ADMINISTERING MEDICATIONS

SCENARIO

Dr. Anna Thau just opened a new primary care office in the community. She is in the process of hiring office staff, and Dorothy Gaston, CMA (AAMA), is being interviewed for a clinical assisting position. One of Dr. Thau’s chief requirements is that the medical assistants working in the clinical area be familiar with medications and competent in their administration. Her primary concern is the safety of her patients, so she requires that employees perform appropriate safety measures when dispensing and administering oral, topical, and parenteral drugs.

While studying this chapter, think about the following questions:

- What safety guidelines should Dorothy incorporate into her practice each time she receives a drug order from Dr. Thau?
- What information must be included in comprehensive documentation of the administration of medication?
- Are there patient assessment factors that might affect medication administration?
- Why does Dorothy have to understand the details of various drug forms and their administration guidelines?
- What practices mandated by the Occupational Safety and Health Administration (OSHA) must be followed in preparing and administering medications?
- Are there intravenous (IV) principles Dorothy should understand?
- Does Dorothy need to be aware of the legal implications of drug administration?

LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary.
2. Apply critical thinking skills in performing the patient assessment and patient care.
3. Analyze safety guidelines for specific patient populations.
4. Document the administration of a medication.
5. Follow safety precautions in the management of medication administration in the ambulatory healthcare setting.
6. Summarize patient assessment factors that can affect medication administration.
7. Identify various drug forms and their administration guidelines.
8. Administer oral medications.
9. Specify parenteral administration equipment, including details about needles and syringes.
10. Follow OSHA guidelines in the management of parenteral administration.
11. Describe and demonstrate the types and locations of parenteral administrations.
12. Outline the principles of IV therapy.
13. Recognize the medical assistant’s role in patient education about the administration of drugs.
14. Assess legal and ethical issues in drug administration in the ambulatory care setting.
Previous medication chapters in this text explained general pharmacologic principles and pharmacology math. In this chapter you will learn about safety factors in drug administration, documentation guidelines, and the forms of medications and how they are administered. It is important to remember that medications can cause serious harm to a patient. Therefore, the process of dispensing and administering medications must always be treated with great care. Each member of the healthcare team involved in medication administration must be constantly vigilant to prevent errors and to deliver high-quality patient care.

No matter the type of medication administered, the order first must come from the physician. If the physician delegates drug administration to the medical assistant, it must be allowable under state law. Each state has a medical practice act that defines whether a medical assistant can administer drugs under the supervision of a physician. Some states allow medical assistants to administer only certain types of medications; some prohibit medical assistants from giving injections. You should obtain information about the scope of practice for medical assistants in your particular state from your local government or medical society. You should know what the law states and how your duties fit into that law.

### SAFETY IN DRUG ADMINISTRATION

To ensure patient safety in drug administration, the medical assistant must perform certain procedures every time a medication is ordered. First, it is essential that the medical assistant understand the physician’s order. Safety starts with a clearly written order that can be easily read and understood. Ask the physician for clarification if you have any questions about the medication, dose, strength, or route of administration. Once the order has been clarified, the medical assistant is responsible for looking up the drug in a pharmacology reference, such as the Physicians’ Desk Reference (PDR) (see Chapter 33). A medication should never be given until its purpose, possible side effects, precautions, and recommended dose are known.

After the medical assistant learns about the drug ordered, the medication is dispensed and administered. To safeguard the patient during this process, the medical assistant uses the “seven rights” of proper drug administration. Remember, however, that the patient always has the right to refuse to take a medication. If this occurs, make sure you inform the physician immediately, because he or she may want to follow up with the patient about the importance of the prescribed medication. If a patient refuses to take an ordered medication, be sure to document this refusal in the patient record. The seven rights of drug administration are as follows:

1. **The right patient.** The easiest way to make sure the medication is being given to the correct individual is to ask the patient his or her name or to address the patient by name before administering the drug.
2. **The right drug.** This begins with clarification of the physician’s order if needed. Every time a drug is dispensed, the label must be checked three times to confirm the right drug, dose, and strength. You must be competent in reading and understanding the information on the drug label. The drug’s name and strength on the label must exactly match the physician’s written order. Compare the physician’s written order with the medication label when you:
   - Take the medication from the storage area
   - Dispense the medication from the container
   - Replace the container to storage or before discarding the used container
3. The right dose. If the dose ordered does not match the dose available according to the drug label, perform appropriate pharmacology math procedures to determine the accurate dose. Remember to have your calculations checked if you have any doubts about the accuracy of the dose.

4. The right route. Check the physician's order to clarify the route of administration, whether it is oral, via mucous membrane, or parenteral. Patient assessment includes determining whether this is an appropriate route for that particular patient.

5. The right time. In the ambulatory care setting, most medications are ordered stat. However, it is important to check the physician's order to clarify the time of administration and to refer to this information when looking up the drug to clarify any questions the patient may have about home administration of the drug.

6. The right technique. A medical assistant must be familiar with the proper techniques for all routes of administration. If you have any doubts about your ability to administer a particular drug, always ask for help.

7. The right documentation. Immediately after administering the drug, document the date and time of administration; the drug's name, strength, dose, and route of administration; any reactions the patient has to the medication; and the details of patient education about the drug. For parenteral medications, inspect the site of injection before administration for scarring, altered pigmentation, or any other indication of a possible problem with medication absorption. The exact site of administration must be charted. If the patient calls in for a prescription refill, document all pertinent information on the patient's chart as well. Procedures 35-1 and 35-2 present the safety measures to be followed in preparing and administering medications and documenting it properly.

**Critical Thinking Application 35-1**

Dr. Thau asks Dorothy what safety precautions she would routinely follow when administering a dose of Prilosec. Based on the information you have learned about safe drug administration, what steps should Dorothy follow in dispensing and administering the ordered medication?

**Patient Assessment Factors**

Although medications are given only under the direct order and supervision of the physician, the medical assistant is part of the assessment and problem-solving process. In medicine, assessment never ends, and it is never the responsibility of just one person. A physician gives the order to administer medication to a patient based on a medical assessment, but you also must continue to assess the patient and the patient's environment as you follow through with that order. The physician depends on the medical assistant to be alert to patient changes or to new information that could mean that the use of a particular drug should be reconsidered. For example, perhaps the patient denied having any allergies to medications, but right before you administer an injection of penicillin, the patient mentions that she developed a rash after the last penicillin shot. You should stop right then and go back to the physician with this new information. It is vital to continuing patient safety that you assess the patient, the drug, and the environment before giving any medication.

Drug therapy should be based on a holistic approach to patient treatment. The patient is more than a particular disease. Many factors may have an impact on the patient's compliance with drug treatment, as well as the safety and effectiveness of medication therapy. The first step in holistic medication treatment is collecting a complete and accurate history. This includes gathering details about the patient's health history, current and past use of both prescription and over-the-counter (OTC) drugs, and any negative responses to medications, especially drug allergies. Every time a patient is seen in the office, he or she should be asked about drug allergies. Most medical practices have a specific place on the patient's chart to document drug allergies (e.g., in red ink in the upper right corner of each documentation sheet), as well as a special label on the front of the patient's chart that alerts the physician and staff to medication allergies. Electronic medical records (EMRs) have a specific area on the chart.
PROEDURE 35-1

Administer Medications and Document Patient Care: Safety Measures in Preparing, Administering, and Documenting Medications

GOAL: To safely prepare, administer, and document completion of a medication order.

SCENARIO: Dr. Thau writes the following order: Administer Reombivax 10 mcq IM to Chris MacCarthy.

EQUIPMENT and SUPPLIES
- Written physician's order, including the drug name, strength, dose, and route of administration
- PDR
- Container of ordered medication
- Correct equipment for dispensing the drug
- Patient’s medical record

PROCEDURAL STEPS

1. Read the order and clarify any questions with the physician.
2. If you are unfamiliar with the drug, refer to the PDR or the package insert to determine the purpose of the drug, common side effects, typical dose, and any pertinent precautions or contraindications. Reombivax is a hepatitis B immunization. Use the seven rights to prevent errors.
3. Take the written order with you to the medication room and compare the Reombivax label with the physician’s order. Based on the information printed on the medication label, perform calculations needed to match the physician’s order. Confirm the answer with the physician if you have any questions.
4. Dispense the medication in a well-lit, quiet area. 
   PURPOSE: To prevent distractions and possible errors.
5. Sanitize your hands.
6. Compare the written order with the label on the multidose vial when you remove it from storage. Check the expiration date on the container and, if it was used previously, the date of first use; dispose of the medication if indicated.
   PURPOSE: To check the medication the first of three times.
7. Compare the order with the label on the multidose vial just before drawing up the medication into the appropriate syringe unit. Make sure the strength on the label matches the order or that you dispense the correctly calculated dose.
   PURPOSE: To check the medication the second of three times.
8. Compare the label and the physician’s order before returning the vial to storage.
   PURPOSE: To check the medication the third of three times.
9. Greet and identify Chris by name and inform him you are going to administer a hepatitis B immunization.
   PURPOSE: To make sure you have the right patient.
10. Mention the name of the drug and why it is being given and ask the patient whether he is allergic to the medication.
    PURPOSE: To educate the patient about drug treatment and to verify that the patient is not allergic to the prescribed medication.
11. If necessary, help the patient into a sitting position.
12. Administer the medication into the left deltoid muscle using correct administration techniques and following OSHA precautions.
13. Conduct patient education on the purpose of the drug, typical side effects, and dosage and storage recommendations. Consult the physician to clarify information if needed.
    PURPOSE: To ensure compliance with home drug therapy and to monitor for side effects.
14. The patient must remain in the office for 20 to 30 minutes after drug administration as a precaution against untoward effects.
15. If the patient experiences any discomfort after taking a medication, the physician should be notified immediately and the incident documented completely and accurately.
16. Sanitize your hands.
17. Document the administration of the drug, including the date and time; the drug name, dose, strength, and route of administration; any patient side effects; and patient education provided about the drug.

1/12/XX 11:22 AM Administered 10 mcq Reombivax to D deltoid. Pt informed this is the first of 3 doses. No side effects noted. Appointment scheduled for patient to return in 1 mo for second dose. ———— ———— ———— D. Gaston, CMA (AAMA)

for updating allergies. It is crucial that the physician have current and accurate information about drug allergies to prevent serious complications and possibly death.

Patient assessment does not end with the administration of the drug. Observe patients carefully for drug reactions after the administration of all medications but especially those that are injected. Patients receiving penicillin (a drug with a high incidence of allergic response) or immunotherapy must remain in the office for 20 to 30 minutes after administration in case of an acute anaphylactic reaction. An acute anaphylactic reaction can result in respiratory failure and circulatory collapse within minutes if not reversed with epinephrine. Lesser allergic reactions that may occur include hives, swelling, and itching. The physician may order an antihistamine, such as diphenhydramine (Benadryl), if these reactions occur.

Because patient factors such as age, weight, and height may be used to determine the correct therapeutic dose, accurate recordings of this information should be documented on the chart. As discussed in Chapter 33, chronic conditions, especially liver and kidney disease, may affect the body’s ability to metabolize and excrete medications. Therefore, a complete and accurate medical history is crucial to patient safety.

Besides the patient’s physical state, other holistic factors play a role in successful drug therapy. The patient must understand
PROCEDURE 35-2

Document Patient Care and Patient Education: Maintain Medication Records

GOAL: To document completion of medication orders.

SCENARIO: Dr. Thau writes the following orders to control Mrs. Lange’s hypertension:
- Lasix 20 mg PO qd
- Potassium chloride 20 mEq PO qd to Alice Lange

You review the orders for clarification, complete the three label checks, confirm the identity of the patient, ask the patient about drug allergies, administer the medications as ordered, and answer the patient’s questions about the continuation of drug therapy at home. Now, you must document this process in the patient’s chart.

EQUIPMENT and SUPPLIES
- Written physician’s order, including the name, strength, dose, and route of administration of the medication ordered
- PDR
- Patient’s medical record

PROCEDURAL STEPS

1. Greet and identify Mrs. Lange by name and inform her that you are going to administer a diuretic and potassium supplement.
   PURPOSE: To make sure you have the right patient.

2. Mention the names of the drugs and why they are being given, and ask Mrs. Lange if she is allergic to the medication.
   PURPOSE: To educate the patient about drug treatment and to verify that the patient is not allergic to the prescribed medication. Follow office policy to update the patient’s medical record about any newly reported medication allergies.

3. Sanitize your hands.

4. Administer the medications orally as ordered, making sure Mrs. Lange swallows the pills without difficulty.

5. Conduct patient education about the purpose of the drugs, typical side effects, and dosage and storage recommendations. Consult the physician to clarify information if needed.
   PURPOSE: To ensure compliance with home drug therapy and to monitor for side effects.

6. The patient must remain in the office for 20 to 30 minutes after drug administration as a precaution against untoward effects.

7. If the patient experiences any discomfort after taking a medication, the physician should be notified immediately and the incident documented completely and accurately.

8. Sanitize your hands.

9. Document the administration of the medications, including the date and time; the drug names, dose, strength; and route of administration; any patient side effects; and patient education provided about the drug.

Practice documenting the following orders:

- Tylenol elixir 120 mg PO to Anthony Baker, 8 years old, for a fever
- Cantril Pediatric 500 mg PO to Samantha Carpassi, 3 years old, for a urinary tract infection
- Dilaudid cough syrup 2 mg PO to Roberto Alphonse, 43 years old, for bronchitis
- Diflucan 400 mg PO loading dose to Anastasia Smith, 19 years old, for a vaginal yeast infection

4/02/XX 9:30 AM Administered Lasix 20 mg and potassium chloride 20 mEq PO without difficulty. Pt. informed of importance of taking medications as prescribed for treatment of hypertension; warned she will have to urinate more frequently. No side effects noted. Appointment scheduled for patient to return in 1 mo for F/u. D. Gastro, CMA (AWMA)

the drug regimen, may require family support to follow treatment guidelines, and must be able to afford the prescribed medication. Unless these criteria can be met, the patient may be unable to follow through with the treatment protocol. It is important that the medical assistant investigate these issues and offer appropriate community support, if available, to help the patient maintain proper drug therapy.

Approaches to Special Patient Populations

Pregnant and breastfeeding women must be especially careful in taking OTC and prescription drugs, because medications are known to cross the placenta and may affect the developing fetus. A pregnant woman should not take any medication without the knowledge and approval of her physician. As discussed in Chapter 33, the Food and Drug Administration (FDA) identifies five pregnancy risk categories of drugs. The medical assistant should be familiar with the specific drug category before administering any medication to a pregnant woman. Besides passing through the placenta, medications also are transmitted through breast milk. Therefore similar precautions must be used when the physician prescribes medications for a lactating mother.
As discussed in Chapter 34, special precautions must be followed in determining the correct dose of medication for children. Pediatric doses are determined primarily by the child’s weight; therefore, it is important to measure and record the child’s weight accurately at each office visit. A child’s body manages drug absorption, distribution, metabolism, and excretion differently from an adult’s body, and the physician considers these factors when prescribing pediatric doses.

Aging people also are more sensitive to the effects of medications, so certain factors must be considered when prescribing and administering drugs to this patient population. The metabolic rate typically slows with the aging process, resulting in an increased susceptibility to a buildup of chemicals in the body that may lead to toxic conditions. Part of the normal aging process is loss of subcutaneous fat, which may affect the route of administration of some medications, especially parenteral sites. In addition, many elderly people have accompanying chronic diseases, such as circulatory, liver, or kidney disease, that may affect the distribution, metabolism, and excretion of medications. Geriatric patients frequently take multiple medications prescribed by more than one practitioner, which increases the risk of drug contraindications and interactions.

A holistic approach to aging patients should include a nutritional evaluation, because a poor diet or restricted fluid intake affects drug actions.

Another very real concern for aging patients is the cost of drug therapy. Many patients on fixed incomes may not be able to afford the ordered drug but hesitate to inform the physician of this problem. It may be up to the medical assistant to ask the patient about his or her ability to pay for the ordered medication and to offer available assistance for prescription drugs. This includes offering stocked drug samples with physician approval and/or investigating drug coverage offered by pharmaceutical companies.

### Guidelines for Administration of Medication to Geriatric Patients

- Educate the patient and family about the purpose of the drug, the time, dose, and route of administration; and common side effects. Instructions should be written clearly for home reference.
- If the patient has difficulty swallowing the medication, either crush (if allowed) the medication or mix it into applesauce or pudding.
- Encourage the patient to drink plenty of fluids (at least eight glasses of water per day) while taking the medication.
- Reinforce that the patient should take the medication as prescribed and should not skip or double doses.
- Request that patients bring to every physician visit all of the medications they are currently taking in their labeled containers, including OTCs, so a current medication record can be accurately maintained in the patient record.
- If patients are taking multiple medications, suggest the use of daily or weekly medication dispensers. These can be purchased in drugstores and restocked by family members on a weekly basis.
- Encourage patients not to share or “save” medications. All leftover medications should be discarded to avoid use beyond the expiration date.

### Critical Thinking Application 35-2

Dr. Thou serves both pediatric and geriatric patients. Summarize key items Dorothy should consider when administering medications to these specialty patient population groups.

**Assessment of the Patient’s Environment**

The patient’s surroundings affect the success of medication therapy. The patient may be uncooperative when you attempt to administer a medication (imagine a young child due for immunization updates) or the patient’s family may protest the use of the drug. Administration of certain medications requires the presence of the physician. For example, because of the risk of anaphylactic shock, allergy injections should not be given unless a physician is in the facility. In addition, the environment must be safe for drug administration. Make sure the patient is comfortable and protected from accidental injury. If a patient is to receive an injection, take care to place the patient in a position that best exposes the site and protects the patient from injury in case he or she faints or has a drug reaction. If the patient is to take an oral medication with water, make sure he or she is seated in a position that prevents choking. Because any medication is potentially dangerous to a patient, emergency drugs must be readily available to counteract any adverse effects that might occur immediately after the administration of a medication. Emergency drugs should be in injectable form for rapid effect. Emergency carts typically include adrenergics (e.g., epinephrine), anticholinergics (e.g., atropine), bronchodilators, and histamine blockers. (The pharmaceutical management of emergencies is discussed in Chapter 36.)

### Suggestions for Successful Medication Administration to Children

- Explain why the medication is needed and how it will make the child feel.
- Attempt to gain cooperation by getting down on the child’s level and using a soft but firm voice.
- When possible, offer choices of care, such as, “Would you like your medicine in your right or left leg?”
- Divert the child to relieve stressful moments.
- If the child refuses to cooperate, get help as needed to restrain the child so the medication can be given safely.
- Encourage parents to participate as much as possible, and make sure both the parent and child (if of an appropriate age) understand the prescribed drug therapy.
- Offer a “treat,” such as a sticker, at the end of the visit.
The following section presents suggested questions that can be asked to obtain as much information as possible from the patient about medication therapy. Any information gathered should be included in your documentation.

**Suggested Questions for Gathering Medication Information**

- **What physician-prescribed drugs are you currently taking?** Record the names, doses, strengths, and routes of administration.
- **Do you take any OTC drugs on a regular basis?** Record the purpose, amount, and frequency of use. If appropriate, ask when the last dose was taken. For example, if a mother reports her child has a fever but the temperature is normal at the time of the visit, perhaps she gave the child a dose of Tylenol before the visit.
- **What medications, including OTC drugs, have you taken over the past 6 months to 1 year and why?** Ask this question to gather a history of medication use and perhaps discover health problems that have not been recorded previously.
- **Do you regularly use any alternative or herbal products? What are they? How much do you use and how frequently are they used?** For what purpose are they used?
- **It is important that patients take their medications as prescribed, so focus a few questions on how currently prescribed drugs are taken.** What time of day do you take your medicine?

**How do you remember to take it? Are you having any problems or notice side effects from the medication? Can you afford to take the medication as prescribed? Are you having the desired response to the medication (e.g., pain relief; breathing better, lowered blood pressure)?**

- **Where do you store your medications at home?** Review any special storage precautions for prescribed drugs. Most medications should be stored away from any heat source and sunlight.
- **Have you checked the expiration dates on your containers?** Patients often neglect to dispose of unused medication and may take it after the expiration date if not informed of this precaution.
- **Can you tell me why you are taking the prescribed medication?** You should periodically check on the need for patient education about drug therapy. Patients are more likely to be compliant with treatment protocols if they understand the importance of taking the medication as prescribed.
- **Do you use the same pharmacy to fill all of your prescriptions?** Patients may see more than one physician. An excellent method of keeping track of all prescribed drugs, their contraindications, and possible drug-to-drug interactions is to strongly suggest that the patient use only one pharmacy. The pharmacist then can monitor overall medication safety.

**Drug Forms and Administration**

As discussed in Chapter 33, the chosen route of drug administration determines the rate and intensity of the drug’s effect. A drug prepared for one route but administered by another route may not have any effect at all and is potentially dangerous. Each route requires different dosage forms.

**Solid Oral Dosage Forms**

The basic forms for solid oral dosage are tablets, capsules, and lozenges (troches). Figure 35-1 depicts typical caplets, capsules, and tablets. Tablets are compressed powders or granules that, when wet, break apart in the stomach—or in the mouth if they are not swallowed quickly. Tablets may be sugar-coated to taste better, or enteric-coated (e.g., Ecotrin) to protect the stomach mucosa. Buffered tablets are also designed to prevent stomach irritation by combining the drug with a buffering agent that reduces the amount of acidity in the compound. Buffered or enteric-coated tablets should never be crushed or dissolved. Only **scored** tablets can be cut in half. This is accomplished with a pill cutter (Figure 35-2).
Some tablets are coated with a volatile liquid that helps the medication quickly dissolve in the mouth, such as certain antacid tablets and Claritin RediTabs, which are designed to dissolve on the tongue rather than to be swallowed. Caplets are tablets without a coating: they are solid and oblong, similar in shape to capsules.

Capsules are gelatin-coated and dissolve in the stomach, or they may be enteric-coated to protect them from stomach acids. Timed- or sustained-release (SR) capsules or spansules are designed to dissolve at different rates over a period of time to reduce the number of times a patient has to take a medication. These drugs should never be crushed or dissolved, because this negates their timed-release action. Another form of oral medication, the lozenge (or troche), is a flattened disk that is dissolved in the mouth to coat the throat, such as a lozenge for a sore throat.

### Liquid Oral Dosage Forms

Many liquid forms of medication are available. They differ mainly in the type of substance used to dissolve the drug: water, oils, or alcohol.

Solutions are a mixture of a liquid (usually water) and a powdered drug product (e.g., Amoxicillin solutions for pediatric patients). A solution separates if left standing, so you must shake the container before administering the medication. Liquid forms include the following:

- **Syrups**: A syrup is a solution of sugar and water, usually containing flavoring and medicinal substances. Cough syrups, such as Robitussin, are the most common.
- **Suspensions**: Suspensions are insoluble drug substances contained in a liquid. Examples include the following:
  - **Emulsions**: An emulsion is a mixture of oil and water that improves the taste of otherwise distasteful products (e.g., cod liver oil).
  - **Gels and magmas**: Gels and magmas consist of minerals suspended in water. Minerals settle; therefore products containing minerals must be shaken before use. Milk of magnesia is an example.

A drug substance can be mixed with alcohol to enhance the drug's properties. Examples include the following:

- **Fluid extracts**: Fluid extracts are combinations of alcohol and vegetable products that are more potent than tinctures. For example, belladonna fluid extract has a higher percentage of the powdered belladonna leaf than tincture of belladonna.
- **Tinctures**: A tincture is an alcoholic preparation of a soluble drug or chemical substance, usually from plant sources. Examples include tincture of benzoin and tincture of iodine, which are applied externally.
- **Extracts**: Extracts are very concentrated combinations of vegetable products and alcohol or ether that are evaporated until a syrupy liquid, solid mass, or powder is formed. Extracts are many times stronger than the crude drug.
- **Elixirs**: An elixer is an aromatic, alcoholic, sweetened preparation. Elixir of phenobarbital is one example; the alcoholic cough medicines terpin hydrate with codeine and plain elixir of codeine are two more. Elixirs differ from tinctures in that they are sweetened. They should be used with caution in patients with diabetes or a history of alcohol abuse. Some pediatric medications retain the name elixir, although they no longer contain alcohol.

### Critical Thinking Application 35-3

Dorothy is ordered to administer a loading dose of cephalixin to a 17-year-old patient with acute bronchitis. The physician's order reads, "Administer cephalixin 500 mg cap PO stat." The patient is sent home with a prescription for Keftix, 250 mg cap q6h times 7 days. Document the details that should be included in Dorothy's note.

#### Oral Administration

If the drug is not intended to coat the oral cavity or throat, oral medications should be taken with enough water to transport the drug to the stomach. Make sure the patient is able to swallow the medication. It may be helpful to place the medication on the back part of the tongue. Liquid medications are ideal for children. Solid drugs should not be administered to children until they reach the age at which they can safely swallow a solid drug form without the danger that they will aspirate the drug. Oral syringes are the best way to give liquid medications to children because there is less likelihood the medication will be spilled (Figure 35-3). Liquid medications, especially those that stain the teeth, can be taken through a straw. If the patient has been vomiting or is nauseated, an alternative route of administration may be necessary. Always remain with the patient until all of the medication has been swallowed. Procedure 35-3 outlines how to dispense and administer oral medications.
**Mucous Membrane Forms**

Some mucous membranes are selected for their ability to absorb medication for a systemic effect. The most commonly used areas are the gums, the cheeks (buccal), under the tongue (sublingual), the rectum, and the respiratory mucosa (inhalation). Nasal, ophthalmic, rectal, and vaginal preparations may also be applied to these mucous membranes for their localized effects. Inhalation drugs are discussed in Chapter 46.

**Rectal Administration**

The rectal mucosa provides rapid absorption of a drug, even though the surface of the rectum is small. Drugs are absorbed directly into the bloodstream without being altered, as they would be by the digestive processes and without irritating the patient's gastric mucosa. Rectal medications are useful if the patient is nauseated, vomiting, or unconscious. For example, Tylenol or Compazine suppositories may be prescribed for a child.

### PROCEDURE 35-3

**Administer Oral Medications**

**ORDER:** Administer hydrochlorothiazide (HydroDiuril) 100 mg PO tab stat for hypertension.

**GOAL:** To safely dispense, administer to a patient, and document the administration of an oral medication.

**EQUIPMENT and SUPPLIES**

- Container of ordered medication
- Calibrated medication cup
- Written physician's order, including the drug name, strength, dose, and route
- Water if appropriate
- Patient's medical record

**PROCEDURAL STEPS**

1. Read the order and clarify any questions with the physician.
2. If you are unfamiliar with HydroDiuril, refer to the PDR or the package insert to determine the purpose of the drug, common side effects, typical dose, and any pertinent precautions or contraindications. Be prepared to answer any questions the patient may have about the medication. Use the seven rights to prevent errors.
3. Perform calculations needed to match the physician's order. Confirm the answer with the physician if you have any questions.
4. Dispense the medication in a well-lit, quiet area.
   - **PURPOSE:** To prevent distractions and possible errors.
5. Sanitize your hands.
6. Compare the order with the label on the container of medicine when you remove it from storage. Check the expiration date on the container and dispose of the medication if it has expired.
   - **PURPOSE:** To compare the medication label and the physician's order the first of three times.
7. Compare the order with the label on the container of medicine just before dispensing the ordered dose. Make sure the strength on the label matches the order or that you dispense the correctly calculated dose.
   - **PURPOSE:** To compare the medication label and the physician's order the second of three times.
8. Gently tap the prescribed dose into the lid of the medication container. Do not touch the inside of the lid or the medication (Figure 1).
   - **PURPOSE:** Touching the medication or the inside of the container contaminates the drug.
9. Empty the medication in the container lid into a medicine cup.

**Dispensing Liquid Oral Preparations (HydroDiuril Solution)**

10. Mix medication well if required.
11. When liquid medications are poured, the label should be held in the palm of the hand.
   - **PURPOSE:** To protect the label from medication spills. The medication must be discarded if staff members are unable to read the drug label clearly.
12. Place the medicine cup on a flat surface and, at eye level, pour the medication to the prescribed dose mark on the medicine cup (Figure 2).
   - **PURPOSE:** At eye level, the base of the meniscus is where the prescribed dose should be measured.

**For Both Solid and Liquid Oral Medications**

13. Recap the container and compare the label with the physician's order before replacing the container in storage.
    - **PURPOSE:** To compare the medication label and the physician's order the third of three times.
14. Transport the medication to the patient.
15. Greet and identify the patient by name.
    - **PURPOSE:** To make sure you have the right patient.
16. Mention the name of the drug and why it is being given and ask the patient whether he or she has any allergies to the medication.
    - **PURPOSE:** To educate the patient about drug treatment and to verify that the patient is not allergic to the prescribed medication.
17. If necessary, help the patient into a sitting position.
18. Administer tablets, capsules, or caplets with water. If the patient is receiving liquid medication, offer water after the medication has been taken if appropriate. Make sure the patient swallows the entire dose.
19. Provide patient education about the purpose of the drug, typical side effects, and dosage and storage recommendations. Consult the physician to clarify information if needed.
    - **PURPOSE:** To ensure compliance with home drug therapy and to monitor for side effects.
20. The patient must remain in the office for 20 to 30 minutes after drug administration as a precaution against untoward effects.
PROCEDURE 35.3—cont’d

21. If the patient experiences any discomfort after taking a medication, the physician should be notified immediately and the incident documented completely and accurately.

22. Sanitize your hands.

23. Document the administration of the drug, including the date and time; the drug name, dose, strength, and route of administration;

![Image of a hand holding medication](FIGURE 1)

![Image of a patient receiving medication](FIGURE 2)

6/8/XX 9:45 AM  Aldomet tab 250 mg PO administered per physician order. Dorothy Gaston, CMA (AAAMA)

who has a fever, nausea, and vomiting. Manufacturers supply rectal medications in the form of gelatin or cocoa butter–based suppositories, which melt in the warmth of the rectum and release the medication (Figure 35-4). Suppositories may be used to soften the stool or stimulate evacuation of the bowel; enemas are used to cleanse and evacuate the bowel.

The best time to administer a rectal drug intended for a systemic effect is after a bowel movement or enema. The patient should be cautioned to remain lying down for 20 to 30 minutes to prevent accidental evacuation of the drug by a bowel movement. Of course, suppositories intended to treat constipation are administered to bring about bowel evacuation. The patient should be instructed to insert the suppository approximately 2 inches above the rectal sphincter muscles; a little mineral oil or vegetable oil may be used as a lubricant. If suppositories are individually wrapped in foil, make sure the patient knows that the foil is the wrapper and is not part of the treatment. Suppositories are typically stored in the refrigerator to keep them firm.

![Image of suppositories](FIGURE 35-4)

Vaginal Administration

Vaginal suppositories, tablets, creams, and fluid solutions are used to treat local infections. Irrigating solutions (douches) may be used as antiinfective treatments. Creams and foams are available as local contraceptives. Vaginal instillation is most effective if the patient remains lying down after administration to prevent leakage; many preparations, therefore, are intended to be used at bedtime. The patient may need to wear a pad to absorb drainage. Solid suppositories and tablets may be lubricated or moistened with water and inserted by hand or with an applicator. Creams are instilled with applicators. Prepackaged, disposable irrigation kits are available for douching.

When instructing patients, confirm that the patient can differentiate the urinary meatus from the vaginal orifice and the rectum. Mistakes could result in vaginal infections or in damage to or infection of the urinary tract. A simple drawing and explanation may be required.

Oral Administration

Mouth and throat agents come in the form of sprays, swabs, sublingual tablets, and buccal tablets. The mouth and throat membranes may be treated locally with antiseptics for oral hygiene and local infections, with anesthetics for pain relief, and with astringents that form a protective film over the mucous membranes. The patient may have to gargle, or the area may be painted or sprayed. To paint or spray the throat, first look for the area of inflammation to be treated. Otherwise, the part needing
treatment may be missed entirely. Avoid touching the posterior pharynx (back of the throat); this causes gagging and possibly vomiting.

Sublingual (SL) tablets are placed under the tongue, where they are rapidly absorbed into the bloodstream by the rich supply of capillaries. Sublingual absorption is systemic and bypasses the acids in the stomach. Nitroglycerin, used for treating the chest pains of angina pectoris, may be administered sublingually. Patients should not chew or swallow sublingual medications. The patient should be instructed not to smoke, eat, or drink immediately before administration of these drugs. Buccal tablets are placed between the cheek and the upper molars and are also quickly absorbed by the oral capillaries.

**Nasal Administration**

Nose drops and nasal sprays may be used for localized effect, but, like the inhalation drugs, they can spill over into the bloodstream. Some nasal preparations, such as decongestants, can cause an increased heart rate, elevated blood pressure, or central nervous system stimulation. Nasal medications are commonly used for blocked nasal passages (decongestants) and nosebleeds (hemostatics). Instillation of nasal medications is covered in Chapter 37. Nasal decongestant sprays are often misused by patients. Be sure to teach the patient not to exceed the amount or frequency ordered by the physician. If too much is used, these drugs can dry the mucosa and make congestion worse. Nasal inhalants can also be used for their systemic effect, such as the corticosteroid Flonase, which may be prescribed as part of asthmatic treatment.

**Topical Forms**

Topical drugs are prescribed for both local and systemic effects. Skin medication forms include lotions, liniments, ointments, and transdermal patches. The medical assistant should wear gloves when applying any topical treatment to prevent self-administration of the drug.

**Lotions**

Often used to control itching, lotions are applied by dabbing with a soft cloth, cotton ball, or tongue blade. Calamine is an example. Some lotions are used to relieve inflammation and pain in muscles and joints. After the lotion has been applied, the area may be covered with a thick cloth to retain heat. However, the therapeutic value of these preparations is controversial. The effects of musculoskeletal lotions are limited to the skin surface where the medication is applied.

**Liniments**

Liniments (emulsions) have a higher portion of oil than lotions, and volatile active ingredients may be added. Liniments are often used to protect dried, cracked, or fissured skin.

**Ointments**

Ointments, such as bacitracin, are semisolid medications containing bases such as petrolatum and lanolin. An ointment should be removed from a jar or tube with a tongue blade to prevent contamination of the remaining medication.

**Transdermal Patches**

Certain medications can be absorbed slowly through the skin to create a constant, time-released systemic effect (Figure 35-5). The nitroglycerin patch is particularly useful for patients with frequent attacks of angina. Hormone patches, such as estrogen and testosterone, also can be absorbed slowly through the skin. With dermal patches, drugs can be administered in a time-released manner for as long as 7 days. The date and time the patch was applied should be written on the patch and documented in the patient’s record.

**PATIENT TEACHING RECOMMENDATIONS FOR TRANSDERMAL PATCHES**

- The patient may shower with the patch in place.
- Rotate sites to prevent skin irritation. Follow package insert directions on where to apply the patch, avoiding scars and areas with a great deal of body hair.
- If the patch is to remain on for 24 hours for an extended number of days, apply a new patch at the same time every day and keep the old patch on for 30 minutes after applying the new patch to maintain therapeutic blood levels of the medication.
- Dispose of used patches appropriately, out of the reach of children or pets, because the old patch may still contain some of the medication.

**Parenteral Medication Forms**

Injectable medications must be sterile and in liquid form. The medications may be supplied in an ampule, a single-dose vial, or a multidose vial (Figure 35-6). The drug usually is in a solution that is minimally irritating to human tissues (e.g., physiologic saline solution or sterile water) and may contain a preservative or a small amount of antibiotic to prevent bacterial growth in the vial. All injectable medications are dated. Before use, check the expiration date and examine the solution for possible deterioration. If the medication is discolored or if any sediment has formed at the bottom of the vial, the vial should be discarded. A parenteral medication is administered with a sterile syringe and needle. OSHA guidelines must be followed when any sharp is used, including all types of needles, because every needle used on a patient is contaminated with blood and body fluids. The medical assistant must wear disposable gloves when administering
parenteral injections, immediately dispose of the needle and syringe unit into a sharps container after use, and never recap used needles.

**Ampule**

An ampule is a small, hermetically sealed glass flask that contains a single dose of medication. Its neck has a scored weak point where the ampule is broken just before use (see Figure 35-6, A). Procedure 35-4 explains the special technique required for opening an ampule of medication and withdrawing medication for administration.

**Single-Dose Vial**

A single-dose vial is a small bottle with a rubber stopper through which a sterile needle is inserted to withdraw the single dose of medication inside. Before a sterile syringe and needle unit can be introduced into the solution, the rubber stopper must be wiped in a circular motion with alcohol or another suitable disinfectant (Procedure 35-5).

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**PROCEDURE 35-4**

**Administer Parenteral (Excluding IV) Medications: Fill a Syringe from an Ampule**

**GOAL:** To correctly and safely remove medication for administration from a glass ampule.

**EQUIPMENT and SUPPLIES**

- Syringe and needle unit
- Medication ampule
- Filter needle
- Physician’s order
- Sterile gauze squares
- Alcohol squares
- Sharps container
- Disposable gloves
- Biohazard waste container
- Patient’s medical record

**PROCEDURAL STEPS**

1. Review the physician’s medication order for clarity. If unfamiliar with the drug, look it up in a reference book.
   **PURPOSE:** The medical assistant should never dispense or administer a drug without making sure the physician’s order is legible and the details of the drug are known.
2. Sanitize your hands and assemble the equipment.
3. Perform medication label and physician’s order check when removing the ampule from storage. Check the expiration date on the ampule.
   **PURPOSE:** To complete the first check of the order. Dispose of any medication with an expiration date that has passed.
4. Gently tap the top of the ampule with your fingers to settle all the medication to the bottom portion of the flask (Figure 1).
5. Thoroughly disinfect the neck of the ampule with alcohol squares. Check the label against the order a second time.

   **PURPOSE:** Disinfection prevents possible contamination of the medication.
6. Wrap the top of the ampule with a gauze square or alcohol swab to protect yourself from the glass. Hold the covered ampule between your thumb and finger, in front of you and above waist level (Figure 2).
   **PURPOSE:** To protect your fingers and maintain eye contact with the medication ampule at all times.
7. Push the top of the ampule away from your body to break the neck. You will hear a pop, because the ampule is vacuum sealed. The glass is designed not to shatter, and the medication will not spill out. Dispose of the gauze square and glass top in the sharps container.
8. Open the sterile syringe and needle unit. Touching the needle covers only, unscrew the needle from the syringe, place it on the counter, and attach the sterile filter needle.
   **PURPOSE:** To maintain the sterility of the unit, only the needle covers are touched. The filter needle is needed to withdraw the medication from the ampule to prevent accidental aspiration of glass fragments into the injection unit.
9. Without touching the sides of the opened ampule, insert the syringe unit with the filter needle attached into the ampule and withdraw the ordered dose. Then recover the needle.
   **PURPOSE:** Touching the needle with anything except the sterile interior of the ampule contaminates the needle. If this happens, start over again with a new filter needle.
10. Before discarding the ampule in the sharps container, check the physician’s order against the label one more time to complete the three label checks. If you are drawing the medication up for the physician to
PROCEDURE 35-4—cont’d

administer, take the ampule and the syringe unit to the physician for the final safety check.

11. Change the filter needle, safeguarding the sterility of the injection unit, for a needle of the appropriate length and gauge based on the physician’s ordered route of administration and patient characteristics. Discard the used filter needle into the sharps container.

PURPOSE: A new needle is used to prevent the possible injection of glass particles on or inside the filter needle.

12. Dispose of used alcohol and gauze squares.

13. Transport the ordered medication in the injection unit to the patient. Identify the patient. Put on gloves and administer the medication as ordered. Discard the used syringe unit into a sharps container in the patient room. Remove the gloves, discard them in a biohazard waste container, and sanitize your hands.

14. Answer any questions the patient has and document the procedure in the medical record.

FIGURE 1

FIGURE 2

PROCEDURE 35-5

Administer Parenteral (Excluding IV) Medications: Fill a Syringe from a Vial

GOAL: To fill a syringe from a multidose vial using sterile technique.

EQUIPMENT and SUPPLIES

- Multidose vial containing the medication ordered
- Alcohol wipes
- Sterile needle and syringe unit
- Written physician’s order, including the drug name, strength, and route of administration

PROCEDURAL STEPS

1. Sanitize your hands.

2. Read the order and choose the correct vial of medication.

   PURPOSE: To compare the medication label and physician’s order of the first of three times.

3. Choose the correct syringe and needle size, depending on the site and the amount of medication to be injected (Figure 1).

4. Compare the order with both the name of the drug on the vial of medication and the amount to be withdrawn in the syringe.

   PURPOSE: To compare the medication label and the physician’s order the second of three times.

5. Gently agitate the medication by rolling the vial between your palms (Figure 2).

   PURPOSE: To mix any medication that may have settled.

6. Check the quality of the medication and the expiration date.

   PURPOSE: Dispose of the medication if it appears contaminated, contains sediment, or is outdated.

7. Clean the rubber stopper of the vial with the alcohol wipe using a circular motion (Figure 3). Place the vial on a secure, flat surface, leaving the alcohol swab over the rubber stopper.

8. With the needle cover in place, grasp the syringe plunger and draw up an amount of air equal to the amount of medication ordered.

   PURPOSE: Not enough replaced air makes it difficult to withdraw the medication; too much replaced air increases the pressure in the vial so that medication is forced into the syringes without the plunger being pulled to withdraw it.

9. Remove the needle cover and insert the needle into the center of the rubber stopper. Hold the vial firmly against a flat surface and watch carefully that the needle touches only the cleaned rubber area.
PROCEDURE 35-5—cont’d

PURPOSE: To maintain the sterility of the needle.

10. Inject the aspirated air in the syringe into the vial.

11. Keeping the syringe unit in the vial, pick up and invert them (Figure 4). Slowly pull back on the plunger with the unit at eye level until the proper amount of medication has been withdrawn.

PURPOSE: Withdrawing medication rapidly causes air bubbles to form in the syringe.

12. While the needle is still in the vial, check that no air bubbles are in the syringe.

PURPOSE: Air bubbles displace medication, and the patient will not receive the proper amount of medication.

13. If air bubbles are present, slip the fingers holding the vial down to grasp the vial and syringe as a single unit.

PURPOSE: This frees your dominant hand.

14. With your free hand, tap the syringe until the air bubbles dislodge and float into the tip of the syringe.

15. Gently expel these tiny air bubbles through the needle, then continue withdrawing until the accurate amount of medication has been withdrawn.

16. Withdraw the needle from the vial and carefully replace the needle cover without letting the needle touch the outside of the cover.

17. Return the medication to the shelf or the refrigerator, checking that you have the correct drug and dosage.

PURPOSE: This is the third of the three drug label and order checks.
**Multidose Vial**

A multidose vial is a bottle with a rubber stopper that contains enough medication for multiple injections. The medical assistant should write the date the first dose is used from a multidose vial on the bottle and follow the manufacturer’s guidelines or the facility’s policy on how long the vial can remain on the shelf. Because multidose vials are used more than once, extreme caution must be taken every time a needle is inserted into the medication to protect the medication from contamination, which could cause very serious infections in subsequent patients. If at any time you feel that an error has been made or you suspect possible contamination, discard the vial. Never return unused medication to the vial. Learn to withdraw fluids to the correct mark. If you have more medication than you need in the syringe, eject the excess after you remove the unit from the vial.

Vials are vacuum sealed. Each time you withdraw medication from a vial, you first must replace the portion of withdrawn medication with the same portion of air. Not enough replaced air makes it difficult to withdraw medication, and too much replaced air increases pressure within the vial, forcing medication into the syringe. Procedure 35-5 describes how to safely and accurately withdraw medication from a vial.

**Prefilled Syringe**

A prefilled syringe is a sterile, disposable syringe and needle unit packaged by the manufacturer with a single dose of medication that is ready to administer. Some prefilled syringe units are designed to fit into a reusable cartridge injection system (Figure 35-7). Tubex and Carpuject are two examples of cartridge systems. Most prefilled syringe units are overfilled with medication or may contain more medication than was ordered by the physician. Before administration, carefully check the unit and expel any excess medication or air to make sure the patient receives an accurate dose.

**Parenteral Medication Equipment**

Syringes and needles are manufactured in countless varieties for specific purposes and sometimes for specific medications. For example, a special syringe unit used for insulin is calibrated in units and packaged with a microneedle. Hypodermic needles are manufactured in many lengths and widths, depending on the depth of the injection, the viscosity of the medication to be injected, the ordered route of administration, and patient characteristics. Needles may be purchased separately or as part of a needle-syringe unit. Figure 35-8 shows the parts of a needle and the three common types of bevel points. Needles are measured for length from the place where the cannula or shaft joins the hub to the tip of the point.

**Needle Gauge**

The diameter, or lumen size, of a needle is called its gauge. Needle gauges range in size from 14 (the largest) to 31 (the smallest). **The larger the gauge number, the smaller the diameter of the needle.** Gauges (27 to 28) are used for intradermal (ID) injections, such as screening for tuberculosis (TB), when a very small opening is desired. These fine needle widths leave a small amount of medication just below the surface of the skin with a minimum amount of injury. Gauges 25 and 26 are commonly used for subcutaneous (SC) injections. Insulin needles may be as small as a 31 gauge.

Medications in an aqueous solution and with low viscosity are easily injected through a small opening. In addition, these two gauges cause minimal tissue damage, and the patient experiences less pain. Larger needles (gauges 20 to 23) usually are necessary for intramuscular (IM) injections when the medication is

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**FIGURE 35-7** The Tubex injector system with disposable sterile medication cartridge.

thick (e.g., penicillin), or the needle length requires the extra support of a thicker gauge. A patient cannot feel the difference between a 20- and a 22-gauge needle. In fact, the medication is not forced as strongly into the tissues with the larger 20-gauge needle as with the 22-gauge needle, and the patient actually experiences less pain. Needles larger than 20-gauge are not used for drug therapy. They are used mostly for venipuncture, blood donations, and blood transfusions.

**Needle Length**

Needle lengths range from ¼ inch to 4 inches, depending on the area of the body to be injected, the patient’s size, and the route (depth) used. ID injections require only the short ½ inch needle. Needles that are ½- or ¾-inch long are used for SC injections. Longer needles are needed to deposit drugs intramuscularly. The choice of a 1-inch, 1½-inch, 2-inch, 2½-inch, or 3-inch length depends both on the muscle used and the patient’s size.

**Syringes**

The parts of a syringe are the barrel, a calibrated scale (or scales), the plunger, and the tip (Figure 35-9). The typical syringe holds up to 3 mL and may be calibrated with two scales: milliliters (cubic centimeters), with each calibrated line marked at 0.1 mL, and minimis. Larger syringes are calibrated in milliliters only. The tuberculin syringe, which is used for small amounts of drug, holds up to 1 mL of injectable material, and each calibrated line is marked at 0.01 mL (Figure 35-10, A).

The insulin syringe is calibrated in units specifically for diabetic use. Insulin syringes are calibrated to hold 30 U, 50 U, or 100 U of insulin (Figures 35-10, B and C). The type of calibration chosen depends on the total amount of insulin to be injected in one dose. When less than 30 units is to be drawn up, the 30-U syringe should be used; for 30 to 50 units, the 50-U syringe is used; and for more than 50 units, the 100-U syringe is used.

The establishment of Standard Precautions and recognition of the danger of needle sticks prompted the development of syringes with retractable needle covers (Figure 35-11), and these must be made available to employees as an OSHA safeguard against accidental needle sticks.

![Figure 35-9 Parts of a syringe.](image)

![Figure 35-10 Types of syringes. A, 1-mL syringe. B, 100-unit insulin syringe. C, 50-unit insulin syringe. (From Perry AG, Potter PA: Clinical nursing skills and techniques, ed 6, St Louis, 2006, Mosby.)](image)

![Figure 35-11 Disposable syringe with retractable needle cover.](image)
Disposable syringe and needle units are packaged in either sealed, rigid plastic containers or in peel-apart paper wrappers. Both individual needles and syringe-needle units are color coded for easy identification. Table 35-1 summarizes the needle and syringe sizes used for injections.

**Specialty Syringe Units**

Because of the concern about needle sticks, proper disposal of needles, and cross-contamination of individuals through needle misuse, devices now are available that do not require needle disposal; these can be used by patients who must give themselves injections away from home. An example of such a device is the injector pen. Different types are available, depending on the amount of medication to be dispensed per injection and the type of medication used. Administering insulin away from home has become easier with the development of the insulin pen (Figure 35-12), which contains a predetermined type and amount of insulin that can be injected with minimal preparation. (Different types of insulin are discussed in Chapter 45.)

The EpiPen is an automatic injector system that contains a dose of epinephrine (Figure 35-13). It must be prescribed by a physician, and they come packaged with the correct dose either for an adult (0.3 mg of epinephrine) or for a child (0.15 mg of epinephrine). The EpiPen is carried as a safety precaution by individuals who have anaphylactic reactions to such allergens as bee stings or certain types of foods. Anaphylactic reactions can be fatal if not treated immediately, so patients and their family members should be educated on the signs and symptoms of anaphylaxis and how to manage the EpiPen injection. The steps for EpiPen injection are quite simple:

1. Pull back the gray end of the autoinjector. This sets the device for use.
2. The injector can go through clothing. Firmly press the black tip on the outer aspect of the thigh and hold in place for 10 seconds. The injector automatically administers the prepackaged dose.
3. Remove the EpiPen and massage the injection area for a few minutes to promote absorption of the epinephrine.
4. The patient still should call a physician or go to the emergency department of a nearby hospital for follow-up care.

It is important that patients or family members periodically check the expiration date of the autoinjector. If the device is near its expiration date, another prescription should be filled and the old, unused device discarded. To be of service in an emergency, the EpiPen should be readily available at all times.

**TABLE 35-1 Needle and Syringe Sizes for Injections**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>GAUGE</th>
<th>LENGTH (IN)</th>
<th>SYRINGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intradermal</td>
<td>27-28</td>
<td>⅛</td>
<td>1 mL; tuberculin</td>
</tr>
<tr>
<td>Subcutaneous</td>
<td>25-26</td>
<td>¼, ⅛</td>
<td>2 mL; insulin</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>20-23</td>
<td>1-3</td>
<td>2.5 mL</td>
</tr>
</tbody>
</table>

**FIGURE 35-12** NovoPen.

**FIGURE 35-13** EpiPen prepackaged autoinjector.

**SIGNS AND SYMPTOMS OF AN ANAPHYLACTIC REACTION**

- Hypotension resulting from systemic vasodilation
- Hives, or urticaria
- Difficulty breathing (dyspnea), resulting from bronchoconstriction
- Difficulty swallowing, as a result of edema
- Vomiting and diarrhea

**Parenteral Administration**

With practice, giving medications by injection becomes easy and even automatic. However, the medical assistant must always follow the physician’s orders, perform the three order and label checks while dispensing the medication, and strictly adhere to the seven rights throughout the procedure.

Practice developing techniques that provide maximum safety and comfort for the patient. Injections are least painful when the needle is inserted swiftly, the medication is injected slowly, and the needle is removed quickly, with counterpressure when needed. Remember that the same aseptic conditions necessary for minor surgery are necessary whenever you penetrate the protective skin barrier with an injection.

Never give an injection near bones or blood vessels. Avoid areas that have scar tissue; a change in skin pigmentation or texture; or excess tissue growth (e.g., a mole or a wart). The point of injection should be as far as possible from any major nerve, and the site selected should be capable of holding the amount of medication to be injected. Large doses of medication are given in muscle, because muscles have a larger tissue mass than SC tissue and also a more extensive blood supply; these factors allow for faster absorption and systemic distribution.

Make sure all materials are ready for use. Many offices have a central room where medications are prepared. The medication then is taken to the waiting patient in another room. Handling medication administration in this way has many advantages, but care must be taken that the syringe and needle unit are transported
with sterile technique. After filling a syringe, replace the cap for transport to the patient, taking care to keep the needle sterile. Never transport more than one injection at a time unless two or more are for the same patient or unless you have a special medication tray that has a named position for each syringe. Never combine two medications in a single syringe unless specifically ordered to do so by the physician and you have checked in the PDR or medication package insert for contraindications on mixing different types of medications. If you are preparing a medication for the physician to give, place the vial or empty ampule beside the filled syringe. This shows what medication is in the syringe and offers a double-check for safety (see Procedure 35-5).

Some medications for injection are packaged in vials as sterile powders or crystals that must be mixed with sterile water or saline before they can be administered (see Chapter 34); the amount of solvent to be added to the dry form of the drug (solute) depends on the physician’s order and the label directions. After calculating the correct amount of liquid that must be added to the dry form of the drug to create the dose ordered by the physician, follow the guidelines in Procedure 35-6 to prepare the drug and administer it to the patient.

**GUIDELINES FOR PARENTERAL ADMINISTRATION OF MEDICATIONS**

1. Use a professional approach and explain what you are going to do.
2. Small talk can keep the patient’s mind off the procedure.
3. Never tell a patient that it will not hurt; you may destroy your credibility.
4. Make the patient as comfortable as possible, and allow for privacy.
5. Never allow the patient to stand during the procedure.
6. Keep the syringe unit out of the patient’s sight as much as possible.
7. Always wear disposable gloves.
8. Immediately after injection, cover the contaminated needle with the syringe unit safety device and dispose of it in a sharps container.
10. Sanitize your hands before and after the procedure.
11. Provide patient education as needed.

**PROCEDURE 35-6**

Administer Parenteral (Excluding IV) Medications: Reconstitute a Powdered Drug for Administration

**GOAL:** To reconstitute a powdered drug for intramuscular injection as ordered by the physician.

**EQUIPMENT and SUPPLIES**

- Vial containing the ordered powdered medication
- Diluent: sterile saline
- Alcohol wipes
- Cotton ball
- Two sterile needle and syringe units
- Disposable gloves
- Sharps container
- Written order, including the patient’s name, when to give the drug, the route of administration, and the name and strength of the drug

**PROCEDURAL STEPS**

2. Select the correct vial of powdered medication from the shelf and the recommended diluent for reconstitution. Perform the three drug label and physician’s order checks during preparation and verify the seven rights throughout the procedure.
3. Read the label to determine the correct amount of diluent to add to create the dose ordered by the physician (see Chapter 34 for help with calculations). Calculate the correct dose, if necessary, and continue with the three label checks.
4. Remove the caps from each vial and clean each with an alcohol wipe. Leave the wipes in place on top of each vial.
5. Using one of the syringe units with the needle cover in place, grasp the syringe plunger and draw up the amount of air equal to the amount of diluent needed to reconstitute the drug.
6. Remove the needle cover and insert the needle into the center of the rubber stopper of the diluent. Hold the vial firmly against a flat surface and watch carefully that the needle touches only the cleaned rubber area. 
7. Inject the aspirated air in the syringe into the diluent vial.
8. Invert the diluent vial and aspirate the calculated or recommended amount of diluent.
9. Remove the needle from the diluent vial and inject the diluent into the center of the rubber stopper of the drug vial. Remove the needle from the vial and discard the syringe unit into the sharps container. PURPOSE: An unused syringe unit should be used to administer the medication to the patient, because the needle on the used unit may not be as sharp as that on a new syringe unit.
10. Roll the vial with the drug and diluent mixture between the palms of your hands to mix it thoroughly. Do not shake the vial unless directed to do so on the drug label. When the medication is completely mixed, no residue or crystals are seen on the bottom of the vial.
11. Aspirate air into the second syringe unit that is equal to the calculated amount of medication to be administered.
12. Inject the air into the mixed drug vial, invert the vial, and withdraw the ordered amount of medication.
13. Proceed as outlined in steps 6 to 22 in Procedure 35-10 to administer the medication.
Intradermal Injections

Intradermal injections are given within the skin layers (Figure 35-14 and Procedure 35-7). The ID site is used for allergy testing and tuberculin screening. The skin test is no longer used to screen for TB, because it was found to be unreliable in diagnosing exposures to the TB bacillus. The Mantoux (purified protein derivative [PPD]) ID test now is used routinely to screen for tuberculosis (TB) exposure. It is the only widely used test for detecting asymptomatic TB infection, currently termed latent tuberculosis infection (LTBI). With the Mantoux test, a 0.1-mL solution of PPD is injected into the intradermal layers. If the person being tested was infected with the TB bacillus in the past, his or her immune system developed antibodies that recognize and fight the bacteria. When a PPD skin test is performed, these antibodies move to the injection site to try to stop the infection. This immune reaction causes swelling and induration in the area approximately 48 hours after administration of the skin test. An induration of 5 mm in diameter or larger is considered positive in patients at increased risk of being infected and in individuals who are most likely to develop active disease if infected with the TB bacteria. This would include those infected with the human immunodeficiency (HIV) virus; anyone in close contact with a newly diagnosed patient (e.g., family member); and patients who have undergone recent organ transplantation or are taking immunosuppressant medications. A 10-mm or greater induration is read as positive if the person has a moderate likelihood of TB exposure and infection, including recent immigrants from countries in which TB is prevalent; IV drug users; residents and employees of correctional institutions, homeless shelters, and healthcare facilities (including medical personnel); and children under 4 years of age. Regardless of risk factors, anyone with an induration of 15 mm or larger is considered positive. Patients must return to the office after the specified period for the staff to read the results (see Procedure 35-7, Figure 3). Many healthcare facilities now require employees to have a two-step tuberculin skin test (TST) to more accurately diagnose individuals who have been previously exposed to TB. The employee is tested as explained and then 48 to 72 hours later is retested. The first TST may be negative because the immune system did not immediately identify the TB bacillus. However, the second dose helps trigger the immune response and identifies individuals who have been previously exposed to TB. (TB is discussed further in Chapter 46.)

When an ID injection is administered correctly, a small wheal is raised on the skin. A ½-inch, 27- or 28-gauge needle is used for ID injections. The angle of insertion is 15 degrees, almost parallel to the skin surface. The best site for injection is the center of the anterior forearm, but the upper chest and back are frequently used for allergy testing (Figure 35-15). (Allergy testing is discussed in Chapter 38.)

**CRITICAL THINKING APPLICATION 35-4**

Dorothy is ordered to give her first Mantoux test since being hired by Dr. Ihou. Document the details that Dorothy should include on the patient’s chart. She administered 0.1 mL of PPD by ID injection into the patient’s right midforearm and instructed the patient on when to return to the office to have the test read.

Subcutaneous Injections

Subcutaneous injections are given between the epidermis and the muscle, into the fatty areolar layer called adipose tissue (Figure 35-16 and Procedure 35-8). Smaller doses of less irritating drugs (i.e., no more than 2 mL) are given by this method. A ½- to ¾-inch, 25- or 26-gauge needle is used for SC injections. Insulin micro-needles are 31 gauge. The angle of insertion is 45 degrees; however, heparin and insulin may be administered at a 90-degree
Procedure 35-7

Administer Parenteral (Excluding IV) Medications: Give an Intradermal Injection

ORDER: Administer 0.1 mL PPD ID for a Mantoux test for TB screening
GOAL: To inject 0.1 mL of purified protein derivative (PPD) ID to perform a Mantoux test as ordered by the physician.

EQUIPMENT and SUPPLIES
- Vial of tuberculin PPD
- Alcohol wipes
- 27-gauge, ½-inch sterile needle and 1-mL syringe unit with safety needle cover device
- Physician's order, including the patient's name, when to give the drug, the route of administration, and the name and strength of the drug
- Disposable gloves
- Gauze squares
- Sharps container
- Patient's medical record
- Written patient instructions for follow-up

ORDER: Administer 0.1 mL PPD ID for a Mantoux test for TB screening.

PROCEDURAL STEPS
2. Select the correct medication from the shelf or the refrigerator.
   PURPOSE: Some medications must be refrigerated.
3. Read the label to make sure you have the right drug (PPD) and the right strength. Perform the three label and order checks as the medication is dispensed.
   PURPOSE: Confirm that the medication label matches the physician's order. One medication may be manufactured and prepackaged in different strengths; for instance, an allergen may be available in 1:1000, 1:100, and 1:10 dilutions.
4. Warm refrigerated medications by gently rolling the container between your palms.
5. Prepare the syringe as described in Procedure 35-5 and withdraw the correct dose of 0.1 mL
6. Transport the medication to the patient.
7. Greet and identify the patient by name.
   PURPOSE: To make sure you have the right patient.
8. Ask the patient whether he or she has ever had a positive reaction to a PPD injection (TB test). If yes, report this information to the physician before administering the medication. An individual with a history of a positive PPD test result always has a positive result because of antibody action.
9. Put on gloves and position the patient comfortably.
   PURPOSE: To create a wheel successfully, it is easier if the patient is sitting and the medical assistant is lower than the patient (e.g., on a stool) with the anterior surface of the patient's arm extended straight out and angled downward.
10. Locate the antecubital space, then find a site several fingerwidths down the midanterior aspect of the forearm. Avoid any scarred, discolored, or pigmented areas.
11. Cleanse the patient's skin with an alcohol wipe using a circular motion, moving from the center outward (Figure 1).
12. Allow the antiseptic to dry.
13. Remove the cap from the needle.
14. Wrap the thumb and first two fingers of your nondominant hand around the patient's forearm, pulling downward and apart to stretch the skin of the forearm taut at the location of the injection.
   PURPOSE: Stretching the skin tightens the surface and facilitates insertion of the needle with minimum discomfort to the patient. The skin is not stretched tightly enough if it begins to wrinkle as you start to insert the needle.
15. Grasp the syringe between the thumb and first two fingers of your dominant hand, palm down, with the needle bevel upward. Hold the syringe close to the plunger end.
16. At a 15-degree angle (Figure 2, A), with the syringe unit parallel to the surface of the skin, carefully insert the needle just until the bevel point is under the skin surface (Figure 2, B).
17. Slowly and steadily inject the medication by depressing the plunger with your little finger. Do not aspirate. A wheel should appear.
   PURPOSE: A rapid injection may force the substance through to the surface.
18. After administering all of the medication (0.1 mL), withdraw the needle.
19. Immediately cover the contaminated needle with the syringe unit safety device and discard the unit in the sharps container.
20. Do not massage, but you may blot the area with a cotton ball or gauze square. Do not cover the site with a bandage.
   PURPOSE: Massaging disturbs the wheel and interferes with the intended results.
21. Make sure your patient is comfortable and safe.
22. Observe the patient for any adverse reaction.
23. Dispose of the gloves in the biohazard container and sanitize your hands.
24. Record the procedure and any reactions that occurred at the site of the injection on the patient's medical record. Include the exact site of the injection.
   PURPOSE: A procedure is not considered done until it is recorded. The exact site must be known in order to monitor for reactions to the PPD in 48 to 72 hours.
25. Tell the patient when to return to the office for any reaction to be read.
   PURPOSE: Patient education must be done to obtain intended results.

Reading the Mantoux Test Results
26. Put on latex gloves; using good lighting and with the patient's arm slightly flexed, measure the induration at the site of the injection.
   Measure only the raised area; do not include any areas of inflammation.
PROCEDURE 35-7—cont’d

PURPOSE: A positive Mantoux reaction occurs if the induration is inflamed, raised, and 15 mm or larger; an induration of 5 mm or more is considered positive (Figure 3) in patients with human immunodeficiency virus (HIV) infection, those in recent contact with a person who has TB, patients with a positive chest x-ray, those who have received organ transplants, and anyone who is immunosuppressed. An induration of 10 mm or more is considered positive in recent immigrants, IV drug users, and children under 4 years of age. Further diagnostic tests are ordered either to rule out or to confirm the diagnosis of tuberculosis (see Chapter 46).

27. Discard the gloves in the biohazard waste container and sanitize your hands.

28. Document the results of the Mantoux test in the patient’s chart, including a complete description of the size of the induration, if any, and the appearance of the test site. Notify the physician.

FIGURE 1

FIGURE 2

Mantoux test results

| Degree of sensitivity measured by area of erythema and a wheal |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Neg | +1 | +2 | +3 | +4 |
| no sensitivity or <5mm | 5-9mm erythema; further testing needed | >10mm erythema; with <10mm palpable wheal | >30mm erythema with <10mm wheal | >40mm erythema with <15mm wheal |

FIGURE 3

8/22/XX  9:10 AM  Administered Mantoux TB test as ordered, 0.1 ml ID, lot #MF4780D, exp date 2/XX, to D anterior forearm. Pt tolerated procedure well. No questions. Appointment made to return 8/24 for reading. Dorothy Gaston, CMA (AAMA)
angle when a microneedle is used or if the patient is obese. The posterior upper arm is the typical injection site, but the abdomen, anterior aspect of the thighs, and upper back may be used as well (Figure 35-17).

When multiple or frequent injections are ordered, such as routine insulin administration that requires the patient to receive up to four injections a day, the sites must be rotated to prevent tissue damage and problems with absorption of the medication. It is best to keep a rotation record (Figure 35-18). It might be helpful for patients to mark the site of the last injection with a spot bandage or a piece of tape. The easiest way to rotate sites is to give subsequent injections in a circular pattern around the site of the first injection in a particular location, such as the right anterior thigh. The goal is to avoid using the same location again for another month. Patients with diabetes typically have to administer two different types of insulin at one time. Procedure 35-9 explains how to perform this technique.

**INSULIN ADMINISTRATION GUIDELINES**

- Typically more than one type of insulin is ordered for immediate administration. Check labels carefully, and follow office policy when mixing insulins in the same syringe. Not all insulin products can be mixed.
- Diabetes mellitus is discussed in detail in Chapter 45. Refer to Procedure 35-9 for details on how to mix two different types of insulins in one syringe.
- Insulin is always ordered in unit amounts. Use the appropriate insulin syringe, either 30 U, 50 U or 100 U, depending on the total amount of insulin ordered.
- Insulin should be stored in the refrigerator and gently rotated between hands to warm before dispensing.
- Do not massage the site after injection.

**Intramuscular Injections**

Injections are given into muscle if the drug would irritate the SC tissues, more rapid absorption is desired, or a large volume of medication is to be injected. The angle of insertion is 90 degrees (Figure 35-19), and the preferred sites in an adult are the vastus lateralis, deltoid, ventrogluteal, and gluteus medius muscles (Figure 35-20); in an infant or child, the preferred site is the vastus lateralis. It is important to select a needle that is long enough, especially for obese patients, to ensure that the medication is injected into the muscle and not deposited in the upper adipose tissue. Fatty tissue does not absorb medication well, and the medication may remain at the site of the injection rather than being distributed systemically as intended. The recommended gauge is 20 to 23, and the needle length should be 1 to 3 inches, depending on the patient's size.

In adults, the deltoid region can hold up to 2 mL of medication, and the vastus lateralis and gluteal sites can hold up to 5 mL. Infants and children should be given no more than
Select the Proper Sites for Administering a Parenteral Medication: Give a Subcutaneous Injection

**ORDER:** Administer 0.5 ml varicella vaccine SC stat to Mandy Leno, age 11.

**GOAL:** To inject 0.5 ml of medication into the subcutaneous tissue using a 25-gauge, ½-inch needle and syringe of correct size and type as directed by the physician.

**EQUIPMENT and SUPPLIES**
- Vial of ordered medication
- Alcohol wipes
- Gauze squares or cotton balls
- A sterile needle and syringe unit with safety cover device
- Disposable gloves
- Sharps container
- A written order, including the patient's name, when to give the drug, the route of administration, and the name and strength of the drug
- Patient's medical record

**PROCEDURAL STEPS**

2. Select the correct medication from the shelf or the refrigerator. **PURPOSE:** Some medications must be refrigerated or stored under special conditions.
3. Read the label to make sure you have the right drug and the right strength. Perform the three label and order checks while dispensing the medication and verify the seven rights. Perform any necessary dose calculations. **PURPOSE:** To promote safety and accuracy in drug therapy. One medication may be manufactured and packaged in different strengths. For instance, a particular drug may be available in vials of both 250 mg/mL and 500 mg/mL.
4. Warm refrigerated medications by gently rolling the container between your palms.
5. Prepare the syringe and withdraw the correct dose.
6. Document the vaccine dose on the vaccination log. Each physician's office has a policy for vaccination documentation. **PURPOSE:** The immunization record or vaccination log must be completed each time a vaccine is administered. Information includes the manufacturer, batch and lot numbers, which are stamped on the
PROCEDURE 35-8—cont'd

19. Gently massage the site with the gauze square (do not massage insulin or heparin injections).

   **PURPOSE:** Massage helps increase absorption and reduce pain.

20. Make sure your patient is comfortable and safe.

21. Dispose of the gloves in the biohazard waste container and sanitize your hands.

22. Observe the patient for any adverse reaction. You may need to keep the patient under observation for 20 to 30 minutes.

23. Record the drug administration in the patient’s medical record, including the exact injection site, and on the immunization record.

   **PURPOSE:** A procedure is not considered done until it is recorded. It is important to keep an accurate record of vaccines administered. Include in the documentation the name of the vaccine, dose, route of administration and location, lot number, and any observed patient reactions. The caregiver must be given a Vaccine Information Sheet (VIS), and it must be documented that the VIS was received.

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2 mL in the vastus lateralis or ventrogluteal site. The most important criterion in choosing an IM site is to use one that is not near large nerves, bones, or blood vessels. If any of these structures are damaged by the injection, the patient may experience nerve injury, with lingering pain or may develop an abscess or bone inflammation with infection.

When locating a site for an IM injection, expose the site so that you can see and palpate the landmarks correctly. If the patient must receive repeated IM injections, the sites should be rotated to prevent damage to the muscle and surrounding tissues.

**Deltoid Site.** The deltoid muscle, the muscular cap of the shoulder, is located at the top of the upper arm. The muscle mass is somewhat limited, so it can hold only 1 to 2 mL of medication. This triangular muscle is located between the acromion and deltoid tuberosities, and the injection site is approximately 2 fingerbreadths below the acromial process (Figure 35-21). The major nerves and blood vessels, especially the radial nerve and artery, must be avoided. Aqueous medications, such as vitamin B₁₂, are most appropriate here; hepatitis B and flu vaccines are also given in the deltoid.
If the Lispro vial is cloudy or if either vial has sediment in the mixture, dispose of the contaminated vial or vials.

5. Mix the insulin vials by gently rolling the containers between your palms.

**PURPOSE:** Mixing ensures an equal concentration of medication throughout the vial. Shaking insulin vials can turn the medication frothy, making it difficult to measure the dose accurately.

6. Check to make sure the total amount of insulin ordered is less than the insulin syringe chosen.

**PURPOSE:** Insulin syringes are available in 30-U, 50-U, and 100-U calibrations. The total amount of insulin ordered in this case is 20 units, so the 30-U syringe is the most appropriate.

7. Clean the tops of each vial with individual alcohol wipes, leaving the wipe on the top of each vial.

**PURPOSE:** To disinfect the tops of each vial before drawing up the ordered dose.

8. Remove the alcohol swab and inject 15 units of air into the NPH vial, being careful not to touch the insulin in the vial with the needle, and withdraw the needle (Figure 1).

**PURPOSE:** The NPH dose is drawn up last to avoid adding NPH insulin to the Lispro vial. Inject air into the vial before drawing up the Lispro order so that it is ready for dispensing. Touching the NPH insulin with the needle contaminates the Lispro vial.

9. Remove the alcohol swab and inject 5 units of air into the Lispro vial, keep the needle in the vial (Figure 2). Invert the vial and withdraw the ordered dose of 5 U (Figure 3).

10. Reinsert the needle into the NPH vial and carefully withdraw the ordered 15 U dose (Figure 4).

11. Complete the final label check and return the two insulin vials to the refrigerator.

12. Transport the syringe unit to the patient.

13. Administer the medication according to the steps explained in Procedure 35-8, steps 8 through 13. If a microneedle is used, insulin can be administered at a 90-degree angle.

14. Do not aspirate when administering insulin.

15. Immediately cover the contaminated needle with the syringe unit safety device and discard the unit in the sharps container.

16. Do not massage the site after administration.

**PURPOSE:** Massage increases blood flow to the site, which increases the rate of absorption. Different types of insulin are designed to be distributed at a varied rate to maintain coverage for the patient throughout the day.

17. Make sure the patient is comfortable and safe.

18. Dispose of the gloves in the biohazard waste container and sanitize your hands.

19. Observe the patient for any adverse reaction. You may need to keep the patient under observation for 20 to 30 minutes.

20. Record the drug administration in the patient's medical record, including the exact injection site.

**PURPOSE:** A procedure is not considered done until it is recorded. It is important to keep an accurate record of all medications administered.

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**Vastus Lateralis (Thigh) Site.** The vastus lateralis muscle is part of the quadriceps group of the thigh. It is one of the body's largest muscles, and because it is developed at birth, it is considered the safest IM injection site for infants. Many experts believe that as a site for adult IM injections, the vastus lateralis is better than either the deltoid or the dorsogluteal sites, because fewer major nerves and blood vessels are in the vastus lateralis. The vastus lateralis muscle fills the midportion of the upper, outer thigh. In an adult, it can be located from 1 hand's width below the proximal end of the greater trochanter to 1 hand's width above the top of the patella (knee cap), or the middle third of the upper outer leg.

Administering injections to infants and small children requires some special considerations. The choice of a site is based on muscular development and the absence of major nerves and blood vessels. As mentioned previously, the most popular site for
If frequent injections are ordered, rotate the site and alternate the right and left arms. The deltoid site is acceptable for adults and older children, but it should not be used when the muscle is small or underdeveloped. For a small arm, you may need only a 25-gauge, ½-inch needle; the 23-gauge, 1-inch needle most often is used for an average-sized arm. The patient may be seated or lying down. When injecting, expose the entire shoulder rather than rolling up the sleeve. Rest the palm of your hand across the shoulder, and grasp the muscle before injecting the medication at a 90-degree angle (Procedure 35-10).

![Figure 35-19](image-url) Anatomic illustration of the intramuscular injection. Note that the needle is inserted at a 90-degree angle, which deposits the medication into the large central part of the muscle.

### Procedure 35-9

**Administer Parenteral (Excluding IV) Medications: Mix Two Different Types of Insulin in One Syringe**

**Order:** Administer 5 U of Lispro and 15 U NPH insulin to Gregor Thomas stat.

**Goal:** To mix two different types of insulin from two different multidose vials in one injection unit for administration.

**Equipment and Supplies**

- Multidose vial of Lispro insulin
- Multidose vial of NPH insulin
- Alcohol wipes
- Gauze squares or cotton balls
- Sterile needle and insulin syringe unit with safety cover device (because the total amount of insulin ordered is 20 U, use a 30-U insulin syringe)
- Disposable gloves
- Sharps container
- A written order, including the patient’s name, when to give the drug, the route of administration, and the name and strength of the drug
- Patient’s medical record

**Procedural Steps**

2. Select the correct multidose vials of insulin from the refrigerator.
   **Purpose:** Insulin is always stored in the refrigerator.
3. Read the label to make sure you have the right types of insulin. Perform the three label and order checks for each vial while dispensing the medication and verify the seven rights.
   **Purpose:** To promote safety and accuracy in drug therapy.
4. Inspect the appearance of the medication in each vial. Lispro and Regular insulin are clear and colorless. NPH is opaque or cloudy and colorless.
   **Purpose:** To make sure the Lispro vial is not contaminated with NPH.
IM injections in children and infants is the vastus lateralis muscle. Other sites are avoided for the following reasons:

- Infants do not have well-developed deltoid muscles.
- The sciatic nerve, located near the dorsogluteal site, is proportionately larger in the infant.
- The gluteus medius is not well developed until the child is walking.

If you have any doubts, the best policy is to ask the physician to show you exactly where to inject the medication or vaccine. Any site selected for infants and children involves a greater risk of error, because the muscles are smaller than the muscles of adults.

Infants should be restrained by a co-worker or parent to prevent injury. If the child is old enough to understand, be honest...
and explain that the injection may sting for a minute, but that it is important to hold very still. Always get help if giving an injection to an uncooperative child.

The recommended site for vastus lateralis injections in infants and children is below the greater trochanter of the femur but within the upper lateral quadrant of the thigh (Figure 35-22). When the vastus lateralis site is used in an adult, the needle should be inserted at a 90-degree angle; however, with infants and children, the needle should be inserted at a 45-degree angle, with the needle point directed toward the feet. Needle gauges for adults range from 20 to 23, and lengths range from 1 to 1½ inches; the muscle can hold as much as 5 mL of medication. In pediatric patients, the needle gauge should be 22 to 25, and the length should be ¾ inch; the muscle can hold 0.5 mL in infants and 0.5 to 2 mL in children (Procedure 35-11). An adult patient may sit or lie supine, but the vastus lateralis is easier to locate in pediatric patients with the child lying down.

**PROCEDURE 35-10**

Administer Parenteral (Excluding IV) Medications: Give an Intramuscular Injection into the Deltoid

**ORDER:** Administer 300,000 U penicillin G IM stat to Liz Anderson, age 23.

**GOAL:** To inject ordered medication into the muscle using a 22-gauge, ½-inch needle and 3-mL syringe as directed by the physician.

**EQUIPMENT and SUPPLIES**

- Vial containing ordered medication
- Alcohol wipes
- Cotton ball
- Sterile needle and syringe unit with safety needle cover
- Disposable gloves
- Sharp’s container
- Written order, including the patient’s name, when to give the drug, the route of administration, and the name and strength of the drug
- Patient’s medical record

**PROCEDURAL STEPS**

2. Select the correct medication from storage.
3. Read the label to make sure you have the right drug and the right strength.
   **PURPOSE:** To perform the first of three drug label and order checks. One medication may be manufactured and prepackaged in different strengths; for instance, penicillin G is packaged in vials of 300,000 U/mL and 600,000 U/mL.
4. Warm refrigerated medications by gently rolling the vial between your palms.
5. Calculate the correct dose, if necessary, and continue with the three label checks while drawing the medication into the syringe.
6. Transport the medication to the patient.
7. Greet and identify the patient by name.
   **PURPOSE:** To make sure you have the right patient.
8. Ask the patient whether he is allergic to penicillin or any other antibiotics.
   **PURPOSE:** Antibiotics, especially the penicillin family, are the most likely group of drugs to cause allergies. The patient’s response can change over time, so it is important to contact allergy information before each administration of an antibiotic.
9. Help the patient into an upright sitting position.
10. Put on gloves and expose the deltoid site. The mid-deltoid site is located approximately 2 to 3 fingerswidths below the acromial process.
11. Clean the patient’s skin with the alcohol wipe using a circular motion and moving outward from the center (Figure 1).
12. Remove the needle cover. Place your nondominant hand on the patient’s shoulder, and with the thumb and first two fingers, spread the skin tightly and grasp the muscle deeply on each side (Figure 2).
   **PURPOSE:** To compress the muscle.
13. Grasp the syringe as you would a dart and with one swift movement, insert the entire needle up to the hub, at a 90-degree angle, into the muscle.
   **PURPOSE:** The depth of the injection is determined by the choice of needle length, not by how far you insert the needle. Once the needle is at the tissue layer, stabilize the syringe unit with the nondominant hand
so that the needle does not move during aspiration and injection of the medication.

14. Aspirate; withdraw the plunger slightly to make sure no blood enters the syringe.
   PURPOSE: Blood in the syringe means that the needle is in a blood vessel and is not in the muscle tissue. You may not administer an intramuscular medication by the IV route.

15. If blood appears, immediately withdraw the syringe, discard it in the sharps container, and compress the injection site with the cotton ball.


17. If no blood appears in the syringe, push in the plunger slowly and steadily until all medication has been administered.
   PURPOSE: A rapid injection is uncomfortable for the patient.

18. Place the cotton ball next to the needle and apply counterpressure to the area while you withdraw the needle at the same angle used for insertion. Immediately cover the contaminated needle with the syringe unit safety device and discard the syringe unit in the sharps container.

19. Gently massage the site with the cotton ball.
   PURPOSE: Massage helps increase absorption and reduce pain.

20. Make sure your patient is comfortable and safe.

21. Observe the patient for any adverse reaction. You may need to keep the patient under observation for 20 to 30 minutes.

22. Dispose of the gloves in the biohazard waste container and sanitize your hands.

23. Record the drug administration on the patient’s medical record and on the required Drug Enforcement Agency (DEA) record if the medication is a controlled substance.
   PURPOSE: A procedure is not considered done until it is recorded.

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**CRITICAL THINKING APPLICATION 35-5**

Dr. Thau wants to make certain that Dorothy is comfortable with the procedure for administering IM injections to infants. She orders Dorothy to give the first dose of Diphtheria, Tetanus, Pertussis (DTaP) IM to a 2-month-old infant in the office today for a well-baby check-up. Dorothy administers the injection in the right vastus lateralis. Document the information Dorothy should include on the child’s record.

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**Dorsogluteal (Gluteus Medius) Site.** The dorsogluteal region is the traditional site for deep IM injections. However, complications from sciatic nerve injury are common enough that experts have suggested that use of this site be discontinued and that the vastus lateralis and ventrogluteal sites be used instead. Regardless, the dorsogluteal site continues to be popular and is still acceptable for adults if care is taken to locate the exact site. This site should not be used for pediatric patients.

The patient should lie in Sims’ position with the bottom leg straight and the top leg slightly bent. To locate the site, put the palm of your hand on the greater trochanter of the femur and point your fingers toward the posterior iliac spine. Palpate these bony prominences to make sure you are at the correct site and draw an imaginary line between these two anatomic markings. The injection is made into the gluteus medius muscle above the imaginary line (Figure 35-23). Needle gauge 20 to 23 and a needle length of 1 to 3 inches should be used; the site can hold as much as 5 mL of medication. Procedure 35-12 can help you practice finding the dorsogluteal site.

**Ventricular (Gluteus Medius) Site.** Although considered safe, the ventrogluteal region is not used as frequently as the others.
previously discussed. This technique uses a larger mass of the gluteus medius muscle than is used for the dorsogluteal site. The area is free of major nerves and blood vessels, and it is considered safe for both infants and adults (Figure 35-24). All types of IM medications can be injected here, including thick, oily preparations. Needle gauges 20 to 23 and needle lengths 1 to 3 inches should be used; the site can hold as much as 5 mL of medication.

To locate the site, position the patient in Sims' position and place the palm of your hand on the greater trochanter of the

**FIGURE 35-23** The dorsogluteal (gluteus medius) site is still preferred by many physicians.

**FIGURE 35-24** The ventrogluteal site can be used for most intramuscular injections.

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**PROCEDURE 35-11**

Select the Proper Sites for Administering a Parenteral Medication: Administer a Pediatric Intramuscular Vastus Lateralis Injection

**ORDER:** Administer 0.5 mL of Haemophilus influenzae (Hib) vaccine IM to Lizzy Dearborne, age 4 months, stat.

**GOAL:** To inject 0.5 mL of vaccine into the vastus lateralis muscle using a 22-gauge, ½-inch needle.

**EQUIPMENT and SUPPLIES**

- Vial containing Hib vaccine
- Alcohol wipes
- Cotton ball or 2 × 2-inch gauze square
- Sterile needle and syringe unit with safety device
- Disposable gloves
- Sharps container
- Written order, including the patient's name, when to give the drug, the route of administration, and the name and strength of the drug
- Patient's medical record
PROCEDURAL STEPS

1. Check the patient’s medical record for a previous allergic reaction to Hib vaccine; check the baby’s temperature and ask the caregiver about recent illnesses, because patients with a moderate to severe illness should not be vaccinated.
3. Select the correct medication from storage.
4. Read the label to make sure you have the right drug and the right strength; check the expiration date.
   PURPOSE: To perform the first of three drug label and order checks.
5. Warm refrigerated medications by gently rolling the vial between your palms.
6. Calculate the correct dose, if necessary, and continue with the three label checks while drawing the medication into the syringe. Follow the steps explained in Procedure 35-5 to correctly draw up the vaccine.
7. Complete the vaccination log according to office procedure.
   PURPOSE: The immunization record or vaccination log must be completed each time a vaccine is administered. Information includes the manufacturer; batch and lot numbers, which are stamped on the Hib container; expiration date; dose administered; route of administration; and whether there was a patient reaction. (More details about immunization records are presented in Chapter 42.)
8. Transport the medication to the patient.
9. Greet and identify the patient’s caregiver and the child by name.
   PURPOSE: To make sure you have the right patient.
10. Explain the procedure to the child’s caregiver.
    PURPOSE: To promote cooperation; also, this is a form of implied consent to the procedure.
11. Position the infant on her back. Ask the caregiver to remove any clothing necessary to expose the infant’s thighs. Choose either the right or left thigh for the injection.
    PURPOSE: It is important to expose the entire vastus lateralis muscle to prevent injury to the child. The pediatric vastus lateralis site is located below the greater trochanter of the femur but within the upper lateral quadrant (fourth) of the thigh.
12. Put on gloves and clean the patient’s skin with the alcohol wipe, using a circular motion and moving outward from the center.
13. Ask for the caregiver’s assistance in holding the child still if necessary.
14. Remove the needle cover, and with the thumb and first two fingers of the nondominant hand, spread the skin at the site tightly.
15. Grasp the syringe as you would a dart and with one swift movement, insert the needle at a 45-degree angle into the muscle, with the needle pointing toward the feet.
   PURPOSE: Once the needle is at the tissue layer, do not move it while injecting the medication.
16. Aspirate; withdraw the plunger slightly to make sure no blood enters the syringe.
   PURPOSE: Blood in the syringe means that the needle is in a blood vessel and is not in the muscle tissue. You may not administer an intramuscular medication by the IV route.
17. If blood appears, immediately withdraw the syringe, discard it in the sharps container, and compress the injection site with the cotton ball. Begin again with step 2.
18. If no blood appears in the syringe, push in the plunger slowly and steadily until all medication has been administered.
   PURPOSE: A rapid injection is uncomfortable for the patient.
19. Place the cotton ball next to the needle and apply counterpressure to the area while you withdraw the needle at the same angle used for insertion. Immediately cover the contaminated needle with the syringe unit safety device and discard the syringe unit in the sharps container.
20. Gently massage the site with the cotton ball.
   PURPOSE: Massage helps increase absorption and reduce pain.
21. Make sure the infant is safely held by the caregiver.
22. Dispose of the gloves in the biohazard waste container and sanitize your hands.
23. Record the drug administration in the patient’s medical record and in the vaccination log according to office procedure.
   PURPOSE: A procedure is not considered done until it is recorded. It is important to keep an accurate record of vaccinations performed so that the next dose is timed properly. Include in the documentation the name of the vaccine, dose, route of administration and location, lot number, and any observed patient reactions. The caregiver must be given a Vaccine Information Sheet (VIS), and it must be documented that the VIS was received.
24. Observe the patient for 20 to 30 minutes for any adverse reaction.

3/27/XX 1:30 PM Hib lot #58525, exp date 10/XX, administered IM to O; vastus lateralis. Caregiver given HIB VIS, answered questions regarding followup care. No adverse effects noted. Appointment made for next immunizations in 1 month. D. Gaston, CMA (AAAMA)

femur, pointing your index finger toward the anterior iliac spine. Spread your middle finger back as far as possible from your index finger to form a triangular injection area. For a child you will need a 1-inch needle, whereas for an obese adult patient, you may need a 2½- to 3-inch needle to reach the depth of the muscle. Table 35-2 summarizes the details of parenteral administration of medication.

Z-Track Intramuscular Injection

Some IM medications are irritating to the skin and SC tissues; others, such as iron replacement products, leak to the surface and stain surrounding tissues. These medications should be injected in such a way as to prevent any leakage from the deep muscle back into the upper SC layers. The Z-track
PROCEDURE 35-12

Administer Parenteral (Excluding IV) Medications: Give a Z-Track Intramuscular Injection into the Dorsogluteal Site

ORDER: Administer 1 ml of INFeD Z-track into the dorsogluteal site to Carlos Langa, age 63, stat.
GOAL: Inject 1 ml of medication into the gluteus medius muscle via the Z-track injection using a 23-gauge, 2-inch needle.

EQUIPMENT and SUPPLIES
- Vial containing the ordered medication
- Alcohol wipes
- Cotton ball
- Disposable gloves
- Sharps container
- Sterile needle and syringe unit with safety needle cover
- Additional sterile needle
- Written order, including the patient’s name, when to give the drug, the route of administration, and the name and strength of the drug
- Patient’s medical record

PROCEDURAL STEPS
2. Select the correct medication from the shelf or the refrigerator.
3. Perform the three order and label checks and verify the seven rights.
4. Warm refrigerated medications by gently rolling the container between your palms.
5. Draw up the ordered amount of medication into the syringe unit.
6. Replace the needle cover and give a slight turn to loosen the needle. Secure a new needle, still in its sheath, to the tip of the syringe, being careful not to contaminate the needle or hub of the syringe. Discard the contaminated needle.
   PURPOSE: The needle that was used to withdraw the medication is covered with the drug, which might be irritating to the skin and subcutaneous tissues.
7. Transport the medication to the patient.
8. Greet and identify the patient by name.
   PURPOSE: To make sure you have the right patient.
10. Expose the site and put on gloves.
11. The dorsogluteal site is found by placing the palm of the nondominant hand on the greater trochanter of the femur, pointing your fingers toward the posterior iliac spine and index finger toward the anterior iliac spine. The injection site is in the upper outer area of the gluteus medius. Visualize the area for the Z-track injection.
12. Clean the patient’s skin with the alcohol wipe, using a circular motion and moving outward from the center. Make sure to clean the actual area of injection.
13. Remove the needle cover.
14. Push the skin to one side and hold it firmly in place. If the skin is slippery, use a dry gauze sponge to hold the skin in place.
   PURPOSE: Displacing the skin prevents medication from leaking back to the surface. This method is used for medications that irritate or stain surface tissues.
15. Grasp the syringe as you would a dart and with one swift movement, insert the entire needle up to the hub at a 90-degree angle into the upper outer area of the gluteus medius muscle.
   PURPOSE: The depth of the injection is determined by the choice of needle length, not by how far you insert the needle. Once the needle is at the tissue layer, do not move it while injecting the medication. Inserting the needle as far as the hub helps keep the needle in place.
16. Aspirate; withdraw the plunger slightly to make sure no blood enters the syringe.
   PURPOSE: Blood in the syringe means that the needle is in a blood vessel and not in the muscle tissue. You may not administer an intramuscular medication by the IV route.
17. If blood appears, immediately withdraw the syringe, dispose of the syringe unit in the sharps container, and compress the injection site with a gauze square or cotton ball.
   PURPOSE: To minimize bleeding and bruising.
   PURPOSE: Blood is now mixed with the medication, and the medication is considered contaminated. Blood may interact with the drug and may be irritating to the intramuscular tissues.
19. If no blood appears in the syringe, push in the plunger slowly and steadily until all medication has been administered.
20. Wait 10 seconds for the medication to be dispersed, then withdraw the needle at the same angle used for insertion. As the needle is withdrawn, release the displaced skin to prevent the tracking of medication to the surface.
21. Immediately cover the contaminated needle with the syringe unit safety device and dispose of the needle and syringe unit in a sharps container.
22. If the manufacturer recommends it, gently massage the site with the gauze square or cotton ball. Many medications requiring Z-track administration should not be massaged.
23. Make sure your patient is comfortable and safe.
24. Dispose of the gloves in the biohazard waste container and sanitize your hands.
25. Observe the patient for any adverse reaction. You may need to keep the patient under observation for 20 to 30 minutes.
26. Record the drug administration in the patient’s medical record, including the exact site of injection.

7/13/XX 1:25 pm 1 ml INFeD administered Z-track in @ dorsogluteal site. Injection site not massaged after administration. No evidence of skin discoloration after administration. Dorothy Gaston, CMA (AAAMA)
**TABLE 35-2** Parenteral Administration of Medications

<table>
<thead>
<tr>
<th>ROUTE OF ADMINISTRATION</th>
<th>SITE</th>
<th>NEEDLE GAUGE</th>
<th>NEEDLE LENGTH (IN)</th>
<th>SYRINGE</th>
<th>DRUG AMOUNT</th>
<th>EXAMPLE DRUGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intradermal</td>
<td>Midanterior forearm</td>
<td>27-28</td>
<td>1/4</td>
<td>1 mL: tuberculin</td>
<td>0.1 mL: allergy tests</td>
<td>Tuberculosis skin test (Mantoux)</td>
</tr>
<tr>
<td>Subcutaneous</td>
<td>Posterior upper arm, thigh, abdomen</td>
<td>25-26</td>
<td>5/8</td>
<td>2.5 mL: insulin</td>
<td>Adult: 0.1 to 2 mL Child: 0.5 mL</td>
<td>Insulin, heparin, vaccines</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>Adult deltoid</td>
<td>20-23</td>
<td>1-3</td>
<td>2.5 mL</td>
<td>1-2 mL</td>
<td>Epinephrine, vitamin B₁₂, antibiotics (e.g., penicillin), meperidine, morphine, vaccines</td>
</tr>
<tr>
<td></td>
<td>Child deltoid</td>
<td>20-23</td>
<td>5/8</td>
<td>2 mL</td>
<td>0.5 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adult vastus lateralis, dorsogluteal</td>
<td>20-23</td>
<td>1-1/2</td>
<td>3.5 mL</td>
<td>2.5 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ventral gluteal</td>
<td>20-23</td>
<td>1-3</td>
<td>1 mL</td>
<td>0.5 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infant or child vastus lateralis</td>
<td>22-26</td>
<td>9/16</td>
<td>1-3 mL</td>
<td>0.5-2 mL</td>
<td></td>
</tr>
</tbody>
</table>

Method displaces the upper tissue laterally before the needle is inserted.

Prepare the medication according to safety guidelines and then put on gloves. Palpate the site using anatomically correct markings and localize the injection site visually. Push the skin to one side and clean it as described for IM injections. Insert the needle into the anatomically correct location and slowly release the medication into the deep muscular tissue (Procedure 35-12). After withdrawing the needle, release the tissue so that the needle track is to the side of the point where the medication was deposited in the muscle. This process prevents a direct pathway to the surface for the medication, which protects the SC and surface tissues from the irritating and/or staining properties of the drug.

The medications for which Z-track injection is appropriate require a large muscle mass, so they should be injected only into the dorsogluteal site. Because the medication is so irritating to tissues, the needle should be changed after the medication has been drawn up from the vial and before the injection is given. Some facilities require personnel to use the Z-track method when administering abdominal heparin injections, because leakage of the drug at the site may cause localized bleeding. Although heparin is administered by a SC injection, the technique of pushing the surface tissue to the side before injection is the same.

Medications that require the Z-track method of administration (e.g., heparin) should not be massaged after injection, because massaging encourages spread of the medication. Use alternate sides for multiple or frequent injections to prevent tissue damage.

**PRINCIPLES OF INTRAVENOUS THERAPY**

Administration of IV fluids or medication bypasses the absorption phase of pharmacokinetics, because the fluid and/or medication is administered directly into the bloodstream. IV therapy often is the route of choice if the physician wants to speed up the action of a drug. After administration into a vein, the medication is quickly distributed to the target tissue by the circulatory system and, depending on the medication and its purpose, may start acting within seconds to minutes. This very quality makes IV drug administration the most dangerous route of administration; one minor mistake could be life-threatening to a patient. For this reason, state medical practice acts and the policies of individual healthcare facilities strictly define the types of individuals qualified to perform IV-related procedures and administer IV medications. The medical assistant must be familiar with both legal restrictions and employer policies before having anything to do with IV therapy. However, regardless of whether you are responsible for IV therapy, you may work in a facility where patients have IV lines; therefore it is important that you understand some basic principles of IV administration.

**Intravenous Terminology and Practices**

The administration of IV fluid is closely monitored by the physician to maintain homeostasis. Three basic types of fluids are used for IV therapy (Figure 35-25):

- **Isotonic solutions**, such as 0.9% sodium chloride (NaCl), also called normal saline, contain the same salt level as normal body fluids. Isotonic fluids are used for patients who need replacement of lost body fluids, such as those with gastrointestinal disease or burns. If the patient needs glucose for nutrients, dextrose can be added to either water (D5W) or saline (D5NS) to meet the patient’s caloric needs. Another type of isotonic IV solution is Ringer’s lactate, which contains no dextrose (or calories) but provides electrolytes, including sodium, potassium, calcium, and chloride ions.
- **Hypertonic solutions** contain higher concentrations of NaCl than those found in normal body fluids; this higher level causes extracellular fluid to shift from the cells into the bloodstream. For example, 3% or 5% NaCl solution may be used in a patient with extensive peripheral edema. The concentrated solution in the blood vessels attracts extra intracellular and interstitial fluid into the bloodstream to dilute the highly concentrated plasma. These solutions are helpful in reducing edema, but they also may lead to increased pressure in the blood vessels from the increased volume of fluid and ultimately cause hypertension.

- **Hypotonic solutions**, including 10% dextrose in water (D10W) and 5% dextrose in 0.3% sodium chloride, contain less salt (NaCl) than body fluids. Hypotonic IV fluids promote cellular hydration by shifting fluid from blood vessels into the interstitial spaces surrounding cells; they are administered to maintain fluid intake when the patient does not require electrolyte replacement.

The physician carefully prescribes the type of IV solution based on the patient’s systemic needs. It is crucial that anyone responsible for hanging, changing, or replacing IV fluids carefully follow the physician’s orders to prevent serious complications for the patient.

### Dangers of Intravenous Treatment

Poor aseptic technique may result in infection or inflammation at the IV site and/or systemic infection. Healthcare workers must be extremely careful in dealing with IV equipment or fluids, because material is being injected directly into the bloodstream.

**Localized phlebitis** may lead to clot formation at the site (thrombophlebitis). Local inflammation of the vein typically occurs because of poor aseptic technique when the IV is started or use of a contaminated bandage over the injection site. A vein may also become inflamed because of irritation from medication administered through the IV, the IV solution itself, or patient movement of the site. Signs of phlebitis must be reported to the physician immediately, because phlebitis can lead to serious complications, including thrombus formation and/or systemic infection. Indicators of phlebitis include inflammation, edema, warmth, and tenderness at the site; the vein feels hard and ropelike.

**Infiltration** can also occur if the IV needle or catheter becomes dislodged from the vein. The IV fluid escapes into surrounding tissues, causing edema and discomfort. If you notice this, close the roller clamp on the IV tubing and notify the physician immediately.

**Fluid overload** may be caused by too rapid infusion of the solution. It may cause serious complications in patients with hypertension, heart disease, or congestive heart failure.

**Medication errors** can occur. IV fluids and/or medication circulate throughout the entire body within 1 minute after administration. It is not possible to take back an error in IV therapy.

### Intravenous Equipment

The medical assistant may be asked to gather supplies for starting the IV infusion, so it is important that you become familiar with the various pieces of equipment needed. Whoever is starting the IV infusion must follow strict sterile technique. All IV infusion equipment is individually packaged and disposable. This equipment includes skin-cleansing solution; needle or catheter; tubing with a spike at the end to insert into the IV bag; sterile dressings; and IV fluids. Typically, everything you need except for the ordered IV fluid is packaged in a sterile IV infusion kit. Check the package for the desired needle and catheter gauge, infusion rate of administration, expiration date, and package integrity (if the package is moist or torn, it is no longer considered sterile and must be discarded) (Figure 35-26). Additional supplies include a tourniquet, disposable gloves, biohazard waste container, and IV pole. Most ambulatory care facilities do not use infusion pumps, but one may be needed, depending on your facility’s practice.

Most infusion sets in ambulatory care settings contain butterfly infusion needles that have winged extensions for grasping during placement of the needle into the vein (Figure 35-27). They are available in a variety of gauges and lengths (25 to 17 gauge, length of 0.5 to 1 inch) and are used for short-term IV administration, such as with a single dose of IV medication. The short, hard needle is relatively easy to dislodge from the vein when the patient moves, which may lead to infiltration of IV fluids. The physician prescribes a certain number of drips per minute of the IV solution, depending on the patient’s condition and the reason for fluid administration. The macrodrop size, which delivers 8 to 20 drops/mL, is used for adult fluid replacement, whereas the microdrop unit (50 to 60 drops/mL) is used for children and/or slow administration of medications to patients of any age. The length of the IV tubing that connects the fluid bag to the venous catheter varies according to the patient’s need for mobility and freedom.

To prepare the solution for administration, insert the spike at the end of the IV tubing into the ordered fluid bag. Just below the spike is a drip chamber; this is an enlarged, flexible plastic container in the tubing that is squeezed so that it partly fills with fluid. The drip orifice leading into the drip chamber determines the size of the fluid drops. The rate at which the drops fall into the chamber and from there through the filled

![Figure 35-26 Intravenous administration set. (From deWit S: Fundamentals concepts and skills for nursing, ed 3, St Louis, 2009, Saunders.)](image)
tubing into the patient, is regulated by compressing the roller clamp on the tubing until the number of drops per minute prescribed by the physician is dripping into the drip chamber (Figure 35-28). The distal end of the tubing is connected to the needle or catheter after the needle is in place and the tube has been filled with IV fluid so that all air bubbles are expressed. This step prevents the injection of air into the vein. If the patient is receiving medication, the IV tubing will have an injection port, which is a rubber extension to which either another IV bag of medication can be connected or through which the caregiver can inject medication by inserting a needle into the port.

When the desired fluid or medication infusion is complete, the IV system must be disconnected. To do this, put on gloves before clamping the IV tubing, carefully remove the dressing, and gently slide the needle and catheter out of the vein. Apply pressure to the site with a sterile gauze square to prevent the formation of a hematoma. Discard the contaminated materials in a biohazard waste container (the needle or catheter in a sharps container) and chart the completion of IV therapy.

Role of the Medical Assistant in Assisting with Intravenous Therapy

- Follow state practice acts. The medical assistant should not perform any task, even when it is legal, unless he or she understands the principles behind the procedure and has the technical skill to perform it safely.
- Gather a comprehensive health history to determine the indications for IV therapy.
- Weigh the patient before and monitor vital signs during the infusion so that the physician can be alerted if possible complications arise; do not take the blood pressure in the arm with the IV line.
- Be alert for signs of infiltration and phlebitis.
- Monitor the equipment for problems.
- Watch for too rapid infusion of fluids, which might lead to circulatory overload.
- Document all pertinent information in the patient’s record.
**CLOSING COMMENTS**

**Patient Education**

It is extremely important to teach the patient how to take a prescribed drug and to make sure he or she understands the medication's purpose. Ideally, the physician informs the patient, but the medical assistant should be prepared to reinforce the physician's information or explain parts of the information the patient did not understand. When a patient does not understand the need for the medication or the directions for taking it, the risk is greater that the medication will be taken incorrectly. As a result, the physician's orders will not be carried out, and the desired therapeutic effect will not be achieved. The patient should fully understand the type of medication, its route of administration, its desired effect, and the side effects that need to be reported if they occur.

If the patient receives medication in the physician's office, he or she should understand the expected results or possible side effects. For example, if a patient is given a diuretic in the office, he or she needs to know what the immediate effect is going to be. This prepares the patient for the urinary urgency and polyuria that will occur within a relatively brief period. When a pain medication is given, the patient should have full knowledge so that the possibility of personal injury can be prevented. Any medication given in the ambulatory care setting that affects the patient's ability to walk or drive must be used with caution. The patient must be able to get home safely, and if that is not possible, the medication should not be given.

The medical assistant should instruct the patient to take all of the medication prescribed. Often if a prescription is not completed, the treatment objectives may not be achieved. Patients should also be instructed to take their medication in the time sequence prescribed. This keeps the optimum level of the drug circulating in the bloodstream.

When sample medications are dispensed in the office to the patient, the package contains inserts that can be helpful in education efforts. If the patient should reread certain parts of the inserts, highlight this information for quick reference. If the physician has specific written instructions for the patient to follow, read over the material with the patient before discharge so that any areas of confusion can be cleared up before the patient leaves the office. Always remember that the more the patient knows and understands about how to take the medication and why it has been prescribed, the greater the likelihood that the patient will comply with medication therapy, and the more likely it is that the drug treatment will be successful.

This also would be a good time to suggest that the patient check the status of medications at home. The National Association of Retail Druggists recommends that the medicine cabinet be checked once a month to determine the age and quality of medications. At that time, the patient should discard any medications that fall into the following categories:

- Medicines for past illnesses
- Any expired medicines, unidentified medications, or medications that are more than 2 years old
- Hydrogen peroxide that no longer bubbles or has changed color; ointments or salves that have separated or are crumbly; vinegary smelling aspirin; antiseptic solutions that are cloudy or have a solid residue on the bottom; and any medicine of uncertain quality

The association also suggests the following:

- Keep medicines stored away from light, heat, air, and moisture.
- Use medicine from the original container until it is completely used or expired.
- Do not combine medicines from several containers.
- Keep medicine locked away from children.
- Make sure childproof medicine caps are used properly.

**Legal and Ethical Issues**

A medical assistant must be extremely knowledgeable when administering medications in the physician's office. Follow all of the physician's orders exactly as written. If you have a question about the order, ask for clarification before you proceed. It is advisable to give a medication only after the order has been written in the patient's chart. This helps eliminate errors and possible omissions in medication therapy.

Legal responsibilities in medication practice include preventing error by carefully following the practice procedures in pouring and administering drugs. Always implement the seven rights and perform the three drug order and label checks when dispensing and administering medications. Anyone administering a drug must know the possible serious complications related to the drug and must be alert for side effects. The medical assistant also must demonstrate compliance with individual state laws regulating medications and their administration. Precise charting of the administration of medications, as well as the management of prescriptions, cannot be overemphasized.

The administration of drugs involves ethical principles. The patient always comes first. With that foremost in mind, never risk giving an incorrect medication. There is no such thing as a small error, because any mistake may result in serious harm or possible death. If an error is made, it must be reported immediately to the physician so that measures can be taken to help the patient. It is difficult to admit that a mistake has been made, but it is absolutely necessary. For that reason, be sure to double-check your calculations with a co-worker or the physician before dispensing the drug. If a mistake is made, it must be documented completely, including the details of the error, to whom the error was reported, any action taken, and subsequent observations of the patient.
SUMMARY OF SCENARIO

Dorothy understands the importance of careful management of medications. Because of her concern for patient safety, she asks Dr. Thau to check all of her calculations and refers to the physician if she has any questions about medication orders or patient education. Because Dr. Thau is a primary care physician, it is important for Dorothy to understand the factors that affect the administration of medication to all age groups of patients. She routinely employs the standard three label checks when dispensing medications and implements the seven rights throughout medication administration procedures.

Dorothy also recognizes the importance of complete and accurate documentation of medications, whether they are administered in the physician's office or given to the patient as a prescription order. In addition, she consistently applies the rules of standard precautions when preparing and administering parenteral medications. Although as a medical assistant Dorothy cannot administer IV medication, she understands the principles of IV therapy just in case there is a patient in the facility who is receiving IV fluids or medications. All those administering a drug must know the possible serious complications related to the drug and be alert for side effects. The medical assistant must demonstrate compliance with individual state laws governing medications and their administration. Precise charting of the administration of medications as well as the management of prescriptions cannot be overemphasized.

SUMMARY OF LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary. Spelling and pronouncing medical terms correctly bolster the medical assistant's credibility. Knowing the definition of these terms promotes confidence in communication with patients and co-workers.

2. Apply critical thinking skills in performing the patient assessment and patient care.

Completing the Critical Thinking Application exercises throughout the chapter can help the student medical assistant become more adept at critical analysis of real-life situations.

3. Analyze safety guidelines for specific patient populations.

Safety precautions in the management of medication administration should be applied consistently. Safe drug administration includes understanding the physician's order, looking up the drug if the medical assistant is unfamiliar with it, and using the three label checks and the seven rights every time a drug order is completed.

4. Document the administration of a medication.

Immediately after administering a drug, the medical assistant should document the date and time of administration; the drug's name, strength, dose, and route of administration; any reactions the patient has to the drug; and patient education about the medication. For parenteral medications, the exact site of administration must be charted.

5. Follow safety precautions in the management of medication administration in the ambulatory healthcare setting.

The three label checks and seven rights must always be performed. Medications are prepared in a quiet, well-lit area. A substitute is never used for the ordered drug or drug strength. Medications are stored as ordered on the package. Medical assistants must never administer a medication they have not prepared personally. If preparing a medication for the physician to administer, the medical assistant places the container with the dispensed drug. Only written physician's orders are followed. The medical assistant must check expiration dates and discard expired drugs. Medications with damaged labels are discarded. Dispensed medication that is not given is discarded. Patients must be consistently asked about drug allergies. Patients are observed for at least 20 minutes after administration of a drug. Drug reactions are reported and documented.

6. Summarize patient assessment factors that can affect medication administration.

Such factors include continual evaluation of the patient's physical condition, as well as holistic factors, such as the patient's history, an accurate list of drug allergies, and the patient's ability to understand the drug regimen and to afford the treatment, and special factors based on age, weight, and condition.

7. Identify various drug forms and their administration guidelines.

Drugs are packaged in a variety of forms with a variety of administration guidelines. Oral medications include both solid and liquid preparations; mucous membrane medications are absorbed rectally, vaginally, orally, nasally, or topically through the skin. Each form of medication has specific guidelines for administration, but all require consistent use of the three label checks and the seven rights.

8. Administer oral medications.

See Procedure 35-3.

9. Specify parenteral administration equipment, including details about needles and syringes.

Parenteral medications are manufactured in ampules and in single-dose or multidose vials. The ordered route of administration, the drug's characteristics, and individual patient factors determine the correct gauge and needle length used for administration. The appropriate syringe is determined by the type of medication ordered and the amount of drug to be administered. Specialty syringe units, such as the insulin pen and the EpPen, are designed for quick administration of certain medications. Tables 35-1 and 35-2 provide further details.

10. Follow OSHA guidelines in the management of parenteral administration.

OSHA guidelines include using syringe units with safety needle covers; wearing disposable, nonsterile gloves and other appropriate protective gear when administering any medication that involves coming into contact with blood or body fluids; never recapping a contaminated needle
13. Recognize the medical assistant’s role in patient education about the administration of drugs.
Patient education is crucial if patients are to administer medications correctly at home. The patient should understand the purpose of the drug, the time, frequency, and amount of the dose; any special storage requirements; and the typical side effects. The more the patient knows and understands about how to take the medication and why it has been prescribed, the greater the chance the drug treatment will be successful.

14. Assess legal and ethical issues in drug administration in the ambulatory care setting.
The medical assistant must be extremely knowledgeable when preparing and administering medications in the physician’s office. If any questions arise about the order, the medical assistant must ask for clarification before proceeding. Legal responsibilities include preventing error by carefully following safe practice procedures in dispensing and administering drugs. The medical assistant must comply with individual state laws regulating medications and their administration. Precise charting of the administration of medications and the management of prescriptions cannot be overemphasized.

CONNECTIONS

Study Guide Connection: Go to the Chapter 35 Study Guide. Read and complete the activities.

Evolve Connection: Go to the Chapter 35 link at evolve.elsevier.com/kinn to complete the Chapter Review and Chapter Quiz. Peruse other resources listed for this chapter to increase your knowledge of Administering Medications.