Practices of IV Therapy

1

Chapter Outline

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Learning Outcomes

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

Key Terms

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

1-1 Introduction

Intravenous (IV) simply means "within a vein." IV therapy is a treatment that infuses fluids, medications, blood, or blood products into a vein for treatment of a patient (Figure 1-1). It permits accurate dosing and a swift effect of the substance infused. IV therapy is used to administer fluids, drugs, and nutrients when a patient cannot take these items orally. The rapid effect of fluids delivered directly into the bloodstream is necessary during emergencies or other critical-care situations in which medications are needed. However, the results can be fatal if the wrong medication or dosage is given.

Current IV therapy is less than 100 years old. Yet, it was known as early as the 1600s that medications could be injected into a vein. Because of a lack of understanding about sterility, infection control, and other scientific methods, original attempts to deliver IV fluids and drugs met with little success. The greatest advance in drugs, equipment, and procedures has occurred in the past 25 years. The practice and regulation surrounding IV therapy continues to evolve.

Checkpoint Questions 1-1

1. Why would an IV be started?

_____

_____

2. When are patients most likely to have an IV?

_____

_____

Figure 1-1 Intravenous therapy is used to deliver fluids, drugs, or nutrients directly into a vein.

1-2 IV Therapy Practice and Regulation

The practice of IV therapy is closely controlled by laws and monitored by various organizations. Each institution or agency where you are employed will have specific policies guided by these laws and organizations. These organizations include the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), Health Insurance Portability and Accountability Act (HIPAA), Centers for Disease Control and Prevention (CDC), National Institute of Occupational Safety and Health (NIOSH), and the Occupational Safety and Health Administration (OSHA).

JCAHO, the organization responsible for the accreditation of health care facilities, establishes the National Patient Safety Standards. These standards are updated yearly, and several of them apply to the practice of IV therapy. Table 1-1 identifies the selected goals that could apply to IV therapy.

HIPAA is a federal law passed in 2003 that protects the privacy and confidentiality of patient information. Among other provisions, HIPAA states that information about a patient must not be discussed with individuals other than the patient unless the patient has given written or verbal permission for you to do so. The following is a list of other guidelines from HIPAA that could apply to the care of patients with an IV infusion.

- Close patients' room doors when caring for them or discussing their health.
- Do not talk about patients in public places.
- Turn computer screens that contain patient information so passersby cannot see the information.
- Log off computers when you are done.
- Do not walk away from patient medical records; close them when leaving.

Look for more information and guidelines related to HIPAA in the feature boxes throughout this textbook.

CDC, an agency of the federal government, works to prevent and control infectious and chronic diseases, injuries, workplace hazards, disabilities, and environmental health threats. CDC collects information about infections that occur because of IV therapy. This information is used to track the source of infections and help prevent them.

NIOSH, a division of CDC, conducts research and makes recommendations for the prevention of work-related illnesses and injuries. Through their research into needlestick injuries, NIOSH has recommended that health care facilities use safer medical devices to protect workers from needlestick and other sharps injuries.

OSHA, as a division of the Department of Labor, has the responsibility of protecting the safety of employees in their place of employment. OSHA's mission is to ensure the safety and health of workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA has established universal and standard precautions along with the updated blood-borne pathogen standard, all of which prevent infection and injuries to health care workers.

Through the recommendation of NIOSH and the efforts of OSHA, the Needlestick Safety and Prevention Act was passed into law in 2001. The intent of the new law and the implementation regulation is to mandate the use

TABLE 1-1 National Patient Safety Standards (Selected Goals As They Pertain to IV Therapy)

Goal	Description	Comment
Goal 1. Improve the accuracy of patient identification.	1A. Use at least two patient identifiers (neither to be the patient's room number) whenever administering medications or blood products, taking blood samples and other specimens for clinical testing, or providing any other treatments or procedures.	*Before any IV therapy procedure is performed on a patient, the patient should be properly identified by at least two identifiers (neither of which should be the patient's room number).*
Goal 2. Improve the effectiveness of communication among caregivers.	2A. For verbal or telephone orders or for telephonic reporting of critical test results,verify the complete order or test result by having the person receiving the order or test result read back the complete order or test result.	*IV therapy orders or laboratory results should be read back to verify their accuracy.*
	2B. Standardize a list of abbreviations, acronyms, and symbols that are to be used throughout the organization.	*Use only abbreviations, acronyms, and symbols that are standardized by your health care facility.*
	2C. Measure, assess, and, if appropriate, take action to improve the timeliness of the reporting of critical test results and values and the timeliness of receipt of this information by the responsible licensed caregiver.	*Report test results regarding IV therapy to the licensed caregiver as soon as possible.*
Goal 3. Improve the safety of using medications.	3B. Standardize and limit the number of drug concentrations available in the organization.	*Check the concentrations of medications carefully to ensure that the proper medication is used.*
	3C. Identify and, at a minimum, annually review a list of look-alike/ soundalike drugs used in the organization, and take action to prevent errors involving the interchange of these drugs.	*Check all medications at least three times to ensure that the correct medication is used.*
Goal 7. Reduce the risk of health care–associated infections.	7A. Comply with current Centers for Disease Control and Prevention (CDC) hand hygiene guidelines.	*Wash your hands before and after every procedure. Approved antiseptic hand rubs may be used if no visible soilage is on your hands.*
Goal 8. Accurately and completely reconcile medications across the continuum of care.	8A. Implement a process for obtaining and documenting a complete list of the patient's current medications upon the patient's admission to the organization and with the involvement of the patient. This process includes a comparison of the medications that the organization provides to those on the list.	*Ensure that all medications are recorded completely and accurately.*
	8B. A complete list of the patient's medications is communicated to the next provider of service when a patient is referred or transferred to another setting, service, practitioner, or level of care within or outside the organization.	*Ensure that a complete list of medications is provided for the patient when he or she receives service from another physician or health care facility.*

Source: Adapted from the Joint Commission on Accreditation of Healthcare Organizations, www.jcaho.org

of safety devices that reduce needlestick injuries in the clinical setting. OSHA can now impose monetary fines on any health care facility that is not using an appropriate safety IV catheter. These devices are discussed in Chapter 2, Safety and Infection Control. Additional information about safety and infection control related to IV therapy can be found in the features throughout this textbook.

Checkpoint Questions 1-2

1. What organizations and laws regulate the practice of IV therapy?

2. What is being done to reduce the incidence of needlestick injuries?

3. Which organization sets the standards of practice to prevent infection during IV therapy?

Before you continue to the next section, answer the previous Checkpoint Questions and complete the IV Therapy Practice and Regulation activity under Chapter 1 on the student CD.

1-3 Roles and Responsibilities

An order for IV therapy is made by the physician. Various other health care employees are responsible for the procedures surrounding initiation, administration, and maintenance of the IV therapy that has been ordered. Each profession's role and responsibility are regulated by that profession's scope of practice, training, and state of practice and by the organization or facility of practice. By reading this textbook, you are preparing to learn the principles of IV therapy, which is one of the first requirements to practicing IV therapy. However, even after successfully completing this course, you will need to be aware of *your* scope of practice as well as your state regulations and the policies of the facility at which you are working.

Never perform any of the procedures in this textbook without first determining if the procedure is within your scope. It is your responsibility to know the laws that regulate your actions and also to consider your knowledge and experience when deciding whether you should perform the procedure. Keep in mind the difference between invasive and noninvasive procedures. Invasive procedures, such as starting or flushing an IV, carry with them additional dangers to the patient and typically require additional specialized training. Noninvasive procedures, such as setting up the IV equipment and monitoring or discontinuing an IV, carry less risk to the patient. Depending on your position and place of employment, both invasive and noninvasive procedures may be part of your scope and training.

Allied Health Personnel

Because of downsizing, restructuring, and nursing shortages in many areas of the country, various tasks of IV therapy may be performed by allied health personnel other than by registered nurses (RNs), such as licensed practical nurses (LPNs), licensed vocational nurses (LVNs), patient-care technicians (PCTs), and medical assistants (MAs). When performing IV therapy tasks, LPNs or LVNs must have the necessary preparation and experience. In addition, they must be authorized by their employer and by the state in which they work before they perform any procedures. LPNs and LVNs are governed by the Nurse Practice Act in their state and are accountable for any procedure they accept and perform. PCTs, depending on their training and place of employment, may be trained to set up the equipment to start an IV or to monitor the IV while it is in place.

Medical Assistants

Medical assistants mostly perform noninvasive procedures during IV therapy. Their tasks may include preparation, monitoring, maintenance, and documentation of IV therapy. In some circumstances, they may assist a physician or other licensed personnel during invasive procedures. In all cases the Medical Assistant practices under the direction and supervision of a licensed physician or other licensed health care practitioner. Because of this expanded role, the revised Commission on Accreditation of Allied Health Education Programs (CAAHEP) Standards and Guidelines for Medical Assisting Educational Programs indicates that accredited programs must include the principles of IV therapy. In some states, medical assistants are specifically forbidden from doing IV procedures. In other states, they are allowed if they meet certain requirements. In most states, the law is not clear as to whether a physician may delegate IV procedures to a medical assistant.

In order to prepare for the certified medical assistant (CMA) examination of the American Association of Medical Assistants (AAMA), you must know and understand the theory of IV therapy. More importantly, whether you are a registered medical assistant (RMA) or a CMA, you should be aware of the scope of practice within your state regarding IV therapy. Research the laws in your state to determine what procedures you may or may not perform. Many potential complications are associated with the use of IV therapy, and practicing outside your scope could result in injury to the patient and in possible malpractice lawsuits.

Troubleshooting

Determining Your Role

You have moved into a new state and have begun work at a same-day surgery clinic. Because of the shortage of health care employees, you are placed with a postoperative patient your first day. The patient is ready to leave, and the physician asks you to remove the patient's IV before he leaves. You have had training and have removed several IVs at your previous place of employment.

How would you determine what to do?

Checkpoint Questions 1-3

1. If you are asked to perform a particular procedure that you have not been trained to do, what should you do?

_____

_____

2. What procedure relative to IV therapy is considered invasive?

_____

_____

3. What noninvasive IV therapy procedures are more commonly performed by entry-level allied health personnel?

_____

_____

Before you continue to the next section, answer the previous Checkpoint Questions and complete the Roles and Responsibilities activity under Chapter 1 on the student CD.

1-4 Reasons for IV Therapy

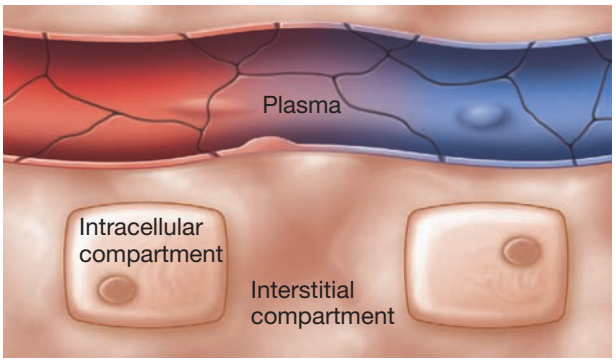
The most common reasons that a physician may order IV therapy for a patient include:

- To replace and maintain fluid and electrolyte balance
- To administer medications, including chemotherapeutic agents, intravenous anesthetics, and diagnostic reagents
- To transfuse blood and blood products
- To deliver nutrients and nutritional supplements

Maintaining Fluid and Electrolyte Balance

In an adult weighing 155 lb (70 kg), about 60 percent of the total body weight is fluid. In an infant, fluids account for about 80 percent of the total body weight. Body fluids are composed of water and **solutes,** which are dissolved

Figure 1-2 Body fluids are located in various compartments separated by cell membranes.



substances. Solutes include electrolytes, such as potassium, and nonelectrolytes, such as proteins. Body fluids have the following purposes:

- Help regulate body temperature
- Transport nutrients around the body
- Transport wastes to excretion sites
- Preserve cell shape

Body fluids are located in compartments. These compartments are separated from each other by cell membranes. The intracellular compartment holds the **intracellular fluid (ICF),** or fluid inside the cell. Intracellular fluid comprises about 55 percent of total body fluid. **Extracellular fluid (ECF),** or the fluid outside the cells, is found in the interstitial compartment (between and around cells) and the intravascular compartment (inside the blood vessels). **Interstitial fluid (ISF),** which is the fluid that surrounds the cells, is in the interstitial compartment. **Intravascular fluid,** or blood plasma, the liquid component of the blood, is found in the intravascular compartment. ECF makes up about 45 percent of the total body fluid, and about 5 percent of ECF is intravascular fluid (Figure 1-2).

The body's fluid balance is regulated by hormones and is affected by fluid volume, distribution of fluids in the body, and concentration of solutes in the fluid itself. Each day the body gains fluids by oral intake through liquids and water in foods. It loses fluids through respiration, perspiration, urine, and feces. Gains must equal losses to maintain the body's fluid balance. A patient who is ill may have fluid volume depletion due to the inability to eat or drink or due to vomiting, diarrhea, and/or diaphoresis (sweating). This patient may require IV therapy.

Electrolytes

Electrolytes are chemicals that separate into electrically charged particles (ions) that conduct electricity necessary for normal cell function. Electrolytes are either positively charged ions, called cations, or negatively charged ions, called anions. Ions are not distributed evenly throughout the intracellular and extracellular fluids because of the cell membranes that separate the ICF and ECF. The cell membranes are selectively permeable and allow only certain ions to cross into or out of the cell. Although the ICF and ECF contain different solutes, the amount of these solutes is about equal when balance is maintained.

The six major electrolytes in body fluids are

1. Sodium
2. Potassium
3. Calcium
4. Chloride
5. Phosphate
6. Magnesium

Of these, potassium and phosphorus are the major intracellular electrolytes, and sodium and chloride are the major extracellular electrolytes. Potassium and sodium are cations, and phosphorous and chloride are anions. The ECF components—interstitial fluid and intravascular fluid—have the same

electrolyte compositions; therefore, electrolytes can move freely between the two, keeping an equal distribution in both compartments.

Fluid Movement

Fluid and electrolyte balance is also regulated by fluid movement. Body fluids continually move among the major fluid compartments. In addition to regulating fluid and electrolyte balance, this constant movement permits nutrients, waste products, and other substances to move into and out of cells. Fluid movement is affected by cell membrane permeability and by concentrations of solutes in the fluid. When solutes and fluids are equal on both sides of the membrane, balance is maintained. Normally, the body can restore an imbalance by moving solutes and fluids across the cell membranes as necessary by one of several methods: diffusion, active transport, osmosis, capillary filtration, and reabsorption.

Solutes move across cell membranes by either diffusion or active transport. **Diffusion,** a passive process that requires no energy, is the most frequent process for movement of solutes. Diffusion moves solutes from an area of higher concentration across a membrane to an area of lower concentration and results in equal distribution of solutes between compartments. **Active transport** requires energy to move solutes from an area of lower concentration across a membrane to an area of higher concentration.

Osmosis, capillary filtration, and reabsorption are the methods that move fluids across membranes. **Osmosis** is a passive process in which water or other fluid simply moves from an area of higher concentration across a membrane to an area of lower concentration. Osmosis is dependent on the concentration of solutes in the fluid compartments and stops when concentrations on both sides of the membrane are equal. **Capillary filtration** forces fluid and solutes through the capillary wall pores from the intravascular fluid into the interstitial fluid. **Capillary reabsorption** keeps capillary filtration from removing an excess of intravascular fluid.

Other Fluid Regulation Processes

In addition to the fluid and electrolyte movements within the cells, the body maintains internal balance through the renal, cardiovascular, respiratory, and endocrine systems. The kidneys (renal system) control fluid and electrolyte balance by retaining or excreting urine as well as excreting metabolic wastes and toxic substances. The heart and blood vessels circulate blood through the kidneys, making urine output possible, and assist in fluid regulation by way of fluid volume and pressure sensors. Lungs remove water from the body during exhalation. The endocrine system produces hormones that regulate fluid volume and concentration. **Antidiuretic hormone (ADH)** from the pituitary gland regulates water retention. The hormone **aldosterone** from the adrenal glands causes the retention of sodium when the circulating fluid volume is low, when the sodium level is low, or the potassium level is high.

Thirst also regulates water volume and participates in maintaining fluid balance. A person becomes thirsty when water loss equals 2 percent of the body weight or when solute concentration increases. The drinking of water or other liquids reestablishes plasma volume and dilutes solute concentration. When a patient cannot replace lost fluids orally, IV solutions become necessary to help the patient maintain fluid and electrolyte balance.

Safety and Infection Control

Monitoring IV Therapy

Children (pediatric patients) have a larger percentage of fluid in their bodies than do adults. Mature adults (geriatric patients) may have conditions that compromise their fluid and electrolyte balance. For these reasons, it is more difficult to maintain the fluid and electrolyte balance in pediatric and geriatric patients. Both these types of patients will require very careful monitoring during IV therapy.

Administering Medications

Approximately 40 percent of the medications administered in the inpatient setting are given intravenously. Medications introduced directly into the bloodstream produce the rapid results that are often necessary during emergencies, because the therapeutic levels of the medication are quickly reached. IV medications are typically added to solutions. Dosages are easily adjusted by changing the concentration of the medication in the solution or by changing the administration rate. If an adverse reaction occurs, administration can be stopped immediately, limiting the amount of medication absorbed. This rapid resolution is not possible with other routes of administration. The IV administration of medication is generally less painful for the patient than are subcutaneous (sub-Q) or intramuscular (IM) administrations because the IV route does not require frequent injections (Figure 1-3).

Figure 1-3 Intravenous medications are frequently administered from a second smaller container into the main intravenous infusion.

Administering Blood and Blood Products

Blood is the body's main transport system for oxygen, nutrients, hormones, and other important substances. Any decrease in the circulating volume disrupts the body's fluid and electrolyte balance. A patient who experiences a decrease in circulating blood volume may require replacement of blood or blood-based products (Figure 1-4).

Figure 1-4 When blood or blood products are administered, two health-care workers must check to be sure the correct match is made.

The process of blood transfusion takes blood or blood products from one individual and infuses the donated blood or blood products into the circulatory system of another individual. Blood transfusions are used to treat medical conditions such as blood loss due to trauma, surgery, shock, or failure of the mechanism that produces red blood cells (or some other normal and essential component). The infusion of blood or blood products restores circulating volume, improves the ability of the blood to carry oxygen, and replaces blood components that the body is deficient in, including factors that enable blood to clot.

Blood is made up of red blood cells, white blood cells, and platelets carried in plasma. To make the most use of donated blood, it is usually separated into components, and recipients may receive only parts of the blood. Blood transfusions typically consist of packed red blood cells rather than whole blood. White blood cell transfusions are less common. Plasma or platelets are given to patients with liver disease, cancer, severe burns, hemophilia, or leukemia because these components provide clotting factors.

When a patient is receiving blood or blood components, two health care workers must check the transfusion to be sure the correct match is made. Once the infusion is started, the patient's vital signs must be taken frequently in case of any reaction. Monitoring the vitals frequently and reporting any changes or abnormalities of the patient is mandatory. Most transfusions are performed without any problems. Mild side effects may include symptoms of an allergic reaction such as headache, fever, itching, increased breathing effort, or rash. Serious reactions are rare. The most common serious side

effect is serum hepatitis, an infection of the liver. Transfusion with blood of the wrong type can be fatal, which is why many precautions are implemented throughout blood donation and during the transfusion of blood.

Delivering Nutrients and Nutritional Supplements

IV therapy can deliver some or all of the nutritional requirements for patients unable to obtain adequate amounts by oral or enteral (directly into the gastrointestinal tract) routes. **Parenteral nutrition** is the IV infusion of nutrients, including amino acids, dextrose, fat, electrolytes, vitamins, and trace elements (Figure 1-5). Parenteral nutrition solutions may be administered peripherally or through a central vein. Peripherally administered solutions are less concentrated and provide only partial nutritional requirements. Infusions through central veins can be more highly concentrated and, therefore, can provide the patient's total nutritional requirements.

Patient Education & Communication

Consent for IV Therapy

Before an IV is inserted into a patient, he or she must be educated about the procedure, including the reason and risks, and must agree either verbally or in writing.

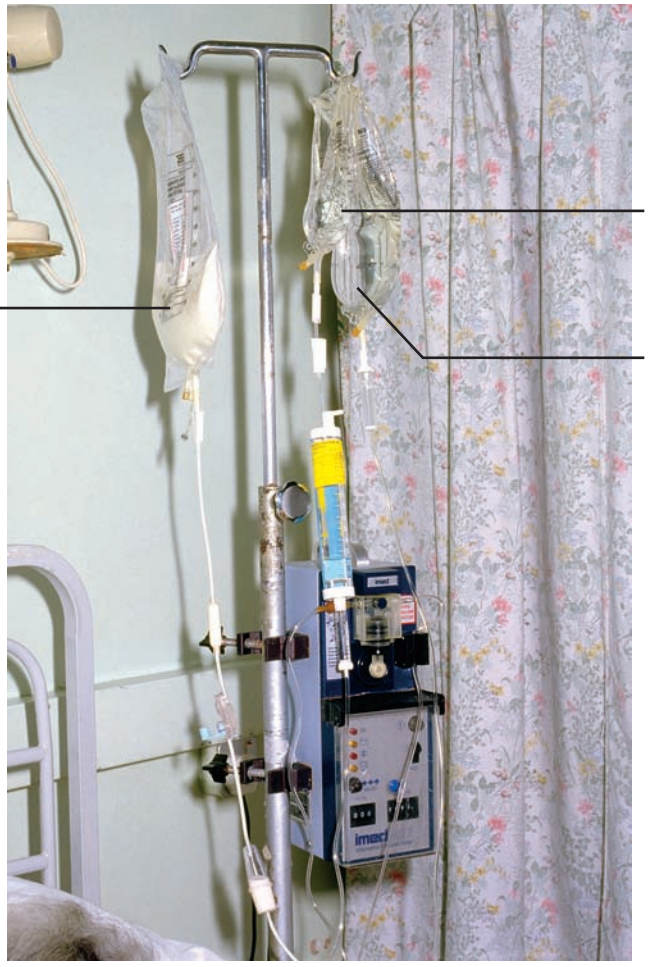


Figure 1-5 Parenteral nutrition is the intravenous infusion of nutrients for patients who are unable to take adequate amounts by mouth or otherwise.

Checkpoint Questions 1-4

1. What are four reasons for IV therapy?

2. How does fluid movement occur in the cells?

3. What other processes regulate the fluid level in the body?

Before you continue to the next section, answer the previous Checkpoint Questions and complete the Reasons for IV Therapy activity under Chapter 1 on the student CD.

1-5 Types of IV Therapy

IV therapy may be achieved by direct access of the vein with a syringe and needle, by a peripherally inserted catheter, or by a central IV catheter. All three are invasive procedures that require needle placement and administering the infusion or medication through an IV line or site.

Direct access of the vein is the simplest form of intravenous access. A syringe with an attached hollow needle is inserted through the skin into a vein, and the contents of the syringe are injected through the needle into the bloodstream. This method is most easily done with an arm vein, usually the antecubital vein at the crease of the elbow. The intravenous administration of medications provides no margin for errors; medications are often injected within one minute or less, so they reach the bloodstream immediately. Direct injection carries a higher risk for side effects and adverse reactions. Although it is a simple procedure, direct injection is rarely used because it allows delivery of only a single dose of medication.

Peripheral IV Therapy

Peripheral IV therapy is the preferred method for short-term IV therapy. It is the most common intravenous access method in hospitals, surgery centers, and paramedic services. A peripheral IV line consists of a short catheter (a few centimeters long) inserted through the skin into a peripheral vein. A peripheral vein is any vein that is not in the chest or abdomen. Arm and hand veins are typically used. Peripheral IV access is used for emergency care, for administration of medications and replacement fluids, and for blood or blood product infusions. Peripherally inserted catheters are easy to monitor and offer easy access to veins. However, peripheral veins frequently become inflamed from medications, or the IV infiltrates (that is, the IV solution infuses into surrounding tissue); both these problems necessitate removal and replacement at another site. (Infiltration of an IV is discussed in more

Figure 1-6 The back of the hand is commonly used for a peripheral IV site.

detail in chapter 6. Even if infiltration or inflammation does not occur, the peripheral catheter must be removed and a new catheter inserted at a different site every 72 hours. This necessary procedure will cause additional discomfort for the patient (Figure 1-6).

Central IV Therapy

Central IV therapy permits infusion of fluids or medications directly into a larger vein, usually the superior vena cava or within the right atrium of the heart. This method can be used in emergencies and permits venous access when a peripheral IV cannot be started. Central lines are used when a patient needs large volumes of fluids, long-term therapy, or multiple infusions. The advantages of central IV therapy are

- The ability to deliver fluids and medications that would be overly irritating to peripheral veins because of their concentration or chemical composition, such as some chemotherapy drugs and total parenteral nutrition
- Rapid onset of action because medications reach the heart immediately and are quickly distributed to the rest of the body
- Access to multiple parallel compartments (lumens) within the catheter, so that multiple medications can be delivered at the same time, even if they are chemically incompatible
- The ability to measure central venous pressure and other physiological variables

Because the IV is situated in a large central vein, it may also be used to obtain blood samples, and unless it becomes infected, it may remain in place for the duration of therapy, which decreases the number of venipunctures a patient must endure. Central IV lines carry higher risks of bleeding, bacteremia, and air embolism. These catheters require greater skill and time to insert and are more costly to maintain than are peripheral IV catheters.

Figure 1-7 Central IV therapy delivers fluids or medication directly into a larger vein for long-term, large-volume, or multiple infusions.

There are various types of central IV lines, but all must be inserted by a specially trained and licensed employee, usually the physician. It may be your responsibility to check these IV sites or monitor the infusion. Some central IV catheters are left in patients over long periods of time and are monitored in outpatient facilities (Figure 1-7).

Peripherally Inserted Central Catheter (PICC)

A peripherally inserted central catheter, or PICC, is inserted into a peripheral vein, usually in the arm, and then is carefully advanced upward until the catheter reaches the patient's superior vena cava or right atrium. Placement of the PICC is usually done by feel and estimation. An x-ray is then taken to verify that the tip is in the right place.

A PICC may have two parallel compartments, each with its own external connector (double lumen), or have a single tube and connector (single lumen). From the outside, a single-lumen PICC resembles a peripheral IV except that the tubing is slightly wider.

Because of the higher risk of infection, the PICC insertion site must be covered by a larger sterile dressing than would be required for a peripheral IV. However, a PICC poses less of a systemic infection risk than do other central IVs, because bacteria would have to travel up the entire length of the narrow catheter before spreading through the bloodstream.

The chief advantage of a PICC over other types of central lines is that it is easy to insert, poses a relatively low risk of bleeding, is externally unobtrusive, and can be left in place for months to years for patients who require extended treatment. The chief disadvantage is that it must travel through a relatively small peripheral vein, which means that the line is limited in

diameter and is also somewhat vulnerable to occlusion or damage from movement or squeezing of the arm.

Central Venous Lines

Several types of catheters take a more direct route into central veins. These catheters are collectively called central venous lines. Physicians or other specially trained personnel usually insert central venous lines.

In the simplest type of central venous access, a catheter is inserted into a subclavian vein, an internal jugular vein, or (less commonly) a femoral vein and is advanced toward the heart until it reaches the superior vena cava or right atrium. In newborn infants, a central line can be inserted into the umbilical vein or artery. Because all these veins are larger than peripheral veins, central lines can deliver a higher volume of fluid and can have multiple lumens.

Another type of central line, called a Hickman or Broviac catheter, is inserted into the target vein and then "tunneled" under the skin to emerge a short distance away. This method reduces the risk of infection, because bacteria from the skin surface are not able to travel directly into the vein; also, these catheters are made of materials that resist infection and clotting.

Implantable Ports

A port (often referred to by brand names such as Port-A-Cath or MediPort) is a central venous line that does not have an external connector. Instead, it has a small reservoir implanted under the skin. Medication is administered intermittently by placing a small needle through the skin into the reservoir. Ports cause less inconvenience and have a lower risk of infection than do PICCs, and are therefore commonly used for patients on long-term intermittent treatment, such as chemotherapy.

HIPAA, Law & Ethics

Patient Privacy

HIPAA, the Health Insurance Portability and Accountability Act, mandates that you protect the privacy of your patients' health information. HIPAA establishes punishments for anyone violating patient privacy. All information about any of your patients who require IV therapy must be kept private and confidential.

Checkpoint Questions 1-5

1. What are the two types of IV therapy?

   _____

   _____

2. Which type of central IV therapy would most likely be used for long-term IV chemotherapy on an outpatient basis?

   _____

   _____

Before you continue to the chapter summary, answer the previous Checkpoint Questions and complete the Types of IV Therapy activity under Chapter 1 on the student CD.

Chapter Summary

- IV therapy is a treatment that infuses fluids, medications, blood, or blood products into a vein for treatment of a patient. It involves both invasive and noninvasive procedures.
- Safety and the legal aspects of IV therapy are closely regulated by agencies and laws such as JCAHO, OSHA, CDC, NIOSH, and HIPAA.
- Your role and responsibility related to IV therapy is regulated by your training, the scope of practice of your profession, your state, your place of employment and the licensed physician or other licensed health care practitioner. Always know what you can and cannot do.
- The four most common reasons for IV therapy are to maintain fluid and electrolyte balance, to administer medications, to transfuse blood and blood products, and to deliver nutrients and nutritional supplements.
- Peripherally inserted catheters are used for short-term therapy; they provide easy access and are easy to monitor. Centrally inserted catheters are used for patients who need large volumes of fluids, long-term therapy, or multiple infusions.

Chapter Review

Matching

_____ **1.** interstitialfluid (ISF)

_____ **2.** antidiuretic hormone (ADH)

_____ **3.** parenteral nutrition

_____ **4.** electrolytes

_____ **5.** central IV therapy

_____ **6.** aldosterone

_____ **7.** intracellular fluid (ICF)

_____ **8.** intravenous

_____ **9.** extracellular fluid (ECF)

_____ **10.** peripheral IV therapy

a. secreted from the adrenal glands and affects fluid balance

b. secreted from the pituitary gland and regulates the retention of water

c. infusion of fluids or medications directly into a large vein such as the superior vena cava

d. sodium, potassium, calcium, chloride, phosphorus, and magnesium

e. fluid outside the cells

f. fluid that surrounds the cells

g. fluid inside the cells

h. into a vein

i. infusion of nutrients including amino acids, dextrose, fat, electrolytes, vitamins, and trace elements

j. introduction of fluids through a catheter for short-term therapy

True/False

T F **11.** A patient may be put on IV therapy to replace fluid losses, receive medications, or receive transfused blood.

T F **12.** To discuss private information about a patient when the patient's door is open is a violation of HIPAA.

T F **13.** A peripheral IV access is preferred for long-term IV therapy.

T F **14.** Central IV lines deliver solutions and medications into large central veins, ensuring rapid onset of actions and rapid distribution to the rest of the body.

T F **15.** The medical assistant may perform preparation, monitoring, and maintenance of IVs in all states.

Multiple Choice

16. A patient has been vomiting for several days. Which of the following would the patient most likely be receiving?

a. blood transfusion

b. parenteral nutrition

c. catheter

d. an enema

17. The patient has cancer and will be receiving chemotherapy. Which of the following types of therapy would most likely be used?
- **a.** peripheral IV therapy
- **b.** direct injection
- **c.** central IV therapy
- **d.** physical therapy

18. Which of the following sets yearly standards for patient safety?
- **a.** HIPAA
- **b.** OSHA
- **c.** JCAHO
- **d.** CDC

19. Several patients at your facility who are receiving IV therapy develop a similar infection at the IV site. Which organization would track the cases of infection and help research the cause?
- **a.** OSHA
- **b.** JCAHO
- **c.** HIPAA
- **d.** CDC

20. Which of the following would be *unacceptable* if you are abiding by the guidelines set forth in HIPAA?
- **a.** signing out of the computer when leaving it
- **b.** talking to your supervisor about a patient in an occupied elevator
- **c.** turning the computer screen so people passing by cannot see it
- **d.** closing the room door when you speak with a patient

21. Which of the following is an invasive procedure related to IV therapy?
- **a.** starting an IV
- **b.** setting up the equipment for an IV
- **c.** discontinuing an IV
- **d.** monitoring an IV

22. Which of the following is the fluid that is found surrounding the cells?
- **a.** intercellular fluid
- **b.** extracellular fluid
- **c.** electrolytes
- **d.** interstitial fluid

23. Which of the following helps maintain fluid and electrolyte balance by regulating water retention?
- **a.** aldosterone
- **b.** active transport
- **c.** antidiuretic hormone (ADH)
- **d.** osmosis

24. Which of the following is considered an advantage of IV medication administration?
- **a.** It is more painful but also more effective.
- **b.** It can be stopped quickly when an adverse reaction occurs.
- **c.** It is given directly into a muscle during emergencies.
- **d.** It is given when the patient cannot take nutrition by mouth.

25. Which of the following is an advantage of peripheral IV therapy?
    a. Fluids and medication reach the heart immediately.
    b. The catheter may be used to administer chemotherapy.
    c. Multiple medications can be delivered at the same time.
    d. It is easy to monitor and access.

What Should You Do? (Critical Thinking/Application Questions)

1. When you take the equipment into a patient's room for an IV to be started, the patient asks, "What's that? What are you going to do?" What should you do?

2. You receive a call about your patient named Carrie. The caller asks, "When did they put that IV in Carrie's arm? I just do not get it. I thought she was getting better. What happened? Why did the doctor order this IV?" What should you do?

Get Connected

Visit the McGraw-Hill Higher Education website for *Intravenous Therapy for Health Care Personnel* at **www.mhhe.com/healthcareskills** to complete the following activities.

1. Use the Internet to research scope of practice in your state.
2. Visit the website of the Joint Commission on Accreditation of Healthcare Organizations (**www.jcaho.org**) and find the National Patient Safety Goals. Review the standards as they apply to the facility at which you will be employed. For example, if you work in ambulatory care, look for ambulatory-care standards.

Using the Student CD

Now that you have completed the material in Chapter 1, return to the student CD and complete any chapter activities you have not yet done. Practice your terminology with the Key Term Concentration game. Review the chapter material with the Spin the Wheel game. Take the final chapter test, complete the troubleshooting question, and e-mail or print your results to document your proficiency for this chapter.