physicist. In 1714, he used mercury plus a chemical solution that kept the mercury from sticking to the tube of the thermometer. Then in 1724, he expanded the thermometer's scale. According to his scale, the temperature of boiling water is 212 °F, and the freezing point of water is 32 °F.

Anders Celsius, a Swedish astronomer, invented the Celsius (or Centigrade) scale in 1742, putting the freezing point of water at 0 °C and the boiling point at 100 °C.

Although the mercury thermometer has been replaced by the much safer and faster electronic thermometer, both the Fahrenheit and Celsius scales are still in use today—300 years later. The Celsius scale is used in almost all countries; the United States uses the Fahrenheit scale.

Your ultimate goal of temperature assessment is to gain an accurate measurement of the patient's core body temperature. **Core temperature** is the body's temperature in the central circulation and organs. Three sites measure core temperature—the head, chest and abdomen. Core temperature may vary by one to two degrees during the day.

As you know, temperature can be measured in degrees Celsius or Fahrenheit. At times, you may need to convert a temperature from one scale to the other. When you need to convert these numbers, you can use these conversion formulas:

Celsius to Fahrenheit

$\frac{(C \times 9)}{5} + 32 = F$ For example: $\frac{(37\ °C \times 9)}{5} + 32 = 98.6\ °F$

Fahrenheit to Celsius

$\frac{(F - 32) \times 5}{9} = C$ For example: $\frac{(102\ °F - 32) \times 5}{9} = 38.9\ °C$

Characteristics

Temperature reflects the balance between heat loss and heat production. The body loses heat through perspiration, breathing and the elimination of body wastes. Heat gain is generated through the process of metabolism.

Illness upsets the metabolic process and disturbs the amount of heat produced. Most diseases increase metabolism. However, some disorders, such as syncope, dehydration and central nervous system injury decrease body temperature. Periods of growth also increase metabolism and therefore body temperature.

An inverse relationship exists between body size and metabolic rate. The larger your body, generally the lower your metabolic rate. Children typically have a slightly higher body temperature; not only because of growth, but also because they have less body surface area where heat is lost. Other parts of the temperature puzzle are the skin receptors and the hypothalamus.

The **hypothalamus** can be thought of as a "thermostat" for the body. As the body overheats, skin receptors send signals to the nervous system. The hypothalamus then sends signals to release perspiration from the skin and to dilate superficial blood vessels to release heat and lower the body's temperature.

The body continuously produces heat as a byproduct of chemical reactions that occur in body cells, or metabolism. The automatic process of **thermoregulation** maintains a fairly constant core temperature regardless of where the heat is produced. A person's metabolic rate determines the rate of heat production. The **basal metabolic rate** (**BMR**) is the amount of energy the body uses during absolute rest while awake. Physical exercise, increased production of thyroid hormones and stimulation of the sympathetic nervous system can increase heat production.

The body also continuously loses heat. Heat is lost through radiation, conduction, convection and evaporation. Let's discuss each of these processes in greater detail.

- **Radiation** is the emission of energy from any source, in this case from the body in the form of heat. Exposure to a cold environment increases your body's radiant heat loss. As you've probably noticed in the winter, covering your body with closely woven, dark fabric can reduce radiant heat loss.

  Did you ever wonder why you get goose bumps when you're cold? When the body senses coolness, surface blood vessels constrict to keep the blood away from the surface of the skin and prevent the loss of heat. Chemical impulses to the sweat glands stop when the temperature falls below normal. The small papillary muscles around your hair follicles contract, causing goose bumps.

  How about shivering? When the hypothalamus receives cold signals, messages are sent to skeletal muscles throughout the body, causing increased muscle tone that produces heat. When the muscle tone rises above a certain level, shivering results and heat production rises dramatically.

- **Conduction** is the transfer of heat from one object to another. The body loses a considerable amount of heat to the air through conduction. The body also can lose heat to water during swimming or during tepid baths.

- **Convection** is the loss of heat through air currents such as from a breeze or a fan. Have you ever stood in front of a fan to cool down? If so, you used convection to lose heat.

- **Evaporation** causes heat loss as water transforms to a gas. Examples of evaporation include sweating during strenuous exercise or when someone has a fever.

Factors Affecting Temperature

Many factors other than body processes can affect your body temperature as well. Here, you'll learn about how age, the environment, exercise and physical activity, the time of day, emotional states, hormones and fever affect body temperature.

Normal body temperature decreases with age. Elderly patients commonly have body temperatures of less than 36.4 °C or 97 °F. Newborns have unstable body temperatures because their thermo-regulatory mechanisms haven't matured completely. Normal infant temperature ranges from 97.7 to 99.5 °F, which is 36.5 to 37.5 °C.

Environmental temperature changes don't typically affect core body temperature. However, exposure to extremely hot or cold temperatures can alter body temperature based on length of exposure, humidity, environmental temperature and wind-chill. A core body temperature of 77 °F or (25 °C) is considered life threatening.

Physical activity increases temperature due to heat production as the body breaks down carbohydrates and fats to provide energy. Body temperature can temporarily rise to 104 °F (40 °C) during strenuous exercise, such as while running a marathon.

Body temperature has **diurnal variation**, or normal fluctuations throughout the day. Temperature is usually lowest in the morning, around 3:00 a.m. and highest between 5:00 and 7:00 p.m. A person's body temperature can vary by as much as 1.8 °F (2 °C) from early morning to late afternoon. Physiologic processes such as digestion or muscle activity may cause this fluctuation.

Emotional or physical stress can elevate body temperature. Stress stimulates the sympathetic nervous system, which circulates increased levels of the hormones epinephrine and norepinephrine. This causes metabolism to increase, and increases heat production. For example, emotional depression decreases temperature.

Hormones also affect body temperature, and females usually have greater temperature variations than men. This is because **progesterone**, a female hormone secreted during ovulation, increases body temperature 0.3 to 0.6 °C (0.5 to 1 °F) above baseline.

Females can often determine when they ovulate by measuring their temperature daily. This is the basis for the rhythm method of birth control. After menopause, this temperature fluctuation stops because females no longer ovulate.

Of course, having a fever is an obvious cause for temperature changes. Fever, also called **pyrexia**, is defined as a temperature higher than 100 °F and often results from infection, brain tumors and hyperthyroidism. Untreated high fevers over 105 °F (40.5 °C) can cause brain damage or death.

Some of the terms used to describe fever include:

- **Febrile**—Having a fever.
- **Afebrile**—Without a fever.
- **Hyperthermia**—Excess body heat or fever associated with heat stroke, alcohol intake and problems with hypothalamus heat regulation signals.

- **Hypothermia**—Low body temperature associated with environmental cold exposure, paralysis, starvation and hypothyroidism. Therapeutic hypothermia may be used with surgical patients, such as with organ transplant to slow the metabolic process and prevent organ rejection. To avoid shock, hypothermic patients need to be warmed gradually.

Now that you know more about body temperature regulation, let's look at how to measure it.

Temperature Sites

There are many methods used to determine body temperature, using different types of equipment. The reliability of a temperature value depends partly on selecting the most appropriate site and following the correct procedure for placement and timing.

You must use your judgment or follow established procedures when you select the route to measure temperature. The five sites most commonly used are the ear, axilla, rectum, mouth and forehead. In most cases, using any of these sites will provide an accurate temperature when you follow correct procedures and techniques.

Ear or Aural

Measuring temperature in the ear's tympanic membrane with a tympanic thermometer is a widely used assessment method in hospitals and healthcare settings. You can use this safe, fast and easy measurement with a wide range of ages and health conditions. The aural temperature assesses the blood flow to the hypothalamus and is considered close to core body temperature.[4] Fewer pathogens live in the ear canal, so the risk of infection or cross contamination is lower than in oral or rectal cavities. Large amounts of earwax may cause inaccurate readings.

Correct placement of the probe and position of the ear is key to accurate measurement. Do not use tympanic measurement on infants or newborns less than one year old due to risk of ear canal injury from the large probe. When you place the probe, pull the ear pinna down and back for one- to two-year-old children. For persons three years or older, pull the ear pinna up and back when you place the probe.

Ensure a tight seal when inserting the probe into the ear canal. If the patient has been lying on the ear, the temperature may elevate artificially. The patient must be indoors for at least 10 minutes prior to assessment to prevent false readings. Tympanic temperatures are not assessed on patients with ear drainage or recent ear surgery.

Armpit or Axillary

The axillary site is often used when assessing infants and children due to the unobtrusive nature of placing a thermometer or stylus under the arm and having the patient hold his arm close to his body. The axillary site is the least reliable body temperature method, but may be used if the other sites aren't safe, or a tympanic thermometer isn't available.

Digital, electronic and glass thermometers can be used for an axillary body temperature. The digital thermometer will beep when the measurement is complete. An older, mercury thermometer must be left in place for a longer time period than in other sites, so it is often considered not as reliable. The assessment time with a mercury thermometer is 10 minutes for adults and five minutes for children. Keep in mind that if a patient has recently washed under her arms or applied deodorant, you must wait 15 minutes before you take her temperature.

Various factors influence axillary temperature including external skin temperature, friction from clothing and probe placement.

Rectal

Rectal temperatures are not assessed as commonly as axillary, oral, temporal or tympanic routes due to the invasiveness of the measurement procedure. However, because external factors such as the environment don't influence the measurement, rectal temperatures offer more reliable and accurate results than some other methods.

To measure a patient's rectal temperature, a specialized thermometer is inserted, but never forced, into the rectum approximately one inch for adults and no more than half an inch in children younger than six years old. The thermometer is lubricated with water-soluble lubricant and gloves are worn to prevent fecal contamination.

A major advantage of the rectal site is that eating food, drinking liquids or the patient's ability to hold the thermometer does not affect temperature readings. Another advantage is that the thermometer is placed in an enclosed space, so it's a more accurate measurement. Disadvantages include patient embarrassment, difficult placement and cross contamination risks. A rectal measurement also may be uncomfortable for the patient.

Proper probe placement can affect temperature accuracy. If the thermometer is placed in fecal material, the reading may be falsely higher. Rectal temperatures are not used in patients with recent rectal surgeries, hemorrhoids, diarrhea and cardiac disorders. Rectal temperatures are only assessed in infants and newborns if no other site can be used, due to potential injury risks to the rectal mucosa.

Mouth or Oral

One of the most common sites for temperature measurement is orally due to quick and easy access and patient comfort. The patient closes her mouth completely around a thermometer for a sufficient period of time.

If the patient eats, drinks, smokes or chews gum immediately before oral temperature assessment, wait 15 minutes before placing the thermometer to allow the mouth temperature to return to baseline. Oral temperatures are not recommended for patients who are prone to seizures, unconscious, unable to breathe through the nose, unable to close their mouth, coughing or sneezing, have an oral disease or use supplemental oxygen. Also, oral temperatures should not be used on children younger than five years of age because they might bite the thermometer.

To record an accurate oral temperature, place the thermometer probe in the **posterior sublingual pocket**, under the middle, posterior portion of the tongue.

Use of a glass thermometer in oral temperature assessments is especially unsafe for infants or children, unconscious or irrational patients or those with seizure disorders.

Temporal Artery or Forehead

The temporal artery site, located on the forehead, is quickly becoming a popular site to measure temperature. The temporal artery (TA) thermometer was developed in answer to requests by pediatricians for a replacement for ear thermometers, due to inaccuracy, and rectal thermometers, due to the dislike of the method.

Ear thermometer

Axillary thermometer

Oral thermometer

TA thermometer

Equipment

You've learned a little about temperature equipment already, but let's take a quick review of the types of thermometers available before you explore temperature assessment procedures.

Glass thermometers are mostly out of use due to the risks associated with mercury exposure if the glass thermometer breaks. The slender glass tube contains, at one end, a bulb of mercury. This presents a safety risk if the bulb breaks and anyone is exposed to the hazardous substance. Instead, tympanic or digital thermometers are recommended.

Glass mercury thermometer

According to the United States Environmental Protection Agency (EPA), if elemental mercury spills or if a thermometer breaks, the exposed substance can evaporate and become an invisible, odorless, toxic vapor.[3] A patient runs the risk of breaking a thermometer in her mouth and swallowing the mercury. However, an even greater risk exists if the thermometer breaks outside of the body and comes into contact with air because the mercury evaporates and reaches dangerous levels in the air.

Electronic thermometers are digital devices that use a **stylus**, or probe, that is covered with a disposable plastic sheath to assess temperature. The stylus can be placed orally or under the arm in the axilla. Once placed and held for a few seconds, the temperature displays digitally. Correct placement is necessary to yield an accurate reading. Once the temperature is taken, the disposable plastic sheath is thrown away.

Electronic thermometer

The tympanic thermometer measures blood flow temperature when placed in the ear by picking up infrared energy from the tympanic membrane. The temperature is immediately displayed on the digital screen. Disposable plastic covers are placed over the membrane sensor on the thermometer and discarded after use.

Temporal artery thermometers assess temperature by measuring the balance between the tissues warming from arterial blood and tissues cooling (warming) caused by heat loss (gain) to the environment. These thermometers work similarly to tympanic thermometers; however, temporal thermometers are completely noninvasive. After the scan, the temperature displays immediately on a digital screen.

Measurement

The purpose of measuring body temperature is to record baseline readings and to compare temperature readings against future measurements, temperature alterations and response to healthcare treatments. Prior to assessing temperature, patients must be evaluated for appropriate measurement sites, recent exercise, food and liquid intake, smoking and medications.

Virtual Lab: Temperature

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Temperature* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Digital thermometer, disposable covers, clean non-sterile gloves, hand towel

Take an oral temperature:

1. Wash hands.
2. Identify the patient and explain the procedure. Do not take a patient's temperature if within 15 minutes of eating, drinking or smoking, as this will alter the result.
3. Place a clean thermometer cover over the tip of the thermometer stylus. Push the power button.
4. Place thermometer under the patient's tongue, in posterior sublingual cavity. Instruct patient to hold lips closed and breathe through nose.
5. When the thermometer beeps, remove the thermometer and drop probe cover off the tip into trash.
6. Document the procedure and communicate appropriate results to patient.

Take an axillary temperature:

1. Wash hands.
2. Put on clean, non-sterile gloves.
3. Place a clean thermometer cover over the tip of the thermometer stylus. Push the power button. Pat the patient's armpit dry with towel.
4. Place thermometer in center of armpit and instruct patient to hold arm snugly against the body with their other arm.
5. Remove after thermometer beeps.
6. Remove and discard gloves.
7. Wash hands.
8. Document the procedure and communicate appropriate results to patient.

Steps to Take: Aural Temperature

1. Wash your hands. Assemble and prepare the required equipment.
2. Prepare the thermometer as described in the manufacturer's instruction sheet.
3. Confirm the patient's details, explain the procedure and obtain verbal consent.
4. Ask if the patient has smoked or exercised in the last half-hour before the procedure to avoid any inaccurate readings. Position the patient to allow access to the site.
5. Inspect the patient's ears to obtain an aural temperature.
6. Gently pull the outer ear up and back to open the auditory canal. Note: In children and infants, gently pull the ear lobe back, and slightly downwards, to open the external ear canal. This is because the shape of the external ear canal in children and infants differs from that of adults.

7. Insert the probe and make sure the opening of the ear is sealed. Do not use pressure.
8. Press the button and wait for the reading to appear, as indicated by a beep.
9. Remove the probe from the ear.
10. Read the temperature and record.
11. Discard the probe cover.
12. Wash your hands and complete the patient's medical record.

Steps to Take: Rectal Temperature

1. Wash hands.
2. Identify patient and explain the procedure.
3. Remove rectal electronic thermometer from battery pack and remove temperature probe from unit. The red probe is only used for rectal temperature to prevent cross contamination of blue oral probe.
4. Securely attach a clean cover on stylus.
5. Close privacy screen or door.
6. Put on clean, non-sterile gloves.
7. Have the patient lie on their left side with the left hip and lower leg straight, while the right hip and knee are bent and flexed. Expose anal area, keeping other patient areas covered.
8. Apply water-soluble lubricant to thermometer probe tip.
9. Separate patient's buttocks with one hand.
10. Instruct patient to take a deep, slow breath, while slowly inserting the probe into the anus towards the umbilicus. If resistance is encountered, do not force probe.
11. Insert no more than 0.5 inch for infants, and 1 inch for adults.
12. Hold the probe in place until thermometer beeps.
13. Slowly remove the thermometer, and drop the probe cover off of tip into trash.
14. Remove and discard gloves.
15. Wash hands.
16. Document the procedure and communicate appropriate results to patient.

Taking a child's temporal temperature is preferable to other options for several reasons. It provides the most comfortable, noninvasive method of temperature-taking for patients, does not involve any mucous membrane and provides ease-of-use for staff.

Steps to Take: Child's Temporal Temperature

1. Position the child in a way that allows easy and comfortable access to its forehead. Support the child's head.
2. Pat any perspiration with gauze or tissue, remove any head wear and brush hair aside. These are obstructions that may interfere with the reading. If perspiration is present on the forehead, use an alternative site.
3. Position the probe in the midline of the child's forehead, ensuring that the probe is flush with the skin.

4. Press and hold the scan button on the probe (or as directed by the manufacturer's instructions).
5. Slide the probe across the forehead, while maintaining pressure on the button, moving the probe from the midline toward the temple, stopping at the hairline.
6. A beeping sound and light indicate when the reading is done. Release the button and note the reading.

Document Temperature

As you know, temperature should be documented to note the date and time, temperature value in Fahrenheit or Celsius and the site where the reading was taken. For example, a healthcare professional charts an axillary temperature as follows:

8-1-2020, 1420, T: 98.7 F (Ax)

Remember, you are using military time, so 1420 is 2:20 p.m.

Practice Exercise 4-1

Select the best answer from the choices provided.

1. **The measurement of the balance between heat produced and heat lost is _____.**
   a. fever
   b. vital signs
   c. temperature
   d. homeostasis

2. **The _____ site is most accurate for taking the core body temperature.**
   a. rectal
   b. oral
   c. axillary
   d. tympanic membrane

3. **A(n) _____ is used to measure a patient's temperature.**
   a. electrocardiograph
   b. thermometer
   c. microscope
   d. nebulizer

4. **Which does not lead to increased body temperature?**
   a. Excitement
   b. Exercise
   c. Starvation or fasting
   d. Illness or infection

5. **Hyperthermia indicates which condition?**
   a. High body temperature
   b. Low body temperature
   c. Defervescense
   d. Low blood pressure

6. **If Tami drinks cold water, how long should you wait before you take an oral temperature?**
   a. One minute
   b. 15 minutes
   c. One hour
   d. 24 hours

7. **When you insert a probe for a tympanic temperature for a four-year-old child, pull the ear pinna _____.**
   a. straight back
   b. up and back
   c. down and forward
   d. perpendicular to the patient

8. **The _____ activates heat loss and heat production mechanisms in order to maintain a normal core body temperature.**
   a. frontal lobe
   b. occipital lobe
   c. parietal lobe
   d. hypothalamus

9. **The correct distance for inserting a rectal thermometer into a four-year-old child's rectum is _____.**
   a. two inches
   b. four inches
   c. 1.5 inches
   d. no more than half an inch

Answer as directed in your own words.

10. **Explain how the body controls temperature.**

Review Practice Exercise 4-1

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Pulse

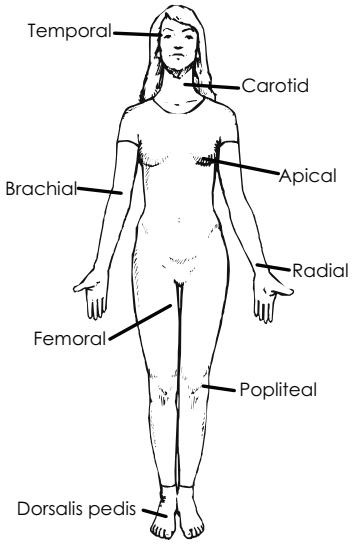
Pulse is caused by alternating expansion and relaxation of arterial walls with each contraction of the left ventricle. In other words, pulse indicates the rhythm with which blood is pumped from the heart's left ventricle into the body's arteries. The pulse rate and its characteristics give clues about how well the cardiovascular system is performing.

Normally, the arterial pulse is the same as the heartbeat heard when a stethoscope is placed over the heart and you listen to the heart contract. You can feel the pulse by applying light pressure with three fingers to **pulse points**, places where arteries are located close to the skin's surface. Light pressure pushes the artery against firm muscle or bone. A "throb" or tap is felt.

Pulse Sites

The pulse is taken anywhere on the body where a superficial artery lies over a bone. The pulse site is **palpated**; that is, gentle pressure is applied with the fingers to detect the pulse.

- **Radial pulse**—Located at the wrist on the thumb side. This is the most commonly assessed pulse site.
- **Carotid pulse**—Located in the groove of the neck between the trachea and sternomastoid muscles.
- **Brachial pulse**—Located on the medial arm at the fold of the elbow.
- **Femoral pulse**—Located in the groin region, on the anterior, medial aspect of the thigh.
- **Temporal pulse**—Located over the temporal bone, in front of the upper ear.
- **Popliteal pulse**—Located at the back of the knee.
- **Dorsalis pedis pulse**—Located on the superior surface of the foot.
- **Apical pulse**—Taken with the stethoscope just below the left nipple. Considered the most accurate assessment of pulse rate, the apical pulse is often performed on infants and cardiac patients.



Body pulse sites

Characteristics

Pulse is described in terms of rate, rhythm and quality. The heart dictates the rate by activating conduction cells that causes the heart to contract. The **sinoatrial** (**SA**) **node**—a small bit of connective tissue in the right atrium that controls the heartbeat—begins the electrical impulse condition in the heart's right atrium. The SA node firing also influences the heart rhythm. Pulse quality is evaluated in terms of amplitude and is primarily evaluated when an irregularity is suspected.

Rate

The number of beats per minute determines pulse **rate**. In the average adult, the SA node fires 60 to 100 bpm (beats per minute). The impulses travel throughout the heart's muscle fibers, causing muscle contraction and ultimately blood to eject from the left ventricle and into the arterial system.

Tachycardia describes rapid pulse rates. In adults, rates above 100 bpm are considered tachycardic. Factors such as **sympathetic nervous stimulation**, or the "fight-or-flight" response, heart conduction abnormalities or certain medications may cause this pulse rate increase.

Bradycardia describes a slow pulse rate. In adults, rates less than 60 bpm are considered bradycardic. Some well-conditioned athletes have lower overall pulse rates that may be considered normal for them, while the same range is bradycardic for non-conditioned adults. **Parasympathetic nervous system stimulation**, also known as the "rest-and-digest" response, heart disease and certain medications may cause the pulse rate to decrease.

Pulse Rate Ranges[4]	
Newborn	100 to 205 bpm
4 weeks - 1 year	100 to 180 bpm
1-3 years	80 to 140 bpm
3-5 years	80 to 120 bpm
5-12 years	75 to 118 bpm
Over 13 years	60 to 100 bpm
Athletes	40 to 60 bpm

There are many reasons that a patient's pulse may be abnormally slow or fast on any given day, and it's a good idea to consider these when you compare his pulse to a baseline pulse.

- **Age and Gender**—Pulse rate decreases throughout life, based on age and health status. The heart becomes less efficient as age increases, which causes reduced cardiac output. After puberty, male pulse rates are normally slower than females due to hormonal differences.
- **Disease and Illness**—The pulse rate may increase or decrease depending on health conditions. Pain, atherosclerosis, hyperthyroidism, infection and fever increase the pulse rate. Hypothyroidism, depression, chronic pain and central nervous system disorders may decrease the pulse rate.
- **Physical Activity**—Exercise and posture influence pulse. While increased activity correlates with an increased pulse rate, well-conditioned athletes often have lower resting pulse rates.

- **Emotional Status**—Agitation and anxiety increase pulse, while depression often decreases pulse rate.
- **Medications**—Depending on their effects, medications may increase or decrease pulse rates. Medications such as digoxin decrease pulse rate for patients with cardiac disease. Diuretics may cause a reflex increase in pulse rate due to the lowered intravascular volume resulting from fluid loss. Atropine increases pulse rate by blocking parasympathetic nervous responses from reaching the heart.

After learning about pulse rate, let's discuss pulse rhythm.

Rhythm

Imagine the beat of a drum. The sound of one drumstick striking the head of the drum is followed by the sound of the other drumstick. The repetitive pattern of the two sounds is referred to as **rhythm**.

Just as the beating of a drum has rhythm, so does the beating of the heart. You can assess heart rhythm by listening to it with a stethoscope or by feeling the pulse.

Heart rhythm may be regular or irregular. A regular pulse rhythm has evenly spaced pulsations and pauses. Irregular pulse rhythm is called **arrhythmia**. Arrhythmia may be caused by disease, medication or electrolyte imbalance. It may be clinically significant, or benign, which means it's harmless. To make things more confusing, an irregular rhythm may be "regularly irregular" or "irregularly irregular." A regularly irregular pulse feels much like a normal pulse, but has "skipped" or "extra" beats that occur at regular intervals. For example, there may be three normal pulsations, followed by an extra beat or an extra-long pause. When you identify a regularly irregular pulse, let the nurse or doctor know; the pattern can give important clues to the patient's condition.

An irregularly irregular pulse is chaotic. It may last only a few seconds, or it may persist. It makes taking a person's pulse very difficult, and can signal health problems. As with other arrhythmias, further assessment is needed, and the nurse or doctor should be notified.

ONLINE LEARNING

Build on what you are learning by watching the video at
https://www.youtube.com/watch?v=zNHl-l_c-ls.

Quality

Like pulse rhythm, several factors affect pulse quality. First, pulse quality is affected by the force of blood being ejected from the ventricle with each heartbeat, which is called **stroke volume**. As blood flows from the left ventricle, through the aorta and into systemic arterial circulation, the ease of blood flow through the system also indicates pulse quality. If blood encounters resistance due to damaged arteries or hemorrhaging, pulse quality will change. A healthy arterial wall is smooth and soft.

When you assess pulse quality, you must determine whether pulses are the same on both sides of the body, or **bilaterally symmetrical**. Pulses are palpated at simultaneous pulse points, except for carotid pulses. Remember that carotid pulses are taken in the neck.

Uneven pulses indicate a problem with local blood flow. Postoperative patients are especially susceptible to pulse alterations if radiographic dye is injected arterially, and the blood's clotting process obstructs the artery, diminishing circulation. Carotid pulses are not simultaneously palpated due to the risk of decreased cerebral blood flow.

A normal pulse quality is considered full or strong. Descriptions of altered pulse quality often include terms such as bounding, weak or thready.

Bounding pulses indicate damage caused by aging and lost arterial elasticity. In other words, the heart must work harder to pump blood through stiff, rigid arteries, which causes the flow to be stronger and more turbulent or bounding.

Exerting too much force on an artery during palpation may make it difficult to palpate, or feel, **weak pulse**—where a pulse is difficult to feel—or a **thready pulse**—a small, fine pulse that feels like a thread or cord under the finger. Numerical scales are a standard practice for describing pulse quality.

Pulse Quality Numerical Scales	
0	Absent or no pulse
1+	Weak, thready or inconsistent pulse
2+	Normal pulse
3+	Increased pulse
4+	Bounding, hyperactive pulse

Measurement

The most common and most efficient method used to measure pulse requires you to palpate one or more body pulse sites. Use the pads of the first three fingers on one hand and apply light pressure to determine the pulsation of the artery as you compress it against firm muscle or bone. Avoid measuring with your thumb because the feel of your own pulse may cause an inaccurate reading. Assess rate, rhythm and quality.

Often, this procedures has the patient with their palm facing down because is it is a more natural and likely more comfortable position for the patient. Also, it is easier to position the first three fingers over the area of the pulse, thus being more ergonomic for the healthcare worker. In this course, you will be instructed to have the palm facing down; however, the pulse can be measured with the palm either up or down.

Measuring pulse

If the pulse is regular, time its rate for 30 seconds, and multiply the rate by two to determine the patient's bpm. The first pulsation is counted as zero. If the patient's pulse is being assessed for the first time, then a baseline pulse is measured for one full minute. If the patient's pulse is irregular, then the apical pulse is measured by placing a stethoscope over the patient's heart.

If obtaining a patient's pulse for the first time, measure a baseline pulse rate for one minute. Review the patient's medical history and risk factors with him prior to assessment to determine factors impacting the pulse rate and previous baseline measurements. Assess whether the patient demonstrates any physical symptoms that could alter pulse rate such as edema, dyspnea or palpitations. Identify the most appropriate physical site to assess pulse.

Doppler

If you cannot measure the pulse with palpation, you can use an ultrasonic Doppler machine for measuring. Pulse may be difficult to palpate in patients with diminished peripheral circulation. With a Doppler measurement, a transmitter is placed over conduction gel on the pulse site and high frequency waves are directed at the artery. When the waves meet the artery that has positive blood flow, signals are conducted back through the transmitter and converted into sound waves that are heard through the Doppler speakers. The sound is just like what you hear with a stethoscope.

Doppler measurements help with patients diagnosed with diabetes, peripheral neuropathy or who have edema resulting in diminished circulation.

Virtual Lab: Pulse

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Pulse* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Stethoscope, clock or watch with a second hand

Taking an apical pulse:

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Assist patient to a sitting or supine position and help remove upper body clothing.
4. Offer patient a gown.
5. Place stethoscope over the 5th intercostal space, left of the sternum, midclavicle to locate the apex of the heart.
6. Count heartbeats for 1 minute, noting any irregularities.
7. Help the patient get dressed, if needed.
8. Let the patient know they're done and document the procedure.

Taking a radial pulse:

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Position patient with arm relaxed, palm facing down.
4. Locate pulse point on the thumb side of wrist, 1 inch above base of thumb. Use pads of first three fingers (not thumb), and apply slight pressure.
5. Count beats for 1 minute and note any irregularities or variations.
6. Let the patient know they're done and document the procedure.

Taking a carotid pulse:

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Assist patient to supine position.
4. Locate pulse point on either side of larynx.
5. Place first three fingers over artery with slight pressure.
6. Count for 1 minute, note rhythm and any irregularities.
7. Let the patient know they're done and document the procedure.

Taking a femoral pulse:

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Have patient remove outer clothing on the lower half of his body. Assist patient to supine position.
4. Locate the femoral pulse by pressing deeply with your first three fingers below the inguinal ligament.
5. Count beats for 1 minute and note rhythm and any irregularities.
6. Let the patient know they're done and document the procedure.

Taking a popliteal pulse:

1. Wash hands.
2. Identify the patient and explain the procedure.
3. Place patient in supine position with knee flexed and skin exposed.
4. Place stethoscope on back of knee to hear pulse as palpation at this site is difficult.
5. Count pulse for 1 minute and note any irregularities or variations.
6. Let the patient know they're done and document the procedure.

For a pediatric patient, finding the carotid artery in the neck may be difficult, so you use the brachial artery instead.

Step to Take: Brachial Pulse

1. Position the child to ensure that you have comfortable access to its upper arm. The child may sit up or lie in the caregiver's lap or sit up or lie on the examination table.
2. Place the child's hand with palm upwards, the arm slightly bent at the elbow and well supported.
3. Place two or three fingers on the inside of the child's upper arm, roughly halfway between the elbow and the armpit, on the brachial artery. Do not use your thumb, as this digit has a discernable pulse of its own, which will interfere with the reading.
4. Press down gently on the arm and feel for the pulse (taking care not to occlude the blood flow). Measure the pulse rate for one minute. Note any irregularities in the rate, rhythm or volume of the pulsation.
5. Release the upper arm, and then record the pulse rate and any irregularities noted.

Document Pulse

When you record pulse, include the date, time, rate in beats per minute and a description of pulse quality. For example, on August 1, 2017, at 2:20 p.m. you took a patient's pulse. The patient's pulse was 75 beats per minute, and the quality was regular. To document the pulse, you will record the following:

8-1-2020, 1420, P: 75, regular

Practice Exercise 4-2

Select the best answer from the choices provided.

1. **The normal resting pulse range for adults is _____ bpm.**
   a. 50 to 70
   b. 60 to 80
   c. 80 to 100
   d. 60 to 100

2. **A(n) _____ pulse is considered the most accurate assessment of pulse rate, and is often performed on infants and cardiac patients.**
   a. femoral
   b. radial
   c. carotid
   d. apical

3. **The pulse rate and characteristics give clues regarding how well the _____ system is performing.**
   a. respiratory
   b. urinary
   c. cardiovascular
   d. gastrointestinal

4. **Which pulse reading indicates bradycardia?**
   a. 50
   b. 60
   c. 80
   d. 110

5. **You count 44 beats in 30 seconds, so the patient's pulse rate is _____ bpm.**
   a. 176
   b. 132
   c. 44
   d. 88

6. **A fast pulse is expected with _____.**
   a. cardiac conduction abnormalities
   b. sleeping
   c. shock
   d. high blood pressure

7. **A patient experiencing tachycardia has a pulse _____ bpm.**
   a. below 60
   b. between 60 and 100
   c. between 80 and 100
   d. above 100

8. **A Doppler may be used to assess pulses in patients with _____.**
   a. bounding pulses
   b. hypertension
   c. a fever
   d. edema

9. **Assess a carotid pulse by _____.**
   a. simultaneously compressing both carotid arteries bilaterally
   b. applying slight pressure to the artery on either side of the larynx
   c. compressing one artery located in the groin area
   d. compressing both arteries located in the groin area

10. **Proper technique for taking pulses involves applying slight pressure to the artery with _____.**
   a. one finger
   b. the thumb
   c. three fingers
   d. the entire hand

Review Practice Exercise 4-2

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Respiration

Respiration involves the exchange of the respiratory gases oxygen and carbon dioxide. One respiratory cycle consists of one **inspiration**, breathing air in, and one **expiration**, or breathing air out. Respiration is both internal and external. **External respiration** involves the exchange of gases between the lung alveoli and capillaries. **Internal respiration** involves the exchange of gases between the capillaries and body cells.

Breathing is largely an automatic act, controlled in the brain by the medulla oblongata and carried out by the respiratory muscles. The brain controls breathing by sensing chemical contents of the blood, especially carbon dioxide. While the act of breathing is often automatic, most can take actions to control their breathing pattern. Due to this conscious control, you measure respirations without the patient's knowledge to establish an accurate baseline. If a patient is aware that you are measuring her respiratory rate, she may alter her breathing pattern consciously or unconsciously.

The primary factors that you consider with a patient's respiratory function are rate, rhythm and depth.

Characteristics

The **respiratory rate** is the number of breaths a person takes in one minute. It consists of one inspiration and one expiration. The normal adult respiratory rate is 12 to 20.

Normal Rates Ranges[5]	
Newborns	30 to 60 per minute
Children 1 to 5 years old	22 to 40 per minute
Children 6 to 12 years old	18 to 30 per minute
Adolescent 13 to 17 years old	12 to 16 per minute
Adults	12 to 18 per minute

Rhythm

A normal **respiratory rhythm** is regular and even. Each inspiration is approximately one-half the length of each expiration. Respiratory rhythm is normally irregular in children, but is not excessively labored nor involves the use of abdominal accessory muscles—a sign of respiratory distress.

Depth and Quality

Respiratory depth describes the amplitude of each breath—or the amount of air inhaled and exhaled with each respiration. In normal circumstances, both lungs expand easily and fully. There is no straining to take in air, but rather easy, rhythmical breathing.

Some medical conditions, such as asthma, pneumonia, panic attack, pulmonary edema and shock, may cause shallow respirations. Shallow breathing is inefficient because it does not take in as much air with each inspiration.

Other times, the quality of respiration may be affected. **Labored respiration** occurs when breathing is difficult. Instead of gentle, effortless breathing, the patient struggles to get enough oxygen. With labored breathing, the body works hard and uses muscles not usually involved with breathing. When you observe a patient with labored breathing, the struggle will be evident. You may see the muscles between the ribs move in and out. You may also see movement in the abdominal muscles and the muscles of the shoulders and neck. If you observe labored breathing, tell the doctor or nurse.

When you assess respiratory rate and quality, be sure to let the doctor or nurse know if you observe shallow respiration.

Breathing Patterns

In order to describe a patient's breathing pattern as accurately as possible, several special terms are used. Here are breathing patterns you should be able to see with your eyes.

- **Eupnea**—Normal breathing
- **Dyspnea**—Difficult, labored breathing
- **Apnea**—Temporary cessation of breathing

- **Orthopnea**—Difficulty breathing in positions other than upright
- **Hypernea**—Increased depth of breathing
- **Tachypnea**—Increased rate of breathing
- **Cheyne-Stokes**—Taking several breaths followed by a long pause before regular breathing resumes

Now, let's look at breathing patterns identified using a stethoscope.

- **Rales**—Small clicking, bubbling or rattling sounds due to excretions in the bronchioles
- **Rhonchi**—Low-pitched breath sound that resembles snoring
- **Crackles**—High-pitched breath sound
- **Wheezing**—High-pitched whistling sound caused by narrowing of the bronchial tubes
- **Stridor**—Harsh, vibratory sound caused by narrowing of the upper airway

The following illustrates a few of these patterns in further detail.

Abnormal Breathing Pattern	Description	Conditions
Bradypnea	Rate below 12 bpm	Neurological or electrolyte disturbances, narcotic overdose, postanesthesia
Tachypnea	Rate above 20 bpm	Trauma, injury, stress, pain, respiratory, cardiac or liver disease
Cheyne-Stokes	Cyclic breathing pattern with periods of increased, deep respirations, alternating with periods of apnea	Congestive heart failure, drug overdose, increased cranial pressure
Kussmaul	Increased rate (above 20 bpm) and depth of respirations	Metabolic acidosis, diabetic ketoacidosis, renal failure

Respiratory Function

Factors that affect respiration include age and gender, physical activity, altitude, emotional status, medications, body position, fever and smoking.

As children grow, their lung capacity increases. This larger volume requires fewer respirations to exchange oxygen and carbon dioxide. As an adult, the aging process causes the lungs to become less elastic, which requires more respirations for adequate gas exchange. Due to their larger lung capacity, males generally have a lower baseline respiratory rate than females.

The need for oxygen increases during exercise or physical activity. The respiratory rate and depth increases during exercise to help deliver more oxygen to body tissues, while removing the additional carbon dioxide and body heat from the body.

At higher altitudes, air contains less oxygen content than at lower altitudes. To compensate for this lower oxygen concentration, respiratory rate and depth increase.

When the sympathetic nervous system is stimulated during heightened emotional states such as stress, the rate and depth of respirations increases.

Depending on their effect, medications can increase or decrease respiratory depth and rate. Respiratory medications such as albuterol and atrovent cause lung bronchioles to dilate, which deepens respiration. This allows more air to move into and out of the lungs. These medications are often used for patients with respiratory diseases. **Chronic obstructive pulmonary disease** (**COPD**) is one of the most common respiratory diseases involving an ongoing obstruction of the airways that makes breathing difficult. Two main forms of COPD are chronic bronchitis and emphysema. **Chronic bronchitis** is typically a long-term cough with mucus; **emphysema** is a condition of the lungs that destroys them over time. Most people with COPD have a combination of both conditions. COPD results in slow, labored breathing. Narcotics such as morphine cause significant decreases in respiratory rate and depth. Patients taking narcotic opiates are closely monitored for respiratory status.

Surprisingly, respiratory rate and depth can even change due to body position. When a patient bends forward, stoops or slumps, respiratory volume can decrease and impair gas exchange.

The lungs release heat during a fever, which increases the respiratory rate.

Cigarette smoke damages lung tissue and airways. The airways swell and make it difficult to clear mucus from the lungs. Lung tissue damage lowers respiratory depth and rate.

Measurement

When you measure a patient's respiratory rate, evaluate rate, rhythm and depth of respirations. This will help you evaluate the impact of factors that can alter respiratory patterns such as medications, physical condition, age, gender and stress.

Before counting respirations, review with the patient any potential respiratory risk factors such as smoking, asthma, medications or chest trauma. If the patient shows signs of reduced consciousness, shortness of breath, pain when inspiring or coughing, these may indicate reduced respiratory function.

Remember to assess respirations so that the patient is not aware. A good time to do this is right after you measure her pulse; leave your fingers on the pulse point so she believes you still are counting her heart rate. By "catching" the patient unaware, she will not inadvertently breathe more slowly or rapidly; your results will be more accurate.

Virtual Lab: Respiration Rate

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Respiration Rate* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Clock or watch with a second hand

1. Introduce yourself, wash your hands, identify the patient and explain the procedure.
2. To take your patient's pulse, position the patient with their arm relaxed and palm facing down. Locate their pulse point on the thumb side of the wrist, 1 inch above the base of the thumb. Use the pads of your first three fingers. Apply a sight pressure.
3. When you're finished with the pulse, while your fingers are still located at the pulse point, begin to count the patient's respirations by watching the patient's chest rise and fall with inspiration and expiration.
4. Count respirations for 1 minute. Consider one respiration as the total of one inspiration and one expiration.
5. If you're unable to see the chest rise and fall, place your free hand on the patient's back to detect respiratory movement. Do not explain this hand placement to the patient.
6. Count respirations for the following intervals: **Adults with regular respiratory rate**: 30 seconds and multiply by 2 to determine respirations per minute. **Children younger than 2 years or adults with irregular respiratory rate**: 1 minute.
7. Document rate, rhythm and depth of respirations.

Obtaining the respiration rater for a pediatric patient isn't much different, but let's look at that process.

Steps to Take: Pediatric Respiration Rate

1. Position the child to ensure that you have comfortable access to its chest. The child may lie or sit on the caregiver's lap or on the examination table. Make sure that the child remains as still as possible, as agitation and movement will increase respiration and make obtaining an accurate respiration reading difficult.
2. Rub your hands together to warm them, and then place a hand on the child's chest, in a position where you can feel the respirations.
3. Ensure that you can also clearly see the rise and fall of the child's chest. Laying a hand over the abdomen may help visualize the respirations if they are difficult to see.
4. Count the respirations for one minute. Watch for any abnormalities in breathing rate, rhythm and depth. Listen for any noticeable breath sounds. Prolonged breathing problems may present with more serious symptoms.
5. Record the respiratory rate and any anomaly observed.

Document Respiration

Respirations are measured during a 30-second period, but documented as respirations per minute. For example, a patient's respirations are counted for 30 seconds and found to be 11 respirations. Multiply the results by two for 22 respirations per minute. Characteristics are also noted with respirations:

8-1-2020, 1420, R: 22, regular

Practice Exercise 4-3

Select the best answer from the choices provided.

1. **If you count 8 respirations in 30 seconds, the patient's respiratory rate for one minute is _____.**
   a. 14
   b. 16
   c. 18
   d. 20

2. **An accurate count of one respiration is one _____.**
   a. rise and fall of the chest
   b. rise of the chest
   c. fall of the chest
   d. expiration and two inspirations

3. **The normal respiratory rate for a newborn is _____ per minute.**
   a. 12 to 20
   b. 30 to 60
   c. 50 to 70
   d. 25 to 45

4. **The minimum amount of time required to accurately measure respiratory rate is _____.**
   a. 15 seconds
   b. 30 seconds
   c. two minutes
   d. five minutes

5. **When checking a patient's respiratory rate, _____.**
   a. count the respirations after taking the patient's pulse, without moving your hand away from her wrist. The patient remains unaware that her respirations are being timed
   b. remember that it is illegal to perform any vital sign test without the patient's knowledge, unless she is unconscious
   c. always inform the patient that you will be counting her breaths before you do so
   d. remember that assessment of respiratory rate is only necessary if the patient is unconscious

6. **Which is not an example of respiratory quality?**
   a. Regular
   b. Shallow
   c. Labored
   d. Abnormal

7. **The normal respiratory rate for adults is _____ per minute.**
   a. 6 to 10
   b. 12 to 18
   c. 22 to 30
   d. 35 to 45

8. **A healthcare professional requires a(n) _____ to count respirations.**
   a. clock or watch with a second hand
   b. stethoscope
   c. electronic thermometer
   d. sphygmomanometer

9. **The best way to correctly record respirations is to write _____.**
   a. RR 15
   b. 10-31-2016, 1820, R: 22, regular, symmetrical
   c. RR 16 regular, symmetrical
   d. Oct 10, 2016, 14 regular, symmetrical

Review Practice Exercise 4-3

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Blood Pressure

Another vital sign is blood pressure. **Blood pressure** is the pressure exerted by the blood against the walls of blood vessels. Measuring blood pressure is common in most medical settings because patients may not display noticeable signs and symptoms of high blood pressure.

As you know, the heart pushes blood from the left ventricle during contraction into the arterial system. Blood flows through the mitral valve into the aorta. The force of pressure exerted against the arterial walls during contraction is called the **systolic phase** of blood pressure.

After contracting, the ventricles relax and allow time for the ventricles to refill with blood, which is called the **diastolic phase** of blood pressure. The pressures are expressed numerically as a fraction with Systolic/Diastolic in units of millimeters of mercury (mmHg).

The difference between systolic (upper number) and diastolic (lower number) pressures is called the **pulse pressure**. For example, a systolic pressure of 110 mmHg and a diastolic pressure of 80 mmHg yields a pulse pressure of 30 mmHg. The average pulse pressure is 40 mmHg with a *systolic: diastolic: pulse pressure* ratio of 3:2:1. As patients age, the systolic pressure increases causing the pulse pressure to increase.

Normal values (averages)[6]		
Newborns up to 1 month	60–90 mm Hg	20–60 mm Hg
Infant	87–105 mm Hg	53–66 mm Hg
Toddler	95–105 mm Hg	53–66 mm Hg
Preschooler	95–110 mm Hg	56–70 mm Hg
School-aged child	97–112 mm Hg	57–71 mm Hg
Adolescent	112–128 mm Hg	66–80 mm Hg
Adult	90-140 mmHg	60-90 mmHG
Elderly	133-139 mmHG	68-69 mmHG

As a healthcare professional, one important responsibility is to monitor a patient's baseline blood pressure. Measure blood pressure in both arms on the initial exam to assess the patient's baseline measurement. Use the arm with the higher reading to measure all future blood pressures. If there is a greater than 10 mmHg variation between arms, it is important to notify the physician as this may be a sign of cardiovascular disease. Allow the patient to rest for about five minutes prior to taking an additional blood pressure reading. This permits adequate time for the pressure to return to baseline levels.

The baseline level is used on the patient's subsequent medical visits to determine if blood pressure needs further investigation. A blood pressure rise or fall of 20 to 30 mmHg from the baseline level is considered significant and is investigated and treated.

Factors Affecting Blood Pressure

Many physical and psychological factors influence your blood pressure. Let's examine these factors.

Cardiac Function and Peripheral Vascular Resistance

The condition of the heart and blood vessels, blood volume, blood viscosity and drugs influence blood pressure. As the heart's pumping action decreases due to cardiac disease, blood pressure decreases. As blood vessels become less elastic, blood pressure increases. As blood volume increases, so does blood pressure. As blood viscosity increases due to diseases such as diabetes, so does blood pressure. Drugs and other healthcare treatments can alter these situations to change the blood pressure.

Age

Blood pressure increases with age. Children experience rising blood pressure linked to their age, weight and height. Rising blood pressure in adults is due to arterial narrowing, decreased arterial compliance and disease processes such as atherosclerosis.

Ethnicity

African Americans experience higher blood pressure than other racial groups.

Gender

After puberty, females generally have lower blood pressure than males. On the other hand, women who take oral contraceptives may have increased blood pressure.

Diurnal Variation

Blood pressure changes minute-by-minute, but in general, pressure is lower in the morning and peaks in later evening.

White-Coat Hypertension

Some patients experience a phenomenon known as white-coat hypertension. Patients affected by **white-coat hypertension** experience elevated blood pressure due to the anxiety caused by seeing a physician. Some studies found that if a nurse or other healthcare professional performs the blood pressure reading, rather than a physician, the blood pressure reading is significantly lower, and often closer to the patient's baseline. See what a difference you can make?

ONLINE LEARNING

Build on what you are learning by watching the video at https://www.youtube.com/watch?v=YQC9PYgZ_Zw.

Additionally, patients who take their own blood pressure outside of the healthcare setting receive lower results than measured in the medical office.

Caffeine and Tobacco

Research studies are unclear as to how caffeine affects blood pressure. Though not everyone is affected in the same way, drinking two to three cups of coffee may raise systolic blood pressure between 3 to 14 mmHg.

Smoking tobacco indirectly raises blood pressure by injuring blood vessel walls and speeding up the hardening of arteries, which increases the risk of heart disease and limits the heart's ability to manage pressure changes. Inhaling nicotine, a vasoconstrictor, also directly increases blood pressure. It should be noted that using nicotine orally or by skin patch can have the same effect.

Wait at least 30 minutes before checking blood pressure if a patient recently ingested caffeine or used tobacco. This time allows the substances to dissipate in the body so you can obtain an accurate blood pressure reading.

Medications

Medications can raise or lower blood pressure depending on the drug. Specific drugs target blood pressure by causing blood vessel dilation or altered cardiac function. Diuretics can influence blood pressure by changing the circulating volume in the vascular system. Narcotics reduce sympathetic nervous system stimulation and decrease blood pressure.

Physical Activity

During exercise, blood pressure increases. Regular exercise, however, can be a powerful weapon against high blood pressure. Rest lowers blood pressure. Those on bed rest may have lower blood pressure than you expect.

Blood Pressure Assessment Technique

Appropriate technique is critical to measure an accurate blood pressure. Clothing, arm position, cuff size and placement affect the accuracy of blood pressure measurement. Let's learn more about each of these in order to minimize reading errors.

- **Clothing**—Before taking a patient's blood pressure, have her remove tight clothing because it can falsely increase blood pressure by pressing on the arteries. You may have patients remove sweaters or roll up their shirt sleeves above the blood pressure cuff.
- **Arm Position**—Raise the patient's arm to the level of the heart and make sure it's in a relaxed position. If the arm is lower than the heart level, the blood pressure reading will be falsely elevated. Likewise, if the arm is higher than the heart level, the blood pressure reading will be falsely lowered. Finally, the reading also will be falsely increased if the patient flexes or supports the arm.
- **Correct Cuff Size and Placement**—Using a sphygmomanometer cuff that is too large or too small for the patient provides an inaccurate reading. Cuffs that are too small for obese or muscular adults often cause a reading to be 10 to 50 mmHg too high. Use a large sized cuff for these patients. In the same way, if a patient is too small for the blood pressure cuff, you'll get a falsely decreased reading.

Common cuff errors	
Width too small	Falsely high reading
Width too big	Falsely low reading
Length too short	Falsely high reading
Cuff too loose	Falsely high reading
Leak in cuff or tubing	Unable to maintain pressure in cuff

The correct width of the cuff bladder should cover two-thirds of the upper arm, and the inflatable part of the cuff should cover about 80 percent of the circumference of the upper arm. Locate the center of the cuff bladder one inch above the antecubital fossa.

Contraindications

A ventricular assist device (VAD) helps pump blood from the lower chambers of the heart to the rest of the body and is a treatment for a weakened heart or heart failure. Patients with a left ventricular assist device (LVAD) have a continuous blood flow, so traditional blood pressure measurements are not reliable. Be sure to check with the facility on the procedure for those with a LVAD.

Characteristics

Now that you've learned about the factors that affect blood pressure, let's take a look at common terms related to blood pressure. First, you'll learn about hypertension in greater detail.

Hypertension

Hypertension refers to high blood pressure. The diagnosis of hypertension is confirmed in adults when the average of two or more blood pressure measurements on at least two separate visits is in the hypertensive range. Two types of hypertension exist:

- **Essential Hypertension**—High blood pressure of unknown cause or origin.
- **Secondary Hypertension**—High blood pressure associated with other disease processes.

Blood Pressure Categories			
Category	**Systolic mm Hg (upper number)**		**Diastolic mm Hg (lower number)**
Normal	Less than 120	and	Less than 80
Elevated	120-129	and	Less than 80
High Blood Pressure (Hypertension) Stage 1	130-139	or	80-89
High Blood Pressure (Hypertension) Stage 2	140 or higher	or	90 or higher
Hypertensive Crisis (Consult your doctor immediately)	Higher than 180	and/or	Higher than 120

Hypotension

Opposite from hypertension is **hypotension**—abnormally low blood pressure. Low blood pressure is defined as a blood pressure lower than 90/60.

While hypotension can pose problems, it generally is not cause for alarm as long as the patient's organs receive enough oxygenated blood. However, you will want to make sure they do not become dizzy or fall when rising from their beds or chairs.

Orthostatic Hypotension

Postural or **orthostatic hypotension** occurs as a sudden, temporary drop in blood pressure when a patient moves from a horizontal to a vertical position. Remind patients to sit for a moment before standing up to avoid orthostatic hypotension. This gives the patient time for his body to adjust from lying down to a sitting position before standing.

Several causes of orthostatic hypotension include hypovolemia, anemia, atherosclerosis, neurological disorders, diabetes or medications. Patients experience lightheadedness, dizziness, headache, blurred vision and syncope.

Measurement Sites

Four measurement sites on the body assess blood pressure—the arm, forearm, ankle and thigh. Let's examine each of these sites.

You've probably had your blood pressure taken in the upper arm before because it's the site most commonly assessed. For the arm or brachial artery, the cuff is placed around the upper arm and brachial artery blood flow is auscultated in the antecubital fossa.

Do not use an arm to measure blood pressure if the patient has had recent arm surgery, a mastectomy or an implanted arteriovenous fistula or hemodialysis catheter, burns, trauma to the arm or a peripheral IV. Use the opposite arm or another site if any of these situations apply.

For the forearm or radial artery, apply the cuff to the arm five inches below the elbow. Auscultate the radial artery for blood flow. Do not use this site in patients with hand or wrist injuries.

The ankle site is used for blood pressure because both the dorsalis pedis and posterior tibial arteries run from the leg and into the foot. The posterior tibial artery passes through the calf while the dorsalis pedis artery carries blood to the surface of the foot.

To take an ankle blood pressure measurement, apply the cuff on the lower leg with the cuff border at the ankle. A standard arm cuff is often used at the ankle site. Select the correct cuff size based on the site location to ensure an accurate reading. Have the patient lie down in order to take the blood pressure on the ankle. Do not measure blood pressure at this site if the patient has an ankle or foot injury.

Another method is to apply the cuff over the thigh, and blood flow is auscultated over the popliteal artery. As with the ankle site, the patient lies down for this measurement. A larger cuff is usually required for an accurate reading. The systolic readings at this site are normally 20 to 30 mmHg higher than arm blood pressure. Do not measure blood pressure at this site if the patient has a leg, hip or thigh injury.

Now that you're familiar with some of the sites, let's talk about the sphygmomanometer, an instrument used to measure blood pressure.

Measurement

As you learned with pulse, certain factors influence readings, and the same goes for blood pressure. You can obtain a more accurate measurement if you eliminate possible factors that influence blood pressure.

First, prior to measuring blood pressure, interview the patient regarding factors that may affect readings, such as medications, lifestyle habits and physical conditions. Review the patient record to determine a baseline measurement.

Also, select the best site based on the patient's physical condition including pulses, surgeries, injuries or implanted medical devices.

Sphygmomanometer

The instrument used to manually measure blood pressure is the **sphygmomanometer**, a cuff with a pump and a calibrated mercury column or aneroid numerical scale. Cuff sizes are available in small, medium and large, and are selected based on the measurement site, patient's age, weight and size.

First, apply the cuff to the site and then place the stethoscope over the site. Next, slowly inflate the cuff to 30 mmHg above the patient's baseline systolic pressure. At this inflation point, blood flow is compressed in the affected artery. Blood circulation in the distal artery ceases. The heart, however, continues to pump blood causing the proximal artery to increase in size.

At this time, no sound is heard through a stethoscope because the cuff's pressure is greater than the artery. When the pressure valve is slowly opened, the cuff is gradually deflated, and blood begins to turbulently circulate again past the cuff. Sounds, called Korotkoff sounds, are auscultated using a stethoscope.

As the cuff deflates, the sound becomes fainter until it is no longer heard. The numerical systolic pressure is noted at the point where the first beat is heard upon auscultation. **Auscultation** is when the physician listens with a stethoscope. The diastolic pressure is noted at the point where the last beat is heard before disappearing.

Korotkoff Sounds	
Phase 1	• First sound heard as faint tapping that increases in intensity. • This first sound is the systolic blood pressure reading.
Phase 2	• Swishing or muffled sounds develop as the vessel distends with blood due to cuff compression. • Sounds may disappear if a person has severe hypertension.
Phase 3	• Crisp, distinct, loud tapping sounds that increase in volume.
Phase 4	• Sounds abruptly become muffled and soft. • Phase 4 is considered the diastolic blood pressure in children.
Phase 5	• Sounds disappear. • This last sound is the adult diastolic blood pressure reading.

Electronic Blood Pressure Devices

In addition to the sphygmomanometer, many healthcare settings use electronic blood pressure devices due to their ease of use and storage of data readings. Blood flow is measured electronically and read digitally. Measurement variations can occur depending on the device used. Electronic monitors are set to record blood pressure over specific time intervals to compare readings.

If using an automated sphygmomanometer, place the blood pressure cuff on the patient's arm according to the manufacturer's instructions. Ensure that the cuff is not too loose or too tight. Press the start button, and the cuff will begin to inflate itself. The digital unit on the cuff automatically detects systolic and diastolic pressures. The reading will appear on the screen.

Virtual Lab: Blood Pressure

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Blood Pressure* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Sphygmomanometer, stethoscope

1. Introduce yourself, wash your hands, identify the patient and explain the procedure.
2. Palpate the brachial pulse in both arms to determine the strongest rhythm. Use the side with the strongest rhythm.
3. Determine cuff size. Keep in mind that this can affect the reading.
4. Roll sleeve to 5 inches above elbow or remove sleeve from arm.
5. Wrap the appropriate sized blood pressure cuff snugly on the patient's arm with the arrow over the antecubital space. The patient's arm should be relaxed and held at about the level of her heart.
6. Place the earpieces of your stethoscope in your ears. Place the diaphragm of the stethoscope in the antecubital space of the arm. Hold it in place by wrapping your fingers around it and the elbow.
7. Using your other hand, tighten the knob on the bulb of the cuff and pump it up to about 160 to 180. If your patient is known to have very high blood pressure, you may need to pump it up to a number higher than her normal range.

8. Carefully loosen the knob slightly and let air slowly escape, keeping your eyes on the numbers of the sphygmomanometer as the mercury or dial drops. Let the air slowly escape and concentrate on the sounds and the numbers on the gauge.
9. While watching the dial, listen for the five phases. **Phase 1**. The first sound you hear when deflating the cuff should be sharp, tapping sound. Note the corresponding number on the sphygmomanometer at that time. **Phase 2**. The next sound is blood passing through the vessels as the cuff deflates. This will be a soft, swishing sound. **Phase 3**. Next, you'll hear a rhythmic tapping as more blood continues to pass through the arm as the cuff deflates. **Phase 4**. The tapping sounds begin to fade. **Phase 5**. Blood is now flowing freely and all sounds disappear.
10. Note what number the arrow is pointing to when you hear the last sound. This is the diastolic pressure. Loosen the knob all the way and let all the air escape.
11. Remove the cuff, clean the earpieces of the stethoscope and let the patient know that they are done. If you need to repeat the blood pressure test for accuracy, be sure to wait at least 5 minutes between readings.
12. Document the procedure.

Now, let's look at the process of taking the blood pressure on a pediatric patient.

Steps to Take: Pediatric Blood Pressure

1. Position the child to ensure that you have comfortable access to one arm, and so that minimal child movement is possible. Make sure the child is calm.
2. Position the selected arm with the palm facing upward. Expose the arm and check that it is resting at the child's heart level. Use the arm with the strongest pulse, or the right arm if there is no pulse difference.
3. Determine the correct cuff size. Ensure that the cuff is around the arm at the level of the heart.
4. Palpate the child's brachial pulse, which is normally found at the inner crease of the elbow, and hold your fingers in place.
5. Tighten the valve on the air pump. Inflate the cuff until the pulse can no longer be felt; this indicates the estimated systolic pressure. Note this point on the gauge; mentally add 30 mmHg to the reading and remember the total.

Document Blood Pressure

Record blood pressure as a fraction with systolic pressure over diastolic pressure. For example, a patient's blood pressure reading of systolic pressure of 118 and a diastolic pressure of 76 would be documented as follows:

8-1-2020, 1420, BP: 118/76

Sometimes the pulse pressure is documented with the blood pressure reading. If pulse pressure is documented, the value follows the format of systolic/diastolic/pulse pressure.

Oxygen Saturation

Your blood oxygen level is a measure of how much oxygen your red blood cells are carrying. Maintaining the precise balance of oxygen-saturated blood is vital to your patient's health. Blood oxygen level can be measured using an arterial blood gas (ABG) test or a pulse oximetry.

To get an ABG measurement, blood is drawn from an artery rather than a vein. Unlike veins, arteries have a pulse that can be felt. Also, blood drawn from arteries is oxygenated.

Pulse oximetry is a test used to measure the oxygen level of the blood. It is an easy, painless measure of how well oxygen is being sent to parts of your body furthest from your heart, such as the arms and legs. A **pulse oximeter** (**pulse ox**) is a probe or sensor that is placed on the fingertip, toe, earlobe or even on the bridge of the nose to determine blood oxygen levels. This noninvasive device estimates the amount of oxygen in the blood by sending infrared light into capillaries in the finger, toe or earlobe. Then it measures how much light is reflected off the gases.

Pulse oximeter

Measurement

Normal oxygen levels range between 95 to 100 percent, while values under 90 percent are considered low. The patient's state of health will cause oxygen saturation levels to vary considerably. This is why it's important to have a baseline reading when monitoring with a pulse ox.

The oxygen saturation reading may not be accurate if the patient has poor circulation and/or cold hands; is wearing nail polish or artificial nails; has heart arrhythmias; smokes; or has very dark skin.

To get the best reading possible, place the patient's hands inside a warm towel or under warm, running water prior to taking the pulse ox. The patient should remove nail polish and/or artificial nails.

Steps to Take: Oxygen Saturation Level

1. Wash your hands. Assemble and prepare the required equipment.
2. Confirm the patient's details, explain the procedure and obtain verbal consent.
3. Assist the patient in a comfortable position.
4. Clip the oximeter sensor to the patient's finger (or earlobe).
5. Ask the patient to keep their finger still. And push the button to start the measurement.
6. Wait for the levels to appear on the monitor and record it.
7. Wash your hands and complete the patient's medical record.

Document Oxygen Saturation

Let's put together all you've learned about vital signs and see how to document a patient with the temperature of 98.3 degrees Fahrenheit, the pulse rate of 100, respiration at 18, blood pressure at 161 over 98 and pulse ox of 99 percent on room air.

> 8-1-2020, 1420, Temperature is 98.3 ˚F, pulse rate 100, respirations 18, blood pressure 161/98, oxygen saturation 99% on room air by pulse oximetry.

Practice Exercise 4-4

Select the best answer from the choices provided.

1. **The pressure of blood against the wall of blood vessels is best defined as _____.**
   a. pulse
   b. blood pressure
   c. hypotension
   d. respirations

2. **A sphygmomanometer measures _____.**
   a. pulse
   b. respiratory rate
   c. temperature
   d. blood pressure

3. **The patient must sit quietly for at least _____ minutes before retaking blood pressure.**
   a. 5
   b. 1 to 2
   c. 15
   d. 30

4. **Blood pressure is recorded as a fraction with the _____ pressure over the _____ pressure.**
   a. systolic; diastolic
   b. diastolic; systolic

5. **A factor that may increase blood pressure is _____.**
   a. shock
   b. exercise
   c. rest
   d. hemorrhaging

6. **A factor that does not increase blood pressure is _____.**
   a. stimulant drugs
   b. exercise
   c. rest
   d. excitement or anxiety

7. **The normal range for an adult systolic blood pressure is _____ mmHg.**
   a. 120-129
   b. 130-139
   c. 90-119
   d. 90 or higher

8. **The correct notation of a blood pressure reading is _____.**
   a. 126/76
   b. 126:76
   c. 76/126
   d. BP: 126/76

9. **If a blood pressure measures 110/86, the pulse pressure is _____.**
   a. 110
   b. 86
   c. 1.3
   d. 24

10. **Which is an abnormal reading for a pulse oximetry?**
    a. 95
    b. 89
    c. 99
    d. 100

Review Practice Exercise 4-4

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Summary

Temperature, pulse, respiration, blood pressure and oxygen saturation are considered vital signs because they measure vital indicators of health. Significant deviations from normal ranges can have serious impacts on your patients' health and treatment. Measuring vital signs is an important job function for healthcare professionals, and is an important component of your new career. You will detect alterations from normal and inform the physician so that patients' health can be evaluated. In this chapter, you learned the characteristics of the five vital signs, as well as factors that influence them. In addition, you learned how to correctly document temperature, pulse, respirations, blood pressure and oxygen saturation. Lastly, you have learned what equipment to use to assess vital signs and the procedures to follow to get an accurate measurement.

Critical Thinking

As you move through this course, it is important that you take the time to think critically about what you're learning. Topics here will allow you to reflect on course material through discussions you may have with other students, instructors or even family and friends. Be sure to read the questions and discuss them with others whenever possible as you work through the chapters. Doing so will further enhance your academic experience.

1. You learned about the four vital signs: temperature, pulse, respiration and blood pressure. The healthcare field now considers pain as the "fifth" vital sign. Research online for articles considering pain as the fifth vital sign. Do you think medical professionals should consider pain as a vital sign?
2. How can inaccurate vital signs in a patient's medical record affect patients, healthcare professionals, other medical staff, medical facilities and insurance companies?
3. Read the article found at https://www.acsh.org/news/2017/01/06/do-vital-signs-wrong-and-pay-ultimate-price-10689. Do you agree with the authors opinion that vital signs aren't reliable?

HM110 Exam 3

Once you've mastered the course content, locate this Exam in your *Workbook*. Read and follow the Exam instructions carefully.

Endnotes

[1] Osterweil, Neil. "What We Can Learn From Ancient Greek Medicine." *WebMD*, 2 August 2004. Accessed 16 August 2023. Web.

[2] "Two Patient Identifiers." *The Joint Commission*, 11 April 2016. Accessed 16 August 2023. Web.

[3] "Basic Information about Mercury." *United States Environmental Protection Agency (EPA)*, 21 December 2022. Accessed 16 August 2023. Web.

[4] "Pulse & Heart Rate." *Cleveland Clinic*, 15 June 2022. Accessed 16 August 2023. Web.

[5] Eldridge, Lynne. "Normal Respiratory Rate for Adults an Children" *VeryWell Health*, 9 October 2022. Accessed 16 August 2023. Web.

[6] Salomon, Sheryl. "Blood Pressure Chart with Readings by Age and Sex." *VeryWell Health*, 21 April 2023. Accessed 16 August 2023. Web.

Chapter 5
Patient Exam

Learning Objectives

When you complete the instruction in this chapter, you will be trained to:

- Describe various interviewing skills, outline the patient interview process and identify the various learning styles.
- Explain how to accurately measure and weigh patients and properly test for vision and hearing, and discuss normal ranges.
- Discuss each section of the physical exam and describe how the physician conducts each part of the examination.
- Describe how to accurately measure an infant's physical statistics, and plot these on a growth chart.
- Explain growth development from infancy to adolescence.

Introduction

Nearly half of adults in the United States have hypertension.[1] Having high blood pressure increases your chances of developing heart disease, a stroke and other serious conditions. High blood pressure is sometimes called the "silent killer" because it usually has no noticeable warning signs or symptoms until other serious problems arise, so many people don't know that they have it. Anyone, including children, can develop high blood pressure. However, high blood pressure is easily detectable and can usually be controlled. Maintaining a healthy blood pressure is an important health strategy, so it is important for you to know your blood pressure level and to check it regularly.

High blood pressure is one important health indicator measured during a physical examination.

Approximately 38 percent of American adults have high blood cholesterol, a major risk factor for heart disease.[2] Cholesterol is a waxy, fat-like substance that your body produces to function normally. When there is too much cholesterol in your body due to a high-fat diet or genetics, it is deposited in arteries, including those of the heart, which can lead to narrowing of the arteries and to heart disease. Many people do not know that their blood cholesterol is too high, even though it can be easily checked and can be controlled.

These are just two of the many health indicators that are generally assessed only during a physical examination or other medical visit. Yet, nearly one in five Americans haven't seen a doctor in over five years.[3] Whether the reasons for not seeking medical care are financial, emotional or geographical; the long-term benefits of a physical examination far outweigh any perceived drawbacks.

How can you educate and persuade the general population to seek regular medical attention? Making the procedure a more pleasant experience for the patient; educating patients, friends and family of the benefits of health care; and displaying the warmth and compassion that all patients should receive when seeing a medical professional is a good start. You will learn all of these skills in this chapter.

First, you will learn the patient examination process, beginning with a warm greeting and continuing with the interview process, performing physical assessments and educating the patient during an exam.

The Physical Examination: A Change in Concept[4]

In the early 1970s, Dr. Barbara Bates turned the medical field upside down by challenging the current methods of physical examination and diagnosis. She envisioned an expanded role for the nurse; to share with doctors some of the responsibilities of patient care. She also became particularly interested in how physicians are trained to diagnose patients.

As she taught the skills of physical examination and clinical thinking, she realized the standard teaching text used by students was inadequate and began meeting with a group of nurses and physicians to completely re-think the teaching guides. The result of their efforts was a hand-drawn, informative and easy-to-use text for nurse-practitioner students. Introductory chapters addressed interview techniques, taking notes on health history, common and important symptoms and assessment of mental health. Techniques for physical exams were described in detail. The first edition of Dr. Bates' *Guide to Physical Examinations and History Taking* was published in 1974. Since then, it has become a standard textbook for nursing and medical training programs.

The Patient Interview

Think about your last visit to the doctor—did you answer a lot of questions that had nothing to do with your visit? Did you wonder if she knew why you were there? Believe it or not, those questions had a purpose. The purpose of the **patient interview** is to gather subjective information from the patient to clarify and verify the patient's health. The interview is most effective when it is performed verbally, as an interaction between you and the interviewer. Verbal communication in the medical office has several benefits:

- The patient's information is accurate, reliable and up to date.
- The patient recognizes that the healthcare staff are interested in her and her care.
- The physician and patient can come to an agreement on the diagnosis and treatment.
- The patient is more likely to play an active role in her medical care.

It may seem like you're wasting time answering needless questions, but you're actually relaying valuable information to the provider. You're participating in a patient interview. Now, let's look at the interview process.

Interview Phases

Interviews move through phases. You wouldn't start an interview with an extremely personal question. Instead, you'll begin by greeting the patient warmly. Then, start with some introductory questions and slowly move into more personal areas of discussion. Let's examine each interview phase and what you want to accomplish in each.

Phase 1	Welcome and introduction
Phase 2	Discover chief complaint
Phase 3	Gather pertinent information
Phase 4	Transition to physician

Phase 1

The first phase is an introductory stage where you want to set the stage for an effective interview. In this stage, you will:

1. Use the two patient identifiers to confirm you have the correct patient.
2. Welcome the patient and use the patient's name.
3. Introduce and identify yourself.
4. Ensure comfort and privacy.

Phase 2

The next phase of the interview is to discuss the chief complaint. In this stage, you will:

1. Briefly have the patient explain his issues, including his chief complaint, other symptoms and any specific requests, such as prescription refills.
2. Determine why the patient came to the doctor.

Phase 3

The third phase of the interview is to obtain the patient's story so that you can gather information. In this stage, you will:

1. Ask open-ended questions.
2. Encourage further explanation with silence as well as verbal and nonverbal cues.
3. Paraphrase and summarize what the patient is saying.

Phase 4

This phase of the interview is the transition, where you begin to shift the interview to the physician. In order to do this, you will:

1. Summarize the interview up to that point.
2. Thank the patient for his information and explain that the physician will be in to examine him soon.

Occasionally, additional information is also gathered during this phase.

- Patient's highest-priority problems
  - Ask about the most urgent problem, or the history of present illness
  - Move from general to specific questions
  - Begin with open-ended questions and move to closed-ended questions
- Pursue other problems as time permits
  - Review of systems
  - Past medical history
    - Allergies/adverse reactions
    - Medications/immunization
    - Major medical or psychiatric problems/major surgeries
    - Last menstrual period/pregnancies/contraception (if female)
    - Smoking/alcohol/caffeine/other drugs
- Other history (as appropriate)
  - Family/social history
  - Occupational history
  - Sexual history

At the end of the interview, the physical examination procedures are explained and the patient is prepared for the examination.

Patient Interviewing Skills

Attitude is everything, isn't it? Even the simple word "No" can mean "Yes," "Maybe" or "No way!" It can be a menacing "No!" a gentle "No, no," or an indifferent "Nah." It's all in the way you say it. Communication involves so much more than the words you say. Effective communication is essential in the therapeutic environment. You'll converse with the public, other medical staff and, most importantly, patients. One of your first interactions with a new patient is the interview. You may have all the right forms, ask all the right questions and say all the right things, but come away with no more information than when you started. Effective interviewing skills not only involve gathering information efficiently, but also forging a mutually beneficial relationship with your patient. By practicing the skills, you can too.

Discussion Facilitation

To **facilitate** means to make something easy. Rather than a nervous interchange of questions and answers, a facilitated interview is relaxed, open-ended and friendly. The first step in facilitating a discussion is to make sure your patient feels comfortable talking with you. Create a welcoming, warm environment when you first meet your patient. Look directly at him, smile and use his name. Keep your body language open and relaxed. Ask him how he is; listen and respond to his answer.

Be open and relaxed

Sometimes a family member or interpreter will accompany the patient. It's easy to start speaking to the person assisting your patient, but avoid that tendency. That person is not the patient. Speak directly to the patient, even if he's not the one answering your questions directly.

Warm-up

Warm up with some general questions in the beginning of the discussion. You can chit-chat for a little while instead of diving in with questions. Mention something about yourself in relation to the conversation. This will help your patient feel more comfortable discussing his information with you. Smile while you are conversing.

Use a Common Language

Interview the patient by asking open-ended questions that allow him to explain his answers rather than replying yes or no. Speak in clear, concise language so the patient can absorb what you're saying. Avoid medical jargon. When you do have to use a medical term, explain it in terms that the average person would understand. Above all, if the patient doesn't understand something, assure him that most other people don't understand it at first either. Then find a different way to explain the term.

Listening Skills

In addition, make sure you listen well. Respond to your patient in a way that indicates that you hear and understand his question or comment. If you need to clarify what the patient is saying, summarize what you think he said and ask the patient if that's correct.

Take Your Time

Also, allow your patient time to reflect and respond to your questions. Don't interrupt when he's talking, even if he seems to be rambling. His apprehension might cause him to take a little longer to get to the point. When your patient responds, acknowledge his feelings and validate his concerns. If the patient gets off track while he's answering a question, try to get him back on the subject by asking a question.

If you see that the patient is having difficulty answering a question, acknowledge the delicate nature of the subject. Make sure the patient knows how dedicated the practice is to the protection of his privacy. It might ease your patient's concerns and allow him to speak more freely.

Document

Write down the smallest details. Information that the patient deems unimportant may help the physician understand the patient's condition. It's important to keep accurate records, even if the patient, or you, feel that something that was said was unimportant.

Closing

When ending the interview, thank the patient. He has opened himself up to you and may feel awkward and vulnerable, so it's important that you end the interview on a high note. Find something positive to say to close the interview. It can be a compliment, a reassurance about something he's concerned with or an expression of appreciation.

Explain the next step so the patient is aware of what is coming. For example, if the physician is currently with another patient but will be with your patient soon, let him know that it'll be a few minutes. An automatic "The doctor will be right with you," followed by a five minute wait does not show respect for the patient's time. If the wait will be even longer, check back in with him and offer to bring him a magazine or some water. Explain the reason for the wait.

Communication Barriers

The barriers to communication can sabotage all of your efforts to effectively facilitate the interview. Let's look at the pitfalls to avoid.

Don't . . .

Stereotype—To judge or label a person based on an oversimplified, standardized image based on bias, fear and the inability to separate the person from the disability. Get to know the individual patient and always avoid stereotypes and labels.

Give personal opinions—To inject your own personal opinion into discussions with the patient. Give only the medically accurate information that the patient has requested. Let him make his own decisions. If he asks your opinion about a simple issue, you can relate your personal experiences. If the issue is medically complex or outside of your scope of expertise, ask his doctor to discuss the matter with him.

Express disapproval—To convey disagreement with a patient's decision or lifestyle. The patient will do what is right for him. Maintain the trusting relationship you have with your patient and remember that you don't know everything. To express disapproval could cause the patient to shut down communication.

Belittle patients' feelings—To deny the importance or relevance of a patient's fears or concerns. Most likely, you've heard the expression "Put yourself in his shoes." When you find yourself denying or minimizing the patient's statements, excuse yourself from the conversation and take a moment for a reality check. Literally imagine what your life would be like if you had his ailment or disability. You'll probably realize that you don't know enough about the patient's situation to make a judgment. At that point, it should be easy for you to modify your attitude to one of acceptance of your patient's feelings and sympathy for his situation.

Change the subject or interrupt—To stop the flow of the patient's communication by bringing up another topic or a question. These are both obvious communication barriers. The patient may think that you're not listening or are in a hurry to wrap up the conversation. The patient should feel that he can talk to you about anything and that you have the time to listen.

Do you know someone who can make friends everywhere she goes? Maybe you're one of those rare individuals. Good communicators use these techniques—possibly without even realizing it. Are you imagining how some of these tips might help in your personal life as well? Great! There's even more you can do to communicate effectively with the people in your life. Let's review the aspects of nonverbal communication to keep in mind when interviewing a patient.

Communication Do's
Respect individuality
Relate personally
Express appreciation for communication
Accept feelings
Listen

Nonverbal Communication

The first scientific study of nonverbal communication was Charles Darwin's book *The Expression of the Emotions in Man and Animals* published in 1872. He theorized that all mammals show emotion in their faces. Studies now range across a number of fields, including kinesics, linguistics and social psychology. A large proportion of nonverbal communication is iconic and may be universally understood. Paul Ekman's influential 1960s studies of facial expression determined that expressions of anger, disgust, fear, joy, sadness and surprise are universal.[5] That means that a person halfway around the world will make the same facial expression when scared by a spider as you would!

Universally understood expressions

Oculesics is the study of the role of eyes—both eye gaze and pupil dilation—in nonverbal communication. People use eye contact to indicate interest in something. For example, when a patient is discussing the increase in pain in his wrist after a change of medication, a healthcare professional may communicate disinterest by reading the patient's chart instead of looking at the patient.[6]

Eye contact is an important aspect of nonverbal communication, and it's essential between healthcare professionals and patients. Make eye contact with your patient and have a positive facial expression. Don't underestimate the power of nonverbal communication. Your patients will read into negative nonverbal communication.

Similarly, your seating position also affects communication with your patients. For example, if your patient is sitting in a chair in the exam room and you're standing up while talking to him, he may feel that you don't have time to sit down and talk, or he may feel like you're talking down to him. Make sure you're at eye level when talking to a patient.

Practice these communication techniques and you'll be an expert interviewer in no time!

Active and Passive Communication

In order for you to effectively assess a patient, you'll need to use active communication. You've probably heard the terms active and passive communication before, but you may not be aware of how these terms apply to assessing a patient. **Active communication** is a two-way communication and involves confirmation that the information is understood. For example, you are actively communicating with a patient when you verbally confirm that she understands the instructions you gave her. **Passive communication** occurs when there is no response to your questions or the communication is one-sided. Ideally, you want active communication when you're interviewing the patient. Ask different types of questions to get the patient involved in communicating.

Another aspect of assisting patients is to provide information. Let's examine your role in educating patients.

Educating Patients

In patient care, you play a vital role in educating patients. Patients may ask you simple questions regarding billing or an appointment. They may also want information on complex matters such as pain control or medical procedures. The purpose of patient education is to empower the patient in a vulnerable situation. She does not control the invasiveness or the discomfort caused by the procedures or treatment that will be performed on her. However, if she knows the purpose and the process of each event, she has the knowledge to weigh the costs versus the benefits. She is no longer the recipient of her medical care; she is the administrator.

The healthcare professional has the opportunity to build a foundation of trust with the patient by providing accurate information in a caring manner. As a result, the patient feels well treated and the physician has a cooperative and knowledgeable partner who is invested in the management of her health care.

Education Preparation

Questions about terminology, tests, procedures, diagnoses and medications require preparation to answer accurately. You might know the information, but when you don't know, avoid trying to make a "best guess." Tell the patient that you don't know and that you'll do some research and get back to him. One option, if you don't feel qualified to discuss the topic, is to ask the physician to discuss the patient's question with him. Remember, a professional providing patient care recognizes the boundaries of her role; you can't—and shouldn't—answer the more complex medical questions. Leave those to the nurse or physician to answer.

Don't ever be afraid to say, "I don't know." Giving an incorrect answer to a patient not only breaks down the trust the patient has in you, but it can have serious consequences. For example, a patient may ask you about a medication's side effects and when he should call the doctor. If the medicine sounds familiar to you, you may be tempted to list some good guesses. However, if the patient is allergic to the medication or experiences different side effects, he may not recognize the problem and wait several days before alerting his physician.

Methods of Teaching

You've purchased a computer desk for your home office—assembly required. Which do you do?

a) Read the instructions front to back

b) Just start putting the pieces together in the most logical way

What is your learning style?

If you said a, you are most likely a reading/writing learner. If your choice was b, you like to learn by doing, or kinesthetically.

Just as you have a particular learning style, your patients learn in different ways as well. To make your education effective, you must present it in a way that each patient can understand. It's your job as the educator to adapt to meet the patient's needs. If you can identify her learning style, you have a much better chance of meeting her needs. Let's discuss the many types of learning styles.

Learning Styles

Learning styles are the most effective way that someone processes and absorbs information. **Multimodal learners** are people who have more than one strong learning style. Learning styles are divided into categories:

Learning Styles		
Style	**Learns By**	**Best Teaching Methods**
Visual	Seeing	Poster, magazine, diagram, DVD, visual demonstration, website with illustrations
Verbal/auditory	Hearing	Spoken instruction, lecture, CD, audiotape, website with emphasis on audio presentation
Reading/writing	Processing text	Written directions, signage, posted notice, brochure, pamphlet, website with emphasis on text
Kinesthetic/ practical	Doing	Hands-on demonstration, keyboard, practice, interactive website

Most patients don't know what type of learner they are, so try different methods to see what works best for each patient. In addition, ask patients if they have questions before, during and after your discussion.

Let's go over a few tips to help you educate your patients.

- Address your patient with her full name. Then, ask the patient how she would like to be addressed in the future. Finally, introduce yourself (name) and your role (MA, PCT, etc).
- Don't assume that a patient already knows anything regarding the subject at hand.
- Don't judge your patient. She should feel comfortable asking you questions.
- Treat all of your patients respectfully, regardless of race, financial status, religion, age or other differences.
- Don't patronize your patients, which means to treat them in a condescending manner.
- Don't rush when you're talking with a patient. Speak slowly and clearly.

Lastly, you can keep your knowledge current with continuing education. Some employers will pay for continuing education, so look into it once you start your healthcare career. By being knowledgeable, you can be a resource to your patients.

Practice Exercise 5-1

Select the best answer from the choices provided.

1. **Don't be afraid to tell your patients "I don't know," because _____.**
   a. then you won't have to educate patients
   b. providing incorrect information can have serious consequences
   c. the physician should answer patients' questions
   d. you aren't authorized to talk to patients

2. **Mrs. Walters wants to know the side effects of a surgical procedure the doctor wants to perform. If you don't feel qualified to discuss this with her, _____.**
   a. ask her to check the web for information
   b. tell her you'll research the topic and call her back
   c. ask the physician to discuss Mrs. Walter's procedure with her
   d. tell her you don't know

3. **_____ learners are people who have more than one strong learning style.**
   a. Multimodal
   b. Visual
   c. Kinesthetic
   d. Multitasking

4. **Your patient, Nick, can't read yet, but he loves to pick up things and play with them. A section of the itchy rash on his arm has become infected from scratching. In addition to giving him antibiotics, the doctor recommended an anti-itch cream to Nick's mother. You now need to teach Nick why it's important not to scratch the rash. Which educational technique do you think will work best for him?**
   a. Show him a poster of what infected rashes look like.
   b. Write out step by step instructions, then ask his mother to read them to him every morning.
   c. Scare him into compliance by telling him he'll have to get a shot if he keeps scratching the rash, or his arm might fall off.
   d. Ask him to touch the part of his arm that is infected, which will be painful, then touch the rash where it is not infected. Explain that if he stops scratching, the rash will heal and won't hurt anymore.

5. **Mrs. Walters doesn't understand why the doctor feels a surgical procedure is necessary to remove a benign growth behind her eye. She sees fine; in fact, she loves to read and reads all the time, and the growth isn't painful. Which educational technique do you think will work best for her?**
   a. Give Mrs. Walters a CD explaining the procedure in great detail.
   b. Ask Mrs. Walters to read a pamphlet explaining the condition and the danger of her losing sight if it is left untreated.
   c. Show her an ultrasound of the growth behind her eye.
   d. Ask her to look in the mirror, and note how the eye with the growth behind it is slightly protruding. Explain how this affects her appearance if she doesn't have it removed.

Answer as directed in your own words.

6. **What is the purpose of the patient interview?**

7. **What are the benefits of verbal communication in the medical office?**

8. **What are the steps of Phase 1 in the interview process?**

9. **What is the goal of Phase 2 of an interview?**

10. **What are the steps of Phase 3 in the interview process?**

11. **How should you end the interview?**

12. **Communication barriers can sabotage the interview process. What are pitfalls to avoid?**

13. **How does your seating position affect communication with patients?**

14. **What are two nonverbal communication techniques that help the patient feel comfortable?**

Review Practice Exercise 5-1

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Assisting with the Examination

Your role in patient care may include obtaining the patient's vital signs and other information. Most importantly, you will assist the physician and patient through the examination. Now, let's look at some of the instruments and equipment used during the physical exam.

Room Preparation

An important responsibility of the healthcare professional is to keep the examination rooms clean and stocked with supplies. Prepare examination rooms at the beginning of the day, between patients and at closing time.

You should focus on the following tasks:

- **Clean up**—Pick up any supplies that were used during an earlier appointment. Make sure disposable supplies are thrown away in the trash or in a hazardous waste receptacle. Wipe the counter and sink with a paper towel.
- **Wipe down surfaces**—Make sure you wear gloves when you clean any surface that may have had blood or bodily fluids on it. Either use a disinfectant or a solution of 1 part bleach to 10 parts water, meaning a **1:10 solution**.
- **Change paper**—Throw away used paper on the examination table and replace with new, clean paper. Fold or tuck the ends under the table.
- **Wash hands**—Use proper hand washing to thoroughly wash your hands.

By properly preparing examination rooms, you're protecting the safety of your patients. Thoroughly cleaned examination tables, clean gowns and new sanitation paper are essential to discourage transmission of germs.

Sanitation paper

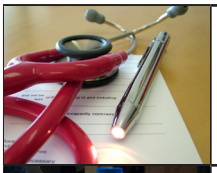
After your last patient leaves, make sure the rooms are well-stocked for the following day. Double check items such as patient gowns, tongue depressors, cotton balls, medical gloves, bandages and blood pressure cuffs.

Some equipment, such as the otoscope, will need to be recharged. Plug in the equipment so it can charge overnight and be ready to use the next day. When the office closes, turn off computers and lights in each room.

Now that you know how to prepare a room, let's learn about some more equipment.

Instruments and Equipment

Let's introduce you to some of the instruments that are used during the physical exam.

	**Penlight** As the name implies, a penlight is a tiny flashlight that is about the size of a pen. You can use this to examine a patient's ears, nose and mouth and check the patient's pupils.
	**Guaiac kit** Stool sample test that is used to detect blood leaking into the intestine, usually from the stomach, intestine or rectum.
	**Tape measure** Small, retractable tape measure used to take the patient's physical measurements.
	**Urine specimen container** A clean, sterile cup that is used to collect urine for tests.
	**Percussion hammer** Used to test reflexes and find bone fractures in joints. It has a triangular rubber head and a short, flattened metal handle.
	**Tongue depressor** A thin blade that is used to press down the tongue during an examination of the mouth and throat.

Patient Preparation

In addition to preparing the examination room and equipment, you will also prepare the patient. In some cases, you'll contact the patient before the appointment to give her special instructions. For example, some exams require fasting, such as a cholesterol test or an enema for a sigmoidoscopy.

Patient Rooming

When the patient checks in at the front desk, she may have some forms to complete, then she'll wait in the reception area until her examination room is ready. You or another medical staff member will call the patient's name in the waiting area. If you're unclear on how to pronounce the patient's name, ask the receptionist.

As you know, you should greet the patient with a smile, establish eye contact and make her feel comfortable. In addition, speak slowly, confidently and clearly.

Escort the patient to the examination room. In some cases, you'll take the patient to a central area for weight and height measurements. In other cases, you'll sit down with the patient and review her medical history or confirm the information on forms that she filled out while in the waiting area. You can save the physician time by clarifying information and documenting the chief complaint.

Once you've reviewed this information, you may ask the patient to change into a gown if it's necessary. Otherwise, tell the patient when she can expect to see the physician.

Let's discuss the details of taking a patient's physical measurements.

Physical Measurements

Even though height and weight may not seem as important as a patient's blood pressure or temperature, they're usually measured during a physical examination and do have importance. Physicians usually measure an adult's height and weight during a yearly exam. Children and adolescents grow much faster than adults, so their height and weight are taken at every examination to monitor their growth. Elderly patients also may have their height taken at every exam to monitor changes. Older patients tend to become shorter because the cushion between their vertebrae shrinks as part of the aging process.

Patient Height

The measuring bar is part of the scale that extends up to measure height. Ask the patient to remove her shoes so you can get an accurate measurement. If the patient is barefoot, place a paper towel on the scale so that the patient isn't barefoot on the scale. The patient should have her back against the scale. This will avoid injuries as the measuring bar is lifted as well as keep her head level for an accurate measurement.

Once the patient is on the scale, the measuring bar is placed directly on the crown of the patient's head, the **vertex**, and you read the line between where the solid bar and the sliding bar meet. Most scales' bars are measured in quarter inches, so you'll record your patient's height in feet and inches. Children's heights may be recorded in feet and inches, or only inches.

Conversions to Know	
1 foot = 12 inches	To convert inches to feet, divide the number of inches by 12. To convert feet to inches, multiply the number of feet by 12.
1 kilogram = 2.2 pounds	To convert pounds to kilograms, take the number of pounds and divide by 2.2. To convert from kilograms to pounds, use the number of kilograms and multiply by 2.2.
1 inch = 2.54 cm	To convert inches to centimeters, take the number of inches and multiply by 2.54. To convert centimeters to inches, take the number of centimeters and divide by 2.54.

Assist patients onto and off the scale as needed. Elderly patients in particular will need assistance. The movable platform and the step up may throw your older patients off balance. In addition, like other medical equipment, scales should be sanitized after each use.

There are a few ways to make sure you take accurate height measurements of your patients. As previously noted, have your patient remove her shoes. Make sure the top of the measuring bar rests on the highest point of the patient's head. Some patients may have hair that adds height, so make sure you're not measuring your patient's hairstyle! In addition, ask your patient to stand up straight to take an accurate height measurement.

Good posture is needed for accurate measurements.

Although traditional beam balance scales are the most common way to measure height, alternative methods are used. Some facilities use wall charts to measure patients' height. Wall charts are attached to the wall and are marked with inches and feet. Patients stand with their back to the wall. In addition, patients should have their feet together, a level head and good posture.

Patient Weight

The patient's health and the physician's preferences determine whether a patient's weight is measured at each visit. Some physicians will measure adults' weight at each visit due to health conditions such as obesity, eating disorders, diabetes, hypertension, pregnancy and cancer. A patient's weight can tell a physician about her nutritional status, fluid status and response to treatment. Other physicians may measure all patients' weight at each visit. As with height, children's weight is measured at every doctor's visit.

> For example, pregnant women are supposed to gain weight, and their amniotic fluid should increase during pregnancy. If the pregnant woman's weight has not changed in several months, it could mean that her baby is not developing properly. The physician will examine the amniotic fluid levels and the patient's dietary needs.

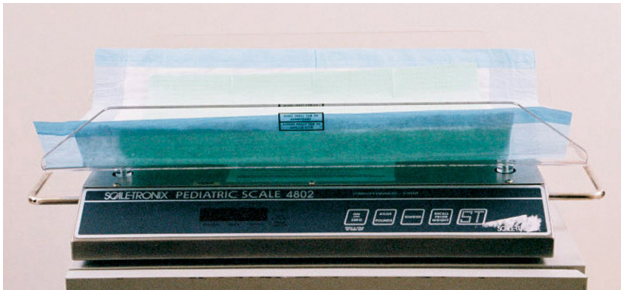
When you're measuring a patient's weight, make sure you have privacy. Many patients are sensitive about their weight and may not want others to see or hear their weight. In addition, if a patient has an eating disorder, she may be extremely anxious about being weighed. Regardless of the situation, don't comment on the patient's weight and protect the patient's privacy as always.

Before you can weigh a patient, you will **calibrate**, or standardize the scale so it will give an accurate measurement. To calibrate the scale, make sure the point of the balance beam is floating in the center when there is no weight on the scale. Once the scale is centered, it is calibrated and ready for use.

Ask patients to remove their shoes and any heavy outerwear. Also, ask patients with bags or purses to set them on a chair or on the counter so you can get an accurate weight measurement. Remember, some patients require assistance on and off the scale.

Another type of scale is the eye-level digital scale that takes weight measurements quickly and easily. The **eye-level digital scale** usually has a stationary platform, which makes it safer for patients, and the digital reading is displayed within a few seconds.

Other types of scales are available for special situations, such as chair scales, bed scales and infant scales. If a patient is unable to stand to be weighed, a **chair scale** is used to measure weight. Like the name implies, a chair scale looks like a chair, and has either a digital scale or a balance beam to weigh the patient. A **bed scale** allows bed-ridden or severely injured patients to be weighed by placing the patient on a stretcher and hydraulically lifting the stretcher a few inches off the bed. An **infant scale** could be a table-top unit designed specifically for babies, or it could have a removable baby tray to convert into a step-on scale for adults. The baby is placed in the tray to measure her weight.



Infant scale

Body Mass Index (**BMI**) is a number calculated from a person's weight and height. According to the CDC, BMI provides a reliable indicator of body fat amount for most people and is used to screen for weight categories that may lead to health problems.[7]

To determine your BMI, multiply your weight in pounds by 703. Divide that answer by your height in inches. Then, again, divide that answer by your height in inches and you'll have your BMI.

Let's look at an example.

> Tonya, age 42, is 200 pounds and 63 inches tall. To determine her BMI, she multiplies 200 by 703, which equals 140,600. She then divides 140,600 by her height in inches, or 63. Then, she divides that answer by 63 again. Her BMI is 35.42.

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and above	Obese

Most medical professionals continue to use BMI as an indication of obesity. However, some studies question using BMI to determine obesity. Researchers argue that individuals can be fit and still be considered overweight by BMI guidelines. Nearly 35 million Americans labeled overweight or obese based on their BMI are healthy, as are 19.8 million others considered obese, according to research out of UC Santa Barbara and UCLA.[8] Researchers claim that BMI doesn't accurately measure body fat content, fat's distribution on the body or the proportion of muscle to fat, which determine obesity-related health risks.

As a result, researchers recommend using other methods to determine obesity:

Waist-to-hip ratio test—Use a tape measure to measure the size of your waistline and the widest part of your hips. Divide the circumference of your waist by your hip measurement. Men with a waist-to-hip ratio above 0.90 and women over 0.85 are considered obese, according to the World Health Organization.

Measuring waist circumference—Use a tape measure to check waist size. In general, a waist size over 35 inches in women and 40 inches in men indicates weight loss is recommended.

Body fat tests—Medical clinics and health clubs have instruments to determine the amount of body fat.

Keep an eye out as more research is conducted to measure individual health, and to see if healthcare professionals will stick with BMI or utilize new methods. For now, let's look at how to use the balance beam scale.

Balance Beam Scale

Normally the balance beam scale in a medical setting is equipped to measure both the patient's weight and height. Measure and write down the patient's weight and height before every appointment. It doesn't matter whether the appointment is for a routine physical, a visit for an illness or a follow-up visit, you take the patient's weight.

Balance beam scale with measuring bar

Virtual Lab: Balance Beam Scale

To view this Virtual Lab, go to the Student Site and select *Resources*. At this time, you will select *Balance Beam Scale* to watch the instructional video. Review this procedure and watch the Virtual Lab until you can explain the procedure without reading the steps or watching the lab.

Equipment Needed: Balance Beam Scale with measuring bar, paper towel

1. The point of the balance beam must be floating in the center of its movement range when no weight is applied to the scale. Once it is centered, the scale is calibrated and ready for use.
2. The patient may wear normal indoor clothing for this measurement. Heavy coats and shoes should be removed.
3. Place a paper towel on the scale before asking the patient to stand on the scale.
4. Ask patient to stand with her back to the balance beam. Offer assistance to prevent falls.
5. Move weights across the balance beam until the end point floats without touching any part of the scale.
6. Record this weight on the chart.
7. Maintain the patient's privacy in obtaining her weight. Don't announce the results out loud. Comments or even encouragement for weight loss should be given in private.
8. To measure the height, slide the vertical measuring bar until the fold-out horizontal section on the top of the bar is resting on the patient's head.
9. Note the reading where the solid bar and the sliding bar meet.
10. Record this height on the chart.

Practice Exercise 5-2

Select the best answer from the choices provided.

1. **Examine the patient's ears, nose, mouth and pupils**
   a. Penlight
   b. Guaiac kit
   c. Tape measure

2. **Detect blood leaking into the intestine**
   a. Penlight
   b. Guaiac kit
   c. Tape measure

3. Take patients' physical measurements

a. Penlight
b. Guaiac kit
c. Tape measure

4. Collect urine for tests

a. Tongue depressor
b. Percussion hammer
c. Urine specimen container

5. Test reflexes and find bone fractures in joints

a. Tongue depressor
b. Percussion hammer
c. Urine specimen container

6. Hold the tongue down while examining the mouth and throat

a. Tongue depressor
b. Percussion hammer
c. Urine specimen container

7. The height and weight measurements for adults are recorded at least _____.

a. every five years
b. every year during the physical exam
c. once during each visit
d. twice a year

8. The patient should _____ when you measure his height.

a. face the measuring bar
b. lean over
c. remove shoes
d. lie down

9 . A patient who weighs 100 pounds weighs _____ kilograms.

a. 22
b. 30
c. 45
d. 100

10. To calibrate a scale, make sure the point of the balance beam is floating _____ when there is no weight on it.

a. in the center
b. towards the bottom
c. towards the top
d. up and down

11. To weigh an infant, _____.

a. use a baby carrier to hold the infant on the scale
b. weigh the parent with the infant, then weigh the infant and subtract
c. use a chair scale
d. place the baby in the tray on the infant scale

Review Practice Exercise 5-2

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Physical Examination

The physical examination contains the findings from the doctor's clinical examination of the patient. The **complete physical examination** (**CPE**) is an examination of the body from head to toe. After the patient's vital signs, height and weight are taken and the medical history has been reviewed, a physical examination is performed.

If a CPE is done, the patient should be in a gown so that the physician can examine all areas of the body. Let's look at six methods that are used to evaluate the patient.

Evaluation Techniques

The methods that a physician uses to evaluate a patient are:

- Observation/inspection
- Palpation
- Percussion
- Auscultation

Observation/inspection is the visual inspection of the body for color, shape, rashes, swelling or visible injuries. The physician will look at posture, body movements, mannerisms and grooming as well.

Palpation uses touch to examine the body and verify any observations. The physician will feel body parts and organs. In addition, the physician may note the skin texture, moisture and temperature.

Percussion is tapping on the body using fingers or an instrument. Different organs produce different sounds depending on their hollowness. For example, the lungs should produce a hollow sound because they hold air. Physicians will use a percussion hammer to test the arms, legs and feet reflexes.

Auscultation is when the physician listens with a stethoscope. Often, the physician focuses on the patient's heart, lungs and abdomen; listening for abnormal sounds such as murmurs or rales.

Now let's look at the different parts of the physical examination.

Physical Assessment

The first part of the physical exam is a general overview, and then the exam begins with the head and ends with the patient's toes. Here are the various parts of the physical assessment.

- General appearance
- HEENT (head, eyes, ears, nose and throat)
- Neck
- Chest
- Abdomen
- Genitalia
- Rectum
- Extremities

Let's take a closer look at each part of the physical exam.

General Appearance

The physician will look at the patient's general appearance including the patient's walk, posture, speech, breath, nutritional status, skin and hair distribution.

First, let's discuss a patient's walk, or **gait**. If a patient limps, walks with feet wide apart or cannot stay balanced, it's noted in this part of the examination. Abnormal gait can signal a health problem or disease.

A person's posture can also display health problems. For example, if a patient is in pain, he might have limited mobility. The physician will look at the spine and its alignment. **Scoliosis**, or curvature of the spine and **kyphosis**, or a humped back, are abnormal health conditions that could be found during this part of the examination.

If a patient has lost his voice, cannot get his words out or mixes up words, his speech problem could indicate another more serious problem. Brain diseases, lesions and disorders could affect a patient's speech patterns.

A patient's breath can also signify a health problem. A sweet, fruity odor could mean the patient has **acidosis**, or a problem with the acidity of the body's fluids. A musty breath odor could indicate a problem with the patient's liver.

Physicians use the height and weight guidelines mentioned earlier to monitor her patients' nutrition.

An assortment of health issues can be revealed by an examination of the skin. For example, **jaundice**, or yellowing of the skin, can indicate a problem with the liver.

HEENT

HEENT stands for head, eyes, ears, nose and throat. The physician will begin by looking for blemishes on the head and face. Next, the physician will use an ophthalmoscope to examine the retina and optic disc. The patient's pupils should be equal in size, round and react to light and accommodation (PERRLA). The physician will examine the ear with an otoscope and the nasal cavity with the nasal speculum. She'll look for discharge, obstruction or abnormalities. Lastly, the physician will use a tongue depressor and a penlight to look at the gums, teeth, palate and throat.

Neck

The physician will examine the neck for any lumps or swelling. The patient will be asked to swallow and the physician will feel the thyroid gland. In addition, the physician may use a stethoscope to listen to the carotid artery.

Chest

The physician will visually check for abnormalities and any swelling or masses. She will place a stethoscope on the patient's back to listen to the lungs. The patient is asked to take several deep breaths so the doctor can listen for any abnormal sounds. The physician will also listen to the heart for any abnormal sounds. In addition to the stethoscope, the physician often examines the lungs using percussion.

In female patients, the doctor will examine the breasts for **symmetry**, or similar size and shape. In addition, she will check for any masses in the breast and armpit. Any discharge from the nipple is also noted.

Abdomen

First, the physician will look at the abdomen for any visual abnormalities. Then, he will use auscultation, percussion and, finally, palpation to examine the abdomen. The physician will use the stethoscope to listen to bowel sounds. Next, he will percuss the abdomen to evaluate abdominal organs and fluid presence. Finally, he will palpate each quadrant for tenderness, masses or enlarged organs.

Genitalia

Both females and males have genitalia examinations. The male exam includes an examination of the penis and testes for any discharge, redness, tenderness and masses. In addition, the physician will check for **hernias**, or protrusions of an organ through the cavity wall that holds it. Gynecological exams are recommended every year after the age of 20 or once a female is sexually active. This exam includes the inspection of external genitalia for swelling, lesions or ulcerations. Next, the pelvic examination is done to check the cervix, uterus, tubes and ovaries. Then the physician may perform a rectal examination. Also included is a breast examination. The physician will look for any redness, dimpling or puckering and palpate to look for lumps or thickening.

Rectum

To conduct a rectal exam, a gloved finger is placed into the rectum to check for masses and hemorrhoids. In males, the doctor will palpate the prostate gland to check for masses or enlargement. In females, the doctor will check for herniation of the rectum.

Extremities

The focus of the extremities portion of the examination is poor circulation. Feet and ankle temperature, color and swelling will indicate any circulation problems. The physician may also check the limbs' **range of motion** (**ROM**), or ability to move in normal ways. Finally, she will check reflexes with a percussion hammer.

Cancer

During the CPE, the physician will be alert to symptoms that may indicate the presence of cancer. Early detection of cancer is a key factor in survival rates. It's helpful for patients and you to be aware of early signs of cancer. The acronym *CAUTION* can help you remember the signs of cancer in adults:

Change in bowel or bladder habits

A sore that does not heal

Unusual bleeding or discharge

Thickening or lump in breast or elsewhere

Indigestion or difficulty swallowing

Obvious change in wart or mole

Nagging cough or hoarseness

Use the acronym *CHILDREN* to remember the signs of cancer in your pediatric patients:

Continued, unexplained weight loss

Headaches with vomiting in the morning

Increased swelling or persistent pain in bones or joints

Lump or mass in abdomen, neck or elsewhere

Development of a whitish appearance in the pupil of the eye

Recurrent fevers not due to infections

Excessive bruising or bleeding

Noticeable paleness or prolonged tiredness

Cancer is generally categorized into four stages. Some cancers may use different categories, but most kinds of cancer use these four stages.

Stage 1	The cancer is relatively small and contained within the organ where it originated.
Stage 2	The cancer is localized, but the tumor has grown larger than in Stage 1.
Stage 3	The neoplasm is larger and cancer cells are now in the nearby lymph nodes.
Stage 4	The cancer has metastasized, or spread from the tumor's original site to other lymph nodes and organs.

The CPE is one of the physician's most important tools to monitor her patients' health and detect illness in its early stages, while it can still be treated.

Pediatric Examination

A yearly checkup is considered adequate to monitor an adult's health because her body has stopped growing; however, a child's development should be assessed more often, and by a pediatrician. **Pediatrics** is the branch of medicine that specializes in the care of newborns, infants, children and adolescents. Pediatricians recommend a strict schedule of assessments, or **well-baby visits**, for their young patients. A newborn will have checkups at one month, two months, four, six and nine months. Assessments continue at 12, 15, 18 and 24 months. After age two, a yearly checkup is usually sufficient. During these exams, you will record a history of the child, assess the child, measure vital signs, height, weight, vision and hearing.

Pediatric Measurements

In addition to measuring the child's vital signs, you will take his physical measurements. Let's begin with a discussion of the infant's measurements.

Infant Measurements

In order to examine an infant's growth patterns, you'll need to take a few measurements. Some can be trickier than others; however, you will be measuring infants' length, weight and head circumference in no time.

An infant is fragile and wiggly, so you must be careful when you lift and hold him. In particular, be very careful of the infant's neck if he's younger than four months. Make sure it's always supported by your arm or hand. When the infant is on the examination table, keep one hand on him at all times. He can easily roll off while you're trying to measure and examine him.

Infant Weight

To measure the baby's weight, you will use the infant platform scale that displays the weight in either pounds and ounces or kilograms and grams. The infant is completely undressed and either sits or lies on the tray, which has curved edges. Place a paper towel or cloth on the platform for sanitary purposes before you set the baby on the scale.

If you're measuring an older infant or a toddler who doesn't want to sit still long enough to be weighed, the child's parent can give you a hand. Ask the parent to hold the child and step on the scale. Write down this weight. Then hold the child while the parent steps on the scale by herself. Subtract the adult's weight from the first measurement of both, and you'll have the child's weight.

Infant Recumbent Length

Recumbent length refers to stature taken while laying down. There are two methods to measure an infant's length. The first uses an **infant measuring board**, which is a stationary headboard and a moveable footboard attached to a rigid board imprinted with a height scale. Lay the measuring board on the examination table, then lay the infant on the measuring board so that his head touches the headboard. Adjust the footboard so it touches the infant's feet. The measurement on the scale that lines up with the footboard is the child's length.

The second way to measure infant length is to lay the infant on top of the exam table paper or a pad on the examination table. Use a straight pin or a pen to mark the paper or pad at the infant's head and at his heel. After removing the baby, measure the distance between the two pins or pen marks.

Once a child is able to stand up without support, a stature-measuring device can be used. This is similar to the adult measuring bar that you learned about earlier. The **stature-measuring device** has a moveable headpiece that is attached to a measuring bar and platform.

Head Circumference

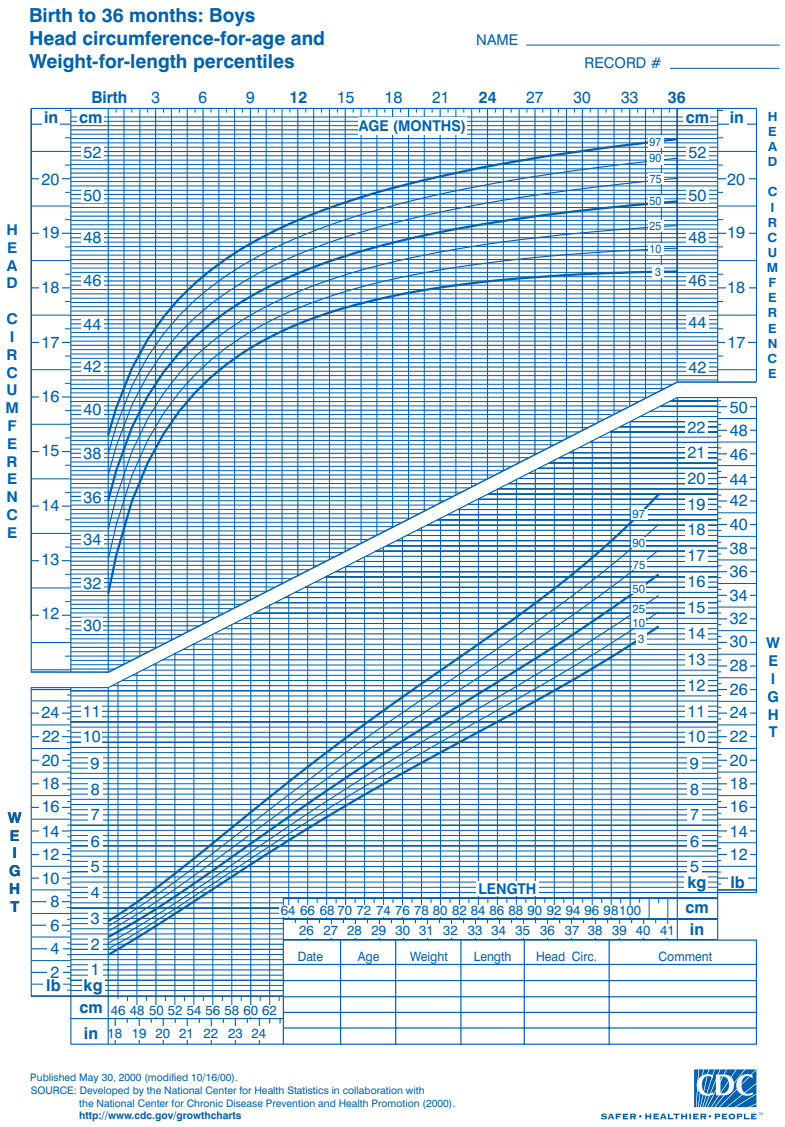
The infant's head circumference is measured during the physical exam to monitor brain development. Usually an infant's head is measured at every visit until he is 36 months old. After that, the head circumference is measured once a year.

In order to measure head circumference, you'll need a paper or metal measuring tape. Avoid using a cloth measuring tape because it can stretch and isn't as accurate. Place the tape around the widest part of the child's head. Make sure the tape is snug, and read the measurement to the nearest inch or centimeter. Record the circumference in the child's chart. Most likely, you'll plot the circumference on a chart as you do with weight and length.

Paper measuring tape

The head circumference could indicate a health problem. **Hydrocephalus**—a condition where the head size is increased because of fluid around the brain—is one possible condition. Another possible condition is **microencephaly**, a condition in which the skull's fontanels, or bones, fuse too soon in the infant's development so the brain cannot grow and develop.

Usually, a newborn's head circumference is between 12.5 and 14.5 inches. Look at the chart to see the circumference growth for a boy up to 36 months. Note that this example is for a male infant. The chart for a female infant is similar, but tracks growth to a three-year-old average head size a half-inch smaller than a male infant.[9]



Steps to Take: Measure an Infant

Infant weight:

1. Wash your hands.
2. Explain the procedure to the parents or caregiver and have her undress the infant including the diaper.
3. Place a paper towel or sanitation paper on the scale and then check the scale's balance if necessary.
4. Place the infant on his back on the scale and keep your hands on the infant.
5. Place the bottom weight as high as it will go before the balance drops.
6. Move the upper weight until the balance bar is in the center.
7. Read the weight while the infant is still.
8. Pick up the infant and have the caregiver or parent put the diaper on.
9. Throw the paper towel into the biohazard waste container.
10. Sanitize the scale and wash your hands.
11. Record the weight on the growth chart and the patient's chart.

Infant length:

1. Wash your hands.
2. Explain the procedure to the parents or caregiver. The infant should still be undressed from being weighed.
3. Place the infant on her back on the examination table. If you're using an infant measuring board, place the head against the headboard. Feel free to have the parent or caregiver assist you in this procedure. Gently try to straighten the infant's back and legs. Place the infant's heels against the footboard. If you don't have an infant measuring board, mark the exam table paper at the top of the child's head with a pen mark or pin. Then try to straighten the infant's back and legs and mark the heel location with a pen or pin. Ask the caregiver to pick up the infant. Use your measuring tape to measure the distance between the two marks.
4. Read the length and remember it so you can write it down.
5. Wash your hands.
6. Record the height on the growth chart and patient's chart.

Head circumference:

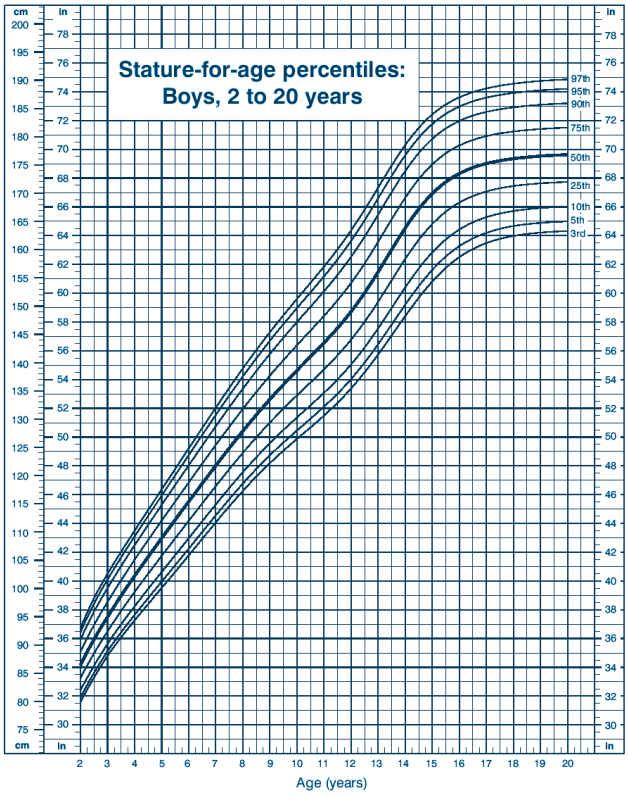
1. Wash your hands.
2. Explain the procedure to the parents or caregiver.
3. Ask the parent or caregiver to hold the child or see if the child will lie on the examination table. Older children can stand or sit if they stay still.
4. Place the measuring tape snugly at the largest part of the head, around the temples.
5. Read the measurement.
6. Wash your hands.
7. Record the head circumference on the growth chart and patient's chart.

Child Measurements

Once the child is able to stand unsupported, his weight and height are measured using the same methods as an adult's. However, whether an infant or a child, it's important to document the pattern of growth from birth to adulthood.

Growth Patterns

Growth patterns are tracked in children to monitor their development in relation to the "average" child. If an abnormal pattern is detected at a young age, it can often be corrected, or educational needs can be addressed much sooner. To track these growth patterns, the physician uses various types of **growth charts**, which display the patient's age, weight, length and head circumference that you have plotted at each well-baby visit. You can then see how the patient compares with average growth rates that are preprinted on the chart. This information is also used to calculate pediatric medication dosages.



Growth charts

Andrew and his parents have arrived at the doctor's office for Andrew's 18-month well_baby checkup. Andrew weighs 29 pounds and is 33 inches long. Let's figure out his growth rate. Go to https://www.cdc.gov/growthcharts/data/set1/chart07.pdf. First, you need to plot Andrew's weight to find his percentile. Find the point where his age and weight intersect, then follow the line to the percentile. Andrew is in the 95th percentile for weight. Now let's look at Andrew's height. Again, find the spot where Andrew's age and height intersect. Then follow that line to the percentile. Andrew is in the 90th percentile for height. Looks like Andrew is growing very well!

After your measurements have been completed, you may be asked to make an initial assessment of the child's developmental level. To accurately describe growth and development, you must know how it compares to normal—let's learn more!

Children's Growth and Development

Children develop and grow at different rates, but you should know some general guidelines for growth. Let's take a look at the growth of infants, toddlers, preschoolers, school-aged children and adolescents.

Infants

An infant's first year of life is full of growth and development. **Infants**, or the stage between one month and one year, begin their gross and fine motor skills development at the head and then progress down the body to the feet. For example, at one month of age, the infant may be able to imitate facial expressions, and then by one year be able to walk. **Gross motor skills** are bigger muscle movements, such as crawling, pulling up and walking. **Fine motor skills** are smaller movements, such as picking up a cracker and putting it into the mouth or using a crayon to scribble.

In the first six months, a baby usually doubles her birth weight. By one year, she has tripled her birth weight. Usually, the infant will grow in length at the rate of about an inch a month for the first year, and then height development slows. Of course, the infant's head is growing quickly to accommodate the equally rapid growth of the brain. By the end of the year, the infant's head is about 66 percent of the size of an adult's.

Toddlers

Once an infant is one year old, she's considered a toddler. **Toddlers**—the stage between one to three years of age—experience a lot of change. They become more independent, improve their gross motor skills and begin to communicate verbally. Toddlers are curious and their independence is important, but it's essential to educate the parents that some guidelines should be set to protect children from harm during their explorations.

Toddlers continue to grow, but not as rapidly as infants. The rate of height growth in a toddler is about three inches a year. The rate of weight gain is approximately five pounds per year. In addition, toddlers are usually walking at around 12 to 15 months and can climb stairs by 18 months old.

Some toddlers also gain bladder and bowel control between the ages of one and three. Parents or caregivers may need information on potty-training strategies.

An area that some parents may talk to you about is their toddler's nutrition. Toddlers will eat when they're hungry, but they are less interested in food at this stage. This is because growth has slowed, so they don't need as many calories. Parents or caregivers may need reassurance that their toddlers are getting the food they need.

If proper diet and exercise are ingrained in the child at this age, most likely they will continue into adulthood. The future benefits of disease prevention and a longer life can be goals even at this young age.

Preschoolers

Once children are between the ages of three and six, they're considered **preschoolers**. Preschoolers typically grow at the rate of two pounds in weight and three inches in height per year.

Most preschoolers can control their bowel and bladder, dress and feed themselves and interact with others. Preschoolers use a great deal of creativity and imagination to play with others. In addition, preschoolers learn through play and imitation.

Preschoolers should have examinations every year to monitor growth, vision, nutrition, hearing and blood pressure. As with toddlerhood, parents may have questions about their children's nutrition. Some preschoolers will refuse to eat for the day or will only eat one kind of food. Educate yourself and discuss these issues with children's parents or caregivers.

School-aged Children

School-aged children—between the ages of six and 11 years—gain about five pounds of weight and two inches in height a year. In addition, children's motor skills continue to improve and their muscle size increases.

School-aged children should visit the doctor at five, six, eight, 10, 11 and 12 years of age. At these appointments, children's height, weight, vital signs, vision and hearing are tested. They also receive a physical exam and the doctor will counsel them about nutrition. A scoliosis screening and tuberculosis test are conducted at these visits as well. Children should be educated on good nutrition, exercise and the dangers of recreational drugs, tobacco and alcohol.

The last stage of the school-aged years is **prepuberty**, in which axillary and pubic hair appear and sexual characteristics begin developing. Hormonal changes cause an increase in body odor as well. During prepuberty, some children may be concerned about not looking the same as their friends because children develop differently. Educate parents or caregivers about this concern as well as other potential concerns such as stress, bullying and peer pressure.

Adolescents

Adolescents—children between 12 and 21 years old—experience tremendous physiological changes. Girls gain about 10 pounds and can grow up to five inches in a year. Boys annually gain up to 14 pounds and can grow up to six inches.

Because of the rapid physiological and psychological changes in adolescence, children in this stage should visit the doctor once a year to discuss physical activity, injury prevention, nutrition, birth control, depression and suicide. The physical examination will check vital signs, height, weight, vision and hearing. It may also include laboratory tests, urinalysis and complete blood count (CBC).

In this stage, adolescents focus more on relationships with friends than their relationships with their families. They become more independent from their parents as they think ahead to their own adulthood. Oftentimes, this is a period of conflict. You can assist parents with problems with adolescents through education. Provide parents and caregivers with handouts, demonstrations, videos and discussions that address their concerns.

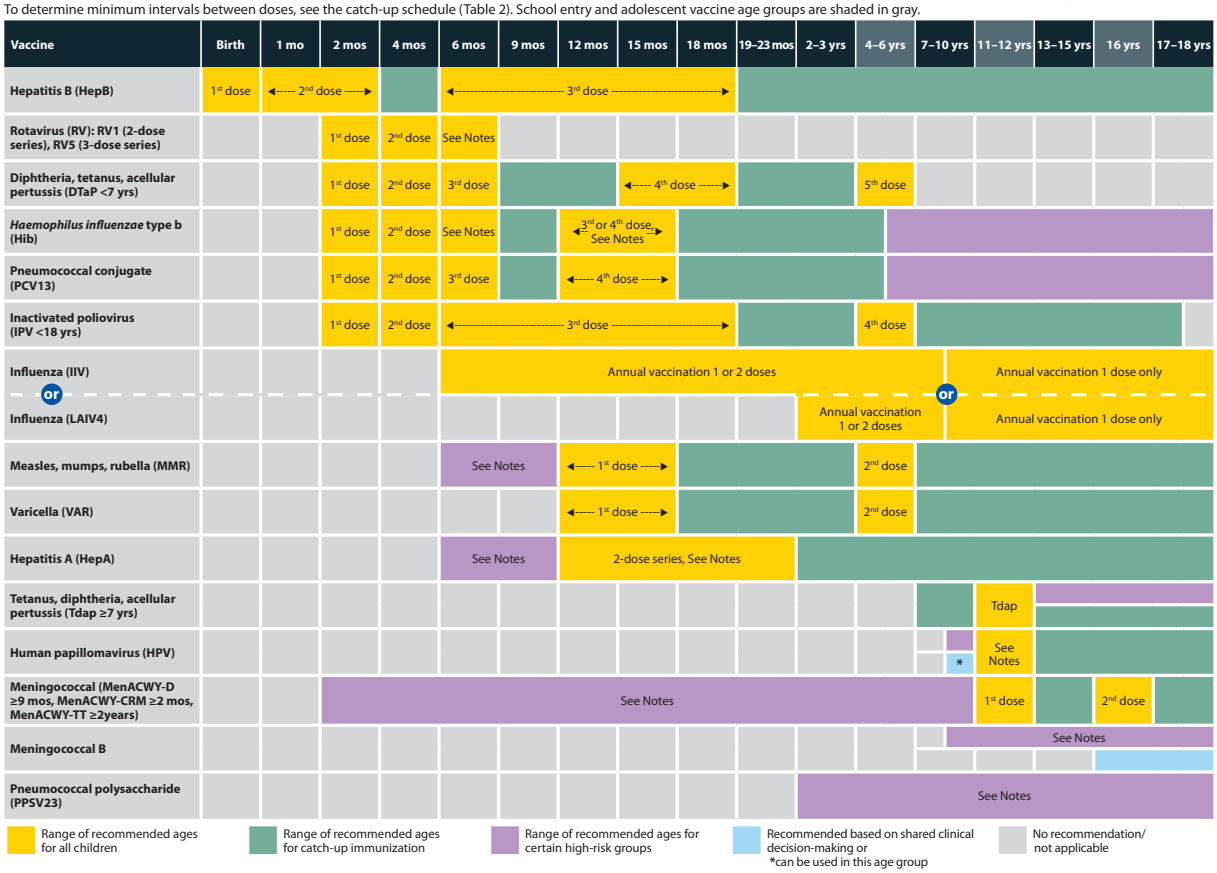
Immunizations

Immunizations protect against hepatitis A and B, rotavirus, polio, measles, mumps, rubella, pertussis, diphtheria, tetanus, haemophilus influenza type b, pneumococcus, varicella and influenza. All of these immunizations are given to children before the age of two to protect them from diseases when they're most vulnerable.

Take a look at the following table of recommended vaccines.

Table 1 Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2021

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2). School entry and adolescent vaccine age groups are shaded in gray.



Please note, the footnotes indicated on the table can be reviewed at the CDC website.

Childhood Immunization Schedule and Diseases Prevented		
Vaccine	**Disease Name**	**Disease Information**
Inactivated poliovirus (IPV)	Poliomyelitis	Prevents breathing by paralyzing the skeletal muscles and diaphragm
Haemophilus influenza type B (Hib)	Meningitis, pneumonia, epiglottitis, pericarditis	Causes bacterial meningitis, pneumonia, epiglottis, septicemia, death
DTaP	Diphtheria, tetanus, pertussis	Diphtheria causes breathing problems, paralysis, heart failure and death Tetanus (lockjaw) causes painful locking of muscles, especially in the jaw Pertussis (whooping cough) causes severe coughing spells, vomiting and disturbed sleep
Hep B	Hepatitis B	Anorexia, fatigue, diarrhea, vomiting, liver damage, cancer, death
Tdap	Tetanus, diphtheria, pertussis	Tdap and DTaP vaccines help protect against the same diseases but are used for different age groups. Tdap is recommended for older children and adults, and DTaP is recommended for infants and young children.
MMR	Measles, mumps, rubella	Measles causes pneumonia, seizures, brain damage, death Mumps causes fever, swollen glands, deafness, meningitis, swelling of testicles or ovaries, death Rubella causes miscarriages or babies with anomalies later in life
Varicella	Chickenpox	Skin infection, pneumonia, brain damage, death
Hep A	Hepatitis A	Liver disease with flu-like symptoms, jaundice, nausea, vomiting
Influenza	Influenza	Fever, cough, chills, aches, death
Pneumococcal	Pneumococcal conjugate	Meningitis, septicemia, otitis media, pneumonia, deafness, brain damage
Meningococcal	Meningitis	Infection of the brain and spinal cord coverings, mental retardation, seizures, stroke, death
Rotavirus (RV)	Rotavirus	Leading cause of severe, acute gastrointeritis (vomiting and diarrhea) among children worldwide
HPV	Human Papillomavirus	Cervical cancer, vaginal and vulvar cancer, anal cancer, throat cancer, penile cancer, genital warts
MenB	Serogroup B Meningococcal Meningitis	Infections of the blood

If you think this is a lot of information to keep track of, you're right! Luckily, each child's medical record includes an immunization record. For each immunization, in addition to giving the parent or caregiver a vaccine information sheet (VIS) on each vaccine given, the following information is recorded:

- Month, day and year that the vaccine is given
- Name of vaccine given
- Manufacturer name
- Lot number and the expiration date
- Site and route of where the vaccine was given
- Name and address of the medical office or clinic
- Title of person giving the vaccine

Practice Exercise 5-3

Select the best answer from the choices provided.

1. **Part of the physical examination is the _____ of the patient's grooming, posture, mannerisms and body movement.**
   a. observation/inspection
   b. percussion
   c. manipulation
   d. auscultation

2. **_____ is when the physician listens to the patient's heart, lungs and abdomen with a stethoscope.**
   a. Palpation
   b. Percussion
   c. Auscultation
   d. Manipulation

3. **Remember the acronym _____, in order to remember that the patient's pupils should be equal in size, round and react to light and accommodation.**
   a. PEARL
   b. PERRLA
   c. PELRA
   d. PERLA

4. _____ are protrusions of an organ through the cavity wall that holds it.

a. Extremities
b. Hernias
c. ROM
d. Cancers

5. _____ can protect against hepatitis A and B, rotavirus, polio, measles, mumps, rubella, pertussis, diphtheria, tetanus, haemophilus influenza type B, pneumococcus, varicella and influenza.

a. Washing hands
b. Nutrition
c. Immunizations
d. Checkups

6. _____ are bigger muscle movements, such as crawling, pulling up and walking.

a. Gross motor skills
b. ROM
c. Fine motor skills
d. Milestones

7. Infants are weighed on a(n) _____.

a. stature-measuring device
b. traditional beam scale
c. measuring device
d. infant platform scale

8. _____ can use the patient's age, weight, length and head circumference to determine the patient's growth pattern.

a. Graphs
b. Growth charts
c. Patient charts
d. Percentiles

Practice as directed with a friend or family member.

9. Measure an infant's (or young child's, for the sake of practice) height. Lay the infant or child on the floor while you mark the floor at her head and heel. After the infant or child is removed, measure the distance between your two marks.

10. Use a tape measure to measure an infant's (or young child's) head circumference.

Review Practice Exercise 5-3

Check your answers with the Answer Key at the back of this book. Correct any mistakes you may have made.

Summary

You've learned a lot of useful skills in this chapter. You can demonstrate how to prepare patients for examinations. As you now know, patient preparation is more than giving the patient a gown and putting her in a room!

In addition to assisting the physician, you will also assist patients. All patients will require your help in one form or another. You'll assist patients with their medical history and other documentation required for the medical record. You'll also take height and weight measurements and vital signs. You can put your patients at ease and help the physician to educate them about particular concerns.

In this chapter, you also learned about special branches of medicine—pediatrics, gynecology and obstetrics. Each of these branches has patients with unique needs. You learned about immunizations, well-baby checkups, details about the gynecologic exam and how often a pregnant woman should visit the doctor.

Critical Thinking

As you move through this course, it is important that you take the time to think critically about what you're learning. Topics here will allow you to reflect on course material through discussions you may have with other students, instructors or even family and friends. Be sure to read the questions and discuss them with others whenever possible as you work through the chapters. Doing so will further enhance your academic experience.

1. The medical specialist plays an important role in assisting with patients' physical examinations. This represents an important responsibility. What are the dos and don'ts involved in this role?
2. The following is a link to a social media healthcare source for an article on the importance of human touch in the healthcare setting: http://www.kevinmd.com/blog/2010/08/touch-humanizes-doctor-patient-relationship.html. Locate another online source for an article on the importance of physical examinations by doctors. What is your opinion on this subject?
3. The following is a link to an article on the importance of patient engagement: https://patientengagementhit.com/news/how-can-healthcare-professionals-define-patient-engagement. What can you do in your role as a medical professional to help educate patients?

HM110 Exam 4

Once you've mastered the course content, locate this Exam in your *Workbook*. Read and follow the Exam instructions carefully.

Course Summary

Congratulations on completing the *Introduction to Patient Care* course! You have explored numerous aspects of patient care. First, you examined how to refer to the patient, resident or client correctly. You learned about some of the surgical instruments, supplies and equipment found in medical facilities. Next, you discovered the procedures necessary to maintain a safe healthcare environment, as well as your role in a medical emergency and how to assist in various emergency situations. You'll learned to measure and record patients' vitals, and the basics of interviewing, educating and assisting patients.

The final step before you complete the course is to finish the Final Exam. The Final Exam covers material you have been learning and working with from Chapter 1 right up through this current chapter.

Before you take the Final Exam, spend some time reviewing all the highlights of the previous chapters, including the Practice Exercises and Exams. If you discover any questions you can't find the answers to, be sure to contact your instructor and get them answered before you complete the Final Exam. Then, you'll be ready to apply all your knowledge and skills to the Final Exam.

HM110 Final Exam

Once you've mastered the course content, locate this Exam in your *Workbook*. Read and follow the Exam instructions carefully.

Endnotes

1 "Facts About Hypertension." *Centers for Disease Control and Prevention*, 8 September 2020. Accessed August 8, 2023. Web.

2 "Cholesterol." *Centers for Disease Control and Prevention*, 8 September 2020. Accessed August 8, 2023. Web.

3 "Nearly 1 in 5 Americans haven't seen a doctor in over five years." *Online Doctor*, 14 April 2021. Accessed August 8, 2023. Web.

4 "Dr. Barbara Bates." *National Institutes of Health*. Accessed 7 August 2019. Web.

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6 Berman, Anthony, D. Chautka. "Assessing effective physician-patient communication skills." *National Institutes of Health*, 25 February 2016. Accessed August 8, 2023. Web.

7 "Body Mass Index (BMI)." *Centers for Disease Control and Prevention*, 17 September 2020. Accessed August 8, 2023. Web.

8 Cohen, Julie. "A Flawed Measure." *US Santa Barbara*, 4 February 2016. Accessed August 8, 2023. Web.

9 "Birth to 36 months: Boys: Head circumference-for-age and weight-for-length percentiles." *Centers for Disease Control and Prevention*, 16 October 2000. Accessed August 8, 2023. Web.

Answer Key

Chapter 1

Practice Exercise 1-1

1. This describes those that receive services at a hospital. **b. Patients**
2. This term describes people who stay in a long-term care facility. **c. Residents**
3. Which describes those that receive health care in their own homes? **a. Clients**
4. Tabitha visits a psychiatric facility for her weekly psychiatry appointment. Which describes Tabitha? **b. Patient**
5. Rosalyn lives at Waypoint Acres. She moved into the facility shortly after her 75th birthday. She loves living at Waypoint Acres because of the assistance she receives with grooming, bathing and meals. Which describes Rosalyn? **c. Resident**
6. Jen is delivering medication to the residents. To verify the patient, Jen says, "Mr. Smith, can you tell me your date of birth?" This is an example of two patient identifiers. **b. False**
7. Every examination room should contain this. **a. Exam table**
8. This should not be found in an examination room. **b. Syringes**
9. Hold the stethoscope up and twist the metal part that holds the earpieces so that they angle backwards. **False**
10. A nasal speculum may be attached to the otoscope to inspect the nasal cavities. **True**
11. A vaginal speculum comes in one standard size. **False**
12. Why is the exam table adjustable? **The table is adjustable so the doctor can perform different procedures while minimizing the patient's discomfort**.
13. What are the four p's in patient rounding? **Pain, position, potty and possessions**

14. Describe the five types of elder abuse and neglect. **Physical Abuse: The use of force that may result in bodily injury, physical pain, injury or impairment. Emotional Abuse: The infliction of mental anguish, pain or distress through verbal or nonverbal acts. Sexual Abuse: Non-consensual sexual contact of any kind with an older adult. Neglect: The refusal or failure to fulfill any part of a person's obligations or duties to care for an older adult. Financial Exploitation: The illegal, unauthorized, or improper use of an older individual's resources for the benefit of someone other than the older individual.**

15. Differentiate between dressings and bandages. **Dressings are sterile material that is applied over a wound surface or site of a surgery. Meanwhile, bandages are applied on top of dressings to keep the dressings in place. They also provide protection and extra padding for the wound.**

Practice Exercise 1-2

1. You may think of an autoclave as a type of pressure cooker that you can use to sterilize instruments. **True**

2. Tap water is typically used in the autoclave. **False**

3. Because autoclave tape develops a striped pattern when exposed to heat, it guarantees that your wrapped instruments are sterile. **False**

4. Ultrasonic cleaning uses sound waves to shake loose dirt, blood and body fluids. **True**

5. For cold sterilization, the instruments are placed in a cold chemical solution which sanitizes the instruments, and then they are put through a heated cycle. **False**

6. What are the advantages of the sterilization bags? **Fairly inexpensive; easy to use; take little space; items are visible; and bags can be cut to fit instruments.**

7. What should you include on the label on the outside of your sterile instrument packaging? **Names of the instruments in the package; date the instruments were sterilized; and the initials of who wrapped the instruments.**

Chapter 2

Practice Exercise 2-1

1. There are agencies that regulate the medical field's safety and accessibility guidelines. **a. True**

2. **a. OSHA** requires employers to disclose all hazardous materials that staff may encounter while performing their duties.

3. This requires that public buildings be equipped to allow all individuals an opportunity to receive entry. **a. ADA**

4. Involvement in larger healthcare studies and the study of infectious diseases are two characteristics of **d. the CDC**.

5. National Institute for Occupational Safety and Health (NIOSH) is part of **a. the CDC**.

6. **d. The Joint Commission** plays a major part in regulating safety hazard control with its Environment of Care Standards.

7. Employee training for staff who may be exposed to infections through blood or bodily fluids is regulated by OSHA's **a. Bloodborne Pathogens Standard**.

8. Refer to **b. the SDS** for information regarding a chemical's hazardous properties.

9. Discuss how the Americans with Disabilities Act of 1990 relates to public facilities. **Your answer should discuss how the ADA requires that all public buildings are equipped to allow all individuals entry. This includes parking lots, sidewalks and entryways. Inside buildings, areas must be wide and obstacle free. Public buildings must also have accessible restrooms.**

10. Imagine you must design a medical office. Keeping in mind those with physical disabilities, describe the various amenities and provisions you would build or utilize in your office design. **Answers will vary. For instance, you might discuss things such as building wide aisles in the reception area with a wheelchair-accessible counter and Braille signs.**

11. Outline common safety procedures in the medical office. **As a healthcare professional, you need to be aware of several safety procedures, including hazard control procedures, employee health programs, ergonomic concerns, hazardous materials handling and fire prevention.**

12. Explain the importance of the SDS in handling hazardous material. **The SDS is essential because it contains information on the potential hazards and how to work safely with the chemical product.**

Practice Exercise 2-2

1. It is essential that you read your employer's emergency manual **c. as soon as possible after you start your new job, and review it often**.

2. To prevent **d. child abductions**, take note of suspicious or hurried individuals and keep an eye out for people with oversized bags. Report strange activity to the proper authorities.

3. In the event of a(n) **a. flood watch**, move furniture and equipment to higher floors if possible and fill you car's gas tank in case you need to evacuate.

4. In the event of a(n) **c. thunderstorm**, stay inside, unplug appliances, avoid running water and draw the blinds and shades over windows.

5. When a(n) **d. tornado warning** is issued, you should direct patients or residents to the center of the building, in a windowless closet or bathroom.

6. Describe the contents of a typical office emergency policy manual. **Standard emergency plans often include defined roles for specific personnel; current listing of personnel to contact for support; communication and coordination plan with detailed procedures to follow in an emergency; coordination with qualified fire, safety and other professional personnel; transferal of casualties and records; triage and assessment guidelines; procurement plans for food, water, electrical power and medical supplies; and detailed procedures and personnel responsibilities regarding moving patients in and out of the facility during various situations.**

7. Outline the steps you should take to prevent a violent act in your work environment. **Follow these steps:**
   - **Keep your valuables with you at all times or locked in a drawer.**
   - **Check the identity of any strangers who enter your office. Notify security or management immediately if anyone makes you uncomfortable.**
   - **Don't stay late if you'll be alone in the office. Create a buddy system for walking to parking lots or public transportation after hours, or ask a security guard to escort you.**
   - **Report any broken or flickering lights, dimly lit corridors, broken windows or doors that don't lock properly.**

8. Outline the steps to take when a hurricane warning is issued. **When a hurricane warning is issued, that means hurricane conditions are expected. Follow these steps:**
   - **Listen to the advice of local officials, and leave if they tell you to do so.**
   - **Complete preparation activities.**
   - **If you aren't advised to leave, keep patients in the building, away from windows.**
   - **Be aware that the worst part of the storm will occur once the calm "eye" passes over and the winds blow from the opposite direction.**
   - **Be alert for tornadoes. They can occur during and after a hurricane. Remain indoors in the center of a building or in a closet or bathroom without windows.**

Practice Exercise 2-3

1. The chain of infection requires a host, a pathogen and a **a. means of transmission**.

2. Infectious agents are not transmitted by **d. properly sterilized instruments**.

3. Broken skin is considered a(n) **a. entry point**.

4. The elderly are more susceptible to infections. **a. True**

5. **c. Nosocomial** infections are contracted at the office and are secondary to the patient's original ailments.

6. The most effective way to prevent the spread of infection is to **b. wash hands frequently with warm water**.

7. Hands need to be washed only before attending to a new patient. **b. False**
8. After a needle is used, apply the safety and **c. dispose of it immediately in a sharps container**.
9. What pathogens does the medical field focus on to control the spread of disease? **Viruses, bacteria, pathogenic fungi and parasites**

Practice Exercise 2-4

1. This guards the general public from devastating outbreaks. **a. Medical asepsis**
2. Which requires the use of chemicals or heat? **c. Disinfecting**
3. Masks, gowns and gloves are examples of **d. personal protective equipment**.
4. In 1987, the Universal Precautions mainly focused on avoiding contact with **b. blood**.
5. Droplet Precautions require masks when within three feet of the patient. **a. True**

Chapter 3

Practice Exercise 3-1

1. A(n) **a. emergency** is considered any instance in which someone becomes suddenly ill or injured and requires immediate attention.
2. CPR stands for **d. cardiopulmonary resuscitation**.
3. Your quick actions could save a patient's life. As a healthcare professional in an emergency situation, you can **c. help your patient until EMS arrives**.
4. The **a. universal medical identification tag** is a small tag worn on a bracelet, neck chain or on the clothing bearing a message that the wearer has an important medical condition that might require immediate attention.
5. In your role as a healthcare professional, once you recognize that there is an emergency and decide to act, your next step is to **b. check for consciousness**.
6. **d. Basic Life Support** measures help a person who is at risk for respiratory arrest, cardiac arrest or both.
7. Caroline is stung by a bee and has an allergic reaction. Her throat begins to swell as she calls 911. In the middle of telling the operator about her emergency, Caroline faints. Caroline's town has an enhanced 911 system; therefore, **d. the system automatically identifies Caroline's location and can still send help to the scene**.

Practice Exercise 3-2

1. A patient waiting to see the doctor in your medical office suffers from a seizure. To assist this patient during the seizure, you should **d. move objects out of the way that might cause injury**.

2. Diane works as a healthcare professional. The afternoon has been quiet. Suddenly, a man grabs his chest and falls to the floor. He is having a heart attack. Diane should **a. see if the patient has nitroglycerine and give it to him immediately**.

3. Paul works construction and has been outdoors all day. He becomes severely dehydrated and begins to feel ill. His temperature reaches 106 °F, and his skin becomes dry and flushed. Paul likely suffers from **c. heat stroke**.

4. Glenn suffers from hypothermia after falling through thin ice while ice fishing. The best thing you can do to assist him is to **c. move him to shelter**.

5. Ralph treats a hemorrhage victim who suffers from arterial bleeding. Ralph should **a. apply pressure at the pressure point of the wound to stop blood flow to the area**.

6. Six-year-old Jenny ingested a large amount of kitchen cleaner that contains bleach. You should **c. contact the Poison Control Center**.

7. Kelli suffers from bleeding. Blood seeps out of her wound slowly. After several minutes, the blood clotted on its own. Kelli likely suffered from **c. capillary** bleeding.

8. Jake vomited up bright red blood. After visiting the emergency department, the doctors determine he has a bleeding ulcer. To treat this, the doctors will **d. perform surgery**.

9. Madeline has a severe nut allergy. One day, she unknowingly eats a cookie that contains peanut butter. Only three minutes after eating the cookie, Madeline begins to have difficulty breathing. She is likely suffering from **d. anaphylactic** shock.

10. Martin assists Polly with a nosebleed. He tilts Polly's head forward and applies an ice pack wrapped in a towel to the bridge of her nose. He has her let the blood drip into a basin. After several minutes, he asks Polly to blow her nose to see if the bleeding has stopped. Martin **b. should not have Polly blow her nose. He should also observe for signs of shock.**

11. Calvin goes to school even though he's sick with pink eye. During art class, he rubs his eye, then passes the scissors to his classmate. The next day, the classmate also has pink eye. The pink eye was spread through **b. indirect** transmission.

Chapter 4

Practice Exercise 4-1

1. The measurement of the balance between heat produced and heat lost is **c. temperature**.
2. The **a. rectal** site is most accurate for taking the core body temperature.
3. A(n) **b. thermometer** is used to measure a patient's temperature.
4. Which does not lead to increased body temperature? **c. Starvation or fasting**
5. Hyperthermia indicates which condition? **a. High body temperature**
6. If Tami drinks cold water, how long should you wait before you take an oral temperature? **b. 15 minutes**
7. When you insert a probe for a tympanic temperature for a four-year-old child, pull the ear pinna **b. up and back**.
8. The **d. hypothalamus** activates heat loss and heat production mechanisms in order to maintain a normal core body temperature.
9. The correct distance for inserting a rectal thermometer into a four-year-old child's rectum is **d. no more than half an inch**.
10. Explain how the body controls temperature. **The hypothalamus is the body's "thermostat." As the body overheats, skin receptors send signals to the nervous system. The hypothalamus then sends signals to release perspiration from the skin and to dilate superficial blood vessels to release heat and lower body temperature.**

Practice Exercise 4-2

1. The normal resting pulse range for adults is **d. 60 to 100** bpm.
2. A(n) **d. apical** pulse is considered the most accurate assessment of pulse rate, and is often performed on infants and cardiac patients.
3. The pulse rate and characteristics give clues regarding how well the **c. cardiovascular** system is performing.
4. Which pulse reading indicates bradycardia? **a. 50**
5. You count 44 beats in 30 seconds, so the patient's pulse rate is **d. 88** bpm.
6. A fast pulse is expected with **a. cardiac conduction abnormalities**.

7. A patient experiencing tachycardia has a pulse **d. above 100** bpm.
8. A Doppler may be used to assess pulses in patients with **d. edema**.
9. Assess a carotid pulse by **b. applying slight pressure to the artery on either side of the larynx**.
10. Proper technique for taking pulses involves applying slight pressure to the artery with **c. three fingers**.

Practice Exercise 4-3

1. If you count 8 respirations in 30 seconds, the patient's respiratory rate for one minute is **b. 16**.
2. An accurate count of one respiration is one **a. rise and fall of the chest**.
3. The normal respiratory rate for a newborn is **b. 30 to 60** per minute.
4. The minimum amount of time required to accurately measure respiratory rate is **b. 30 seconds**.
5. When checking a patient's respiratory rate **a. count the respirations after taking the patient's pulse, without moving your hand away from her wrist. The patient remains unaware that her respirations are being timed**.
6. Which is not an example of respiratory quality? **d. Abnormal**
7. The normal respiratory rate for adults is **b. 12 to 18** per minute.
8. A healthcare professional requires a(n) **a. clock or watch with a second hand** to count respirations.
9. The best way to correctly record respirations is to write **b. 10-31-2016, 1820, R: 22 regular, symmetrical**.

Practice Exercise 4-4

1. The pressure of blood against the wall of blood vessels is best defined as **b. blood pressure**.
2. A sphygmomanometer measures **d. blood pressure**.
3. The patient must sit quietly for at least **a. 5** minutes before retaking blood pressure.
4. Blood pressure is recorded as a fraction with the **a. systolic** pressure over the **diastolic** pressure.
5. A factor that may increase blood pressure is **b. exercise**.

6. A factor that does not increase blood pressure is **c. rest**.
7. The normal range for an adult systolic blood pressure is **c. 90-119** mmHg.
8. The correct notation of a blood pressure reading is **d. BP: 126/76**.
9. If a blood pressure measures 110/86, the pulse pressure is **d. 24**.
10. Which is an abnormal reading for a pulse oximetry? **b. 89**

Chapter 5

Practice Exercise 5-1

1. Don't be afraid to tell your patients "I don't know," because **b. providing incorrect information can have serious consequences**.
2. Mrs. Walters wants to know the side effects of a surgical procedure the doctor wants to perform. If you don't feel qualified to discuss this with her, **c. ask the physician to discuss Mrs. Walter's procedure with her**.
3. **a. Multimodal** learners are people who have more than one strong learning style.
4. Your patient, Nick, can't read yet, but he loves to pick up things and play with them. A section of the itchy rash on his arm has become infected from scratching. In addition to giving him antibiotics, the doctor recommended an anti-itch cream to Nick's mother. You now need to teach Nick why it's important not to scratch the rash. Which educational technique do you think will work best for him? **d. Ask him to touch the part of his arm that is infected, which will be painful, then touch the rash where it is not infected. Explain that if he stops scratching, the rash will heal and won't hurt anymore.**
5. Mrs. Walters doesn't understand why the doctor feels a surgical procedure is necessary to remove a benign growth behind her eye. She sees fine; in fact, she loves to read and reads all the time, and the growth isn't painful. Which educational technique do you think will work best for her? **b. Ask Mrs. Walters to read a pamphlet explaining the condition and the danger of her losing sight if it is left untreated.**
6. What is the purpose of the patient interview? **The purpose of the patient interview is to gather subjective information from the patient to clarify and verify the patient's health.**
7. What are the benefits of verbal communication in the medical office? **The patient's information is accurate, reliable and up to date. Demonstrates that the healthcare staff is interested in patient care. The physician and patient can come to an agreement on the diagnosis and treatment. Encourages the patient to play an active role in her medical care.**

8. What are the steps of Phase 1 in the interview process? **1. Use the two patient identifiers to confirm you have the correct patient. 2. Welcome the patient and use the patient's name. 3. Introduce and identify yourself. 4. Ensure comfort and privacy.**

9. What is the goal of Phase 2 of an interview? **To determine the patient's chief complaint.**

10. What are the steps of Phase 3 in the interview process? **1. Ask open-ended questions. 2. Encourage further explanation with silence as well as verbal and nonverbal cues. 3. Paraphrase and summarize what the patient is saying.**

11. How should you end the interview? **Summarize the interview up to that point. Thank the patient for his information and explain that the physician will be in to examine him soon.**

12. Communication barriers can sabotage the interview process. What are pitfalls to avoid? **Stereotyping; giving personal opinions; expressing disapproval; belittling the patient's feelings; and changing the subject or interrupting.**

13. How does your seating position affect communication with patients? **If your patient is sitting in a chair in the exam room and you're standing up while talking, the patient may feel that you don't have time to sit down and talk. Or the patient may feel you are talking down to him.**

14. What are two nonverbal communication techniques that help the patient feel comfortable? **Eye contact and a positive facial expression.**

Practice Exercise 5-2

1. Examine the patient's ears, nose, mouth and pupils **a. Penlight**

2. Detect blood leaking into the intestine **b. Guaiac kit**

3. Take patients' physical measurements **c. Tape measure**

4. Collect urine for tests **c. Urine specimen container**

5. Test reflexes and find bone fractures in joints **b. Percussion hammer**

6. Hold the tongue down while examining the mouth and throat **a. Tongue depressor**

7. The height and weight measurements for adults are recorded at least **b. every year during the physical exam**.

8. The patient should **c. remove shoes** when you measure his height.

9. A patient who weighs 100 pounds weighs **c. 45** kilograms.

10. To calibrate a scale, make sure the point of the balance beam is floating **a. in the center** when there is no weight on it.

11. To weigh an infant, **d. place the baby in the tray on the infant scale**.

Practice Exercise 5-3

1. Part of the physical examination is the **a. observation/inspection** of the patient's grooming, posture, mannerisms and body movement.

2. **c. Auscultation** is when the physician listens to the patient's heart, lungs and abdomen with a stethoscope.

3. Remember the acronym **b. PERRLA**, in order to remember that the patient's pupils should be equal in size, round and react to light and accommodation.

4. **b. Hernias** are protrusions of an organ through the cavity wall that holds it.

5. **c. Immunizations** can protect against hepatitis A and B, rotavirus, polio, measles, mumps, rubella, pertussis, diphtheria, tetanus, haemophilus influenza type B, pneumococcus, varicella and influenza.

6. **a. Gross motor skills** are bigger muscle movements, such as crawling, pulling up and walking.

7. Infants are weighed on a(n) **d. infant platform scale**.

8. **b. Growth charts** can use the patient's age, weight, length and head circumference to determine the patient's growth pattern.

9. Measure an infant's (or young child's, for the sake of practice) height. Lay the infant or child on the floor while you mark the floor at her head and heel. After the infant or child is removed, measure the distance between your two marks. **Review the section about infant recumbent length to ensure that you can properly measure an infant's height.**

10. Use a tape measure to measure an infant's (or young child's) head and chest circumferences. **Review the section about head circumference to ensure that you can properly measure an infant's head circumference.**