



5 INJECTIONS

CORE CONCEPTS

- Select an appropriate needle and syringe for an injection.
- Assemble a needle and syringe for an injection using sterile technique.
- Select medication for injection using physicians' orders.
- Draw medication from a vial and an ampule.
- Reconstitute medication with a diluent.
- Prepare an intradermal, subcutaneous, and intramuscular injection.
- Provide treatment for an allergic reaction and anaphylactic shock.

INTRODUCTION

Combat medics are required to administer injections. **Injection** is a method of delivering liquid medications into the body. The term **parenteral** can be used for any method of getting medication into the body other than through the gastrointestinal tract (**enteral**). The parenteral routes include **intramuscular** (IM), **subcutaneous** (SQ), and **intra**dermal (ID) injections. Enteral routes include oral, mucosal, intranasal, or per rectum. The administration routes affect the onset of a medication's action.

INJECTIONS

Combat medics may give injections by various routes. The following general principles apply for each method:

- Before administering any medication, compare the drug name on the **vial** with the drug name on the doctor's order.
- Validate the medicine when taking it from storage, while preparing and drawing up the medication, and prior to administering the medication to the patient.
- Check the patient's chart (or dog tags) for allergies to medications.
- Ask the patient to verbally confirm any known medication allergies prior to administration.

A basic knowledge of which medication is being prescribed, and why, can also help prevent medication injection errors. Many medications have very similar spellings or similar words, but have very different indications and usages. Extreme caution must be taken when comparing the prescription and the actual medication to be given. After administering the medication, monitor the patient for the prescribed amount of time (defined by either a drug reference or the medical officer [**MO**]). During this time, monitor for adverse reactions both locally at the site of injection and systemically. Systemic reactions affect the entire body and include fevers, vomiting, sweating, redness, generalized swelling, and difficulty breathing. Adverse reactions can lead to **anaphylaxis**, shock, or death if not recognized and treated. Report all reactions to the MO and add them to the patient's medical records.

Sterile techniques are paramount to preventing the introduction of pathogens into the body during the administration of an injection. Pathogens in this situation are usually bacteria that are normally found on the skin surface. These bacteria can be resistant to various antibiotics and it is becoming more common to have patients with a history of skin infections, boils, and abscesses. If the skin is not cleansed appropriately, bacteria will be pushed into the tissue by the needle. Cleaning and proper preparation of the skin before an injection will help keep infection rates low.



Figure 5-1. A combat medic using proper technique to administer an injection.

There are many advantages to administering a medication via injection. Advantages and benefits of injections that should be considered include the following:

- The majority of medications are most effective when given by injection.
- The medication cannot be provided in any other form.
- The patient's condition requires a quicker onset of the desired action (through rapid absorption) than is typically achieved with enteral medications.
- The entire dose of the medication must be obtained to achieve the desired effect.
- Due to nausea, vomiting, or other reasons like altered mental status or injury to the mouth, the oral route is not available.
- The drug cannot be absorbed through the digestive system.

Combat medics must know the locations of common administration sites, the type of injection to be administered, and the mechanism of action of the medication being injected. When providing an injection (Figure 5-1), follow procedures exactly to prevent an adverse outcome. An accidental injection into a nerve could result in injury and paralysis. An unintended injection directly into a blood vessel could cause the medication to be absorbed too rapidly, possibly resulting in injury or death of a patient. Some medications, such as injectable steroids, must be injected into deep muscle tissue, and failure to do so could result in deformity due to tissue **atrophy**.

PREPARING AND USING SUPPLIES FOR INJECTIONS

Needles

All parts of the needle are sterile. Be careful not to touch the **hub**. This would contaminate the needle and possibly pass an infection to the patient. Only the outside of the needle cover may be touched. A needle consists of the following parts (Figure 5-2):

- lumen—hollow cavity inside of needle,
- bevel—cutting edge of needle (slanted),
- hub—point of attachment to syringe,
- cannula (shaft)—elongated part of the needle, and
- protective cover (not shown).

Needles are sharp and made of stainless steel. Standard needle lengths are from 1/2 to 5 in. The length is determined from the tip of the point to the junction of the shaft and hub. The **gauge** (diameter) of the needle varies from 14 to 28; the larger the gauge number (G), the smaller the diameter (Figure 5-3). For example, a 14 G needle has a larger lumen in the bevel and can administer larger amounts of fluid at a faster rate than a 22 G needle, which has a smaller lumen and administers smaller amounts of fluid at a slower rate.



Figure 5-2. The parts of a needle.



Figure 5-3. Different sizes of needles. From top to bottom, needle gauge decreases as needle diameter increases.

It is important to select the appropriate needle when administering an injection. Choose one with the proper length based on the following factors:

- type of injection—SQ, IM, or ID;
- the size of the patient—eg, thin or obese; and
- the injection site—eg, 1 in. needle length for an IM injection into the deltoid muscle versus 1.5 in. length for an IM injection into the gluteus maximus muscle.

Select the needle with the proper gauge (most commonly from 18 to 25 G). The larger the number, the smaller the bore (diameter). For example, a 25 G needle has a very small opening and may be used for SQ or ID injections, whereas a 23 G needle has a larger bore and may be used for an IM injection. Also, small-gauge needles are indicated for watery medications, and large-gauge needles are indicated for viscous (thick) medications.

Blunt-tip needles and needleless systems are becoming more common for administration of medications through an intravenous (IV) port attached to IV tubing. A blunt-tip needle is a rigid, unbeveled needle that significantly reduces accidental **needlesticks** because the point of the needle is not sharp like standard needles. Some IV tubing companies make tubing with integrated needleless and IV medication ports. This allows combat medics to attach a syringe without a needle, for safer medication administration.

Another type of needle a combat medic may use is a “filter needle.” Filter needles are used only to draw up medications from glass **ampules**, and are NEVER

used to administer an injection. Filter needles contain a filter to prevent glass particles from being drawn up into a syringe and accidentally injected into the patient.

Caution: All parts of the needle are sterile. **Do not touch the hub** because contamination could cause patient infection. Only the outside of the needle cover may be touched.

Syringes

A syringe is an instrument that is attached to a needle and used for injecting fluids into cavities or vessels. Hypodermic syringes are the most common type used by combat medics. They are attached to hypodermic needles and are used to inject fluid through the skin. Syringes come in many different sizes depending on the type of medication and amount of fluid to be administered. Most syringes possess units of measurement in milliliters. A cubic centimeter (cc) is equal to a milliliter (mL); however, the cc unit of measurement is no longer used. An example of syringes that measure in different units are those used by people with diabetes. These syringes are used to administer insulin, and their measurements are not in milliliters, but in units.

Most syringes have similar parts, as shown in Figure 5-4. They include the following:

- Barrel—a clear plastic or glass tube marked with calibrated scales. The inside of the barrel is sterile.
- Plunger—the movable portion inside the barrel. The rubber portion and the shaft are sterile.
- Needle adapter—the sterile portion of the syringe where the needle attaches.
- Calibrated scales—measurement markings on the barrel that vary depending on the overall size of the syringe.

Select an appropriate syringe by first checking the drug manufacturer's specifications. Determine whether a glass or plastic syringe should be used for the medication since some medications deteriorate in a plastic syringe. Drug manufacturers' specifications provide guidance. Ensure that the total capacity of the syringe is appropriate for the amount of medication to be administered. The syringe should be large enough to hold the entire dose and small enough to draw up an accurate dose. Check the intervals of the calibration marks on the syringe to ensure they are appropriate for the dose of medication to be administered.



Figure 5-4. The parts of a syringe.

The plunger fits inside the tube or barrel of the syringe. It creates a tight seal inside the syringe, usually with the assistance of a small rubber or plastic gasket. This prevents the contents from escaping out the rear of the syringe, keeping dosages consistent. When depressed, the plunger forces fluid or gas out of the opening of the syringe. When pulled back, a vacuum is created inside the barrel that will suck up any fluids or gases in contact with the syringe. If the plunger is not the right size, or is defective, it can be difficult to pull back or push forward, which can interfere with medication administration.

Caution: The needle adapter and the shaft of the plunger are sterile. **Do not touch the adapter or the shaft of the plunger** because contamination could cause patient infection.

Safety Syringes

Most syringe and needle combinations comprise some type of safety syringe. In syringe-based safety

devices, the safety mechanism is built into the syringe. The needle on a syringe-based safety device can be detachable or permanently attached. Typically, the needle has a standard or conventional design. Safety syringes help prevent needlesticks.

Check on Learning

- 1. What parts of the needle are sterile?
- 2. Put these needles in order from the largest to smallest diameters: 25 G, 18 G, and 22 G.
- 3. What factors influence the length of the needle that should be used for a particular injection?
- 4. What parts of the syringe are sterile?
- 5. How do you know which syringe to select?

Assembling the Needle and Syringe

During needle and syringe assembly, you are responsible for maintaining the sterility and security of the equipment. First, inspect the needle and syringe packaging for defects, such as openings, holes, and water spotting. Discard the equipment into a **sharps container** if any defect is found.

Use the following steps for assembling a needle and syringe:

- 1. Don personal protective equipment (PPE). The minimum PPE for administering injections is gloves and eye protection.
- 2. Select and inspect equipment.
 - a. Ensure that all necessary equipment is retrieved.
 - b. Select the appropriate size needle and syringe for the type of injection being performed.
 - c. Ensure that all packaging is properly sealed and undamaged. Verify that nothing is expired.
- 3. Unpack the syringe.
 - a. Peel the sides of the wrapper apart to expose the rear end of the syringe barrel.
 - b. Grasp the syringe by the barrel. Be careful not to touch the adapter or shaft of the plunger.
 - c. Pull the syringe from the packaging.

Note: The outside of the syringe barrel does not have to be kept sterile.

- 4. Inspect the syringe.
 - a. Pull on the plunger. When pulling on the plunger, a distinct “pop” should be felt; if it is not, the seal was previously broken and the equipment must be discarded.
 - b. Grasp the flared end of the syringe and move the plunger back and forth to test for smooth, easy movement.
 - c. Visually check the rubber stopper (inside the syringe) to ensure that it is attached securely to the top end of the plunger, forming a seal. If the plunger is stuck or does not move smoothly, discard the syringe.
 - d. Push the plunger fully into the barrel until you are ready to fill the syringe with medication.
- 5. Unpack the needle.
 - a. Peel the sides of the flexible wrapper apart to expose the needle hub. **Do not touch the hub**; only touch the outside of the needle cover.
 - b. If the needle is packaged in a hard plastic tube, twist the cap of the tube until a “pop” is felt and remove the cap to expose the needle hub.
- 6. Assemble the syringe.
 - a. Join together the syringe and needle by inserting the needle adapter of the syringe into the needle hub.
 - b. Tighten the needle and syringe by twisting the needle clockwise one-quarter turn to ensure that the needle is securely attached to the syringe.
- 7. Place the assembled needle and syringe on the work surface; leave the protective cover on the needle.
 - a. Leave the plunger pushed fully into the barrel.
 - b. Keep the assembled needle and syringe within sight to ensure safety and prevent contamination.

Check on Learning

- 6. While preparing to administer an injection, the needle is removed from the flexible wrapper. Inadvertently, you drop the needle on the floor. The protective cap was in place when the needle touched the floor. Can the needle still be used? Why or why not?

Recapping a Needle

Recapping needles is not recommended because it increases needlestick risk. Sometimes it may be necessary to recap a needle, such as after withdrawing medication from a vial or ampule. If you must recap a needle, use the following scoop technique while holding the assembled needle and syringe in your dominant hand. Follow these steps:

- 1. Drape a blue chux pad over a hard, flat surface that has been cleared of any other equipment. Place the protective cap on the chux pad.
- 2. Insert the needle into the open end of the protective cap and lift the protective cap, causing it to slide down on the needle.
- 3. Cover the needle with the protective cap, ensuring that the cap is secured to the needle hub.

WARNING: Never recap a dirty (used) needle. Always use extreme caution when recapping a clean needle. Never hold the sheath (the protective needle cover) in your nondominant hand and attempt to recap the needle. Use the scoop method when recapping a clean needle.

PREPARING MEDICATIONS FOR ADMINISTRATION

Drawing and Administering Medication from a Vial

Liquid medications are packaged in different containers such as vials, ampules, and **prefilled syringes**. A vial is a small glass bottle that contains a liquid medication. It differs from an ampule by its distinct rubber stopper. The rubber stopper allows insertion



Figure 5-5. A combat medic using proper technique to draw medication from a vial. The vial is inverted and the rubber stopper prevents medicine from leaking out.



Figure 5-6. Removal of the protective cap of a single-dose vial. The rubber stopper can be seen just below the protective cap.

of a needle and withdrawal of medication from the vial without spilling if the bottle is tilted or inverted (Figure 5-5). The characteristic rubber stopper of a vial is protected from damage by a protective cap, typically made out of plastic or metal (Figure 5-6). Once the protective cap is removed from the vial, it cannot be replaced. Vials come prepared as single- or multi-dose bottles.

Use the items listed below for drawing medication from a vial:

- blue chux pad
- syringe—appropriate size for the type of medication being given
- 18 G or blunt needle used for drawing the medication from the vial
- needle of the appropriate size for administering the medication via the desired type of injection
- alcohol prep pad
- 2 in. × 2 in. (2 × 2) gauze pad

Use the following steps for drawing medication from a vial:

1. After receiving the MO's order to administer a drug from a vial, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights for all patients. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers in accordance with (IAW) your local MTF standard operating procedures (SOP)—usually by asking them to state their name and date of birth (DOB),
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. Check with the MO to see if the patient described an allergy that would contraindicate use of the medication.

2. Don PPE. The minimum PPE for drawing medication from a vial is gloves and eye protection.
3. Check and assemble equipment.
 - a. Select the correct medication from the storage area.
 - i. Conduct the first verification by ensuring that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - ii. Verify that the medication was properly stored (eg, refrigerated).
 - iii. Premixed medications may have to be shaken or rolled in your hands to ensure that the medication is resuspended in the solution; always check the medication label for instructions.
 - b. Obtain the required equipment.
 - c. Ensure that all packaging is properly sealed and undamaged. Verify that nothing is expired. Examine the container. If it is a multi-dose vial that has been opened, check the rubber stopper for defects, such as small holes or torn plugs.

Note: The protective cap should be in place on single-dose vials. If the protective cap has been removed, discard the vial and select a new one from the medication storage area.

- d. Check the date the multi-dose vial was opened and check the expiration date of the medication.
 - i. Multi-dose vials should have the following information written on the label once opened—time, date, and initials detailing first use.
 - ii. Multi-dose vials are good for 28 days from the date of first use, unless the manufacturer specifies otherwise.
- e. If possible, check the medication for floating particles and changes in color

- f. and consistency by holding the vial up to light. If it is a dark, light-obscuring vial, this check must be done when drawing up the medication into the syringe.
 - f. If there is any evidence of medicine or package contamination or damage, or if the vial is outdated, discard the product IAW local SOPs and obtain a new vial.
 - g. Open the packaging on both the 18 G (or blunt) and administration needles, as well as the syringe. Connect the hub of the 18 G (or blunt) needle to the needle adapter on the syringe.
 - h. Open the alcohol prep pad.
4. Remove the cap from the medication vial and cleanse the vial with the alcohol prep pad.
 5. Remove the protective cap from the needle safely. Pull the needle cover straight off without bending or touching the needle.
 6. Pull back on the plunger to draw air into the syringe for injection into the medication vial.
 - a. The amount of air to draw up equals the amount of fluid to be administered.
 - b. Follow the directions on the medication vial, if provided.
 - c. Recheck to ensure that the medication being drawn up into the syringe is the correct medication and concentration (if applicable) ordered by the MO. This is the second check for accuracy.
 7. Insert the 18 G (or blunt) needle into the medication vial on the table.
 - a. Place the medication vial upright on a table. Insert the 18 G (or blunt) needled syringe through the rubber stopper, ensuring the needle tip passes completely through. Ensure the hub of the needle does not touch the rubber stopper.
 - b. Pick up the syringe and vial and turn them upside down.
 - c. Elevate the syringe and vial to eye level.
 8. Push the plunger forward to inject air from the syringe into the vial. The amount of air injected should equal the amount of fluid that must be withdrawn.

9. Pull the plunger back to the desired milliliter mark, withdrawing the prescribed medication into the syringe.
10. Remove the needle from the vial and recap the needle using the scoop method.
11. Attach the appropriate needle to the syringe and administer the medication.
 - a. After the medication has been drawn up and is ready to be administered, conduct a final recheck to ensure that the medication and concentration (if applicable) are exactly what was ordered by the MO. This is the third and final check prior to administration.
 - b. Pull back on the plunger slightly to withdraw any fluid that may be in the 18 G (or blunt) withdraw needle. This moves all fluid into the syringe.
 - c. Detach the 18 G (or blunt) withdraw needle by twisting counter clockwise and discard it into a sharps container.
 - d. Attach the administration needle.
 - e. Slowly advance the plunger of the syringe to expel the air bubble from the top of the syringe and the new administration needle. Place the syringe at eye level and ensure the plunger is positioned exactly on the prescribed milliliter mark once the air bubble has been expelled from the syringe and administration needle.
 - f. Administer the injection.
12. Discard the needle and syringe into the sharps container.

Once the medication has been administered, return the vial to the proper storage area. If it is a multi-dose vial, verify that the date and the time the vial was opened are recorded on the vial label (Figure 5-7), then place it back into storage. Discard single-dose vials and multi-dose vials if they are empty or expired, in accordance with local SOP.

Check on Learning

7. How are clean needles recapped?
8. How do you determine that the correct amount of medication has been drawn?

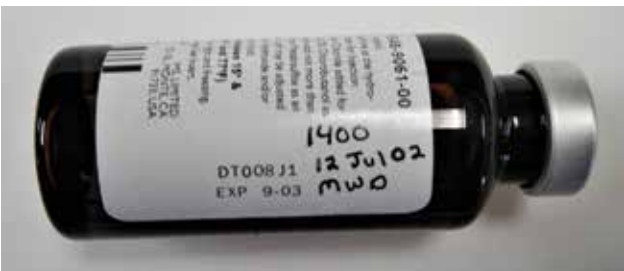


Figure 5-7. A multi-dose vial properly labeled with the date and time of opening.



Figure 5-8. Glucagon is an emergency reconstituted medication used to release sugar stores in the liver during a hypoglycemic event. The Bedford Laboratories (Bedford, OH) glucagon product shown here has two vials; the diluent is on the left and the powdered medication is on the right.

Reconstituting Medicines

Some medications come in a powdered form that must be turned into a solution prior to administration. Normally, the powdered medication is packaged in a vial, and another vial that contains a liquid **diluent** is included. If no diluent is included, check the powdered medication label for instructions on what diluent should be used (Figure 5-8). Once the contents of both vials are mixed together and the medication is dissolved, it is now in its proper form for administration.

Warning: The **reconstituted** powder shown in the skill drills (at the back of the chapter) is Practi-Powder White, by Wallcur (San Diego, CA). Wallcur Practi-Products are NOT medicines and are NOT for human or animal use. They are for training purposes only.

Use the items listed below for reconstituting medication:

- two 3 to 5 mL syringes
- 18 G or blunt needle used for reconstituting the medication
- appropriate size needle for desired type of injection, used for administering the medication
- two alcohol prep pads
- diluent and medication vials

Use the following steps for reconstituting a medication:

1. After receiving the MO's order to administer a drug that requires reconstitution, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights for all patients. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers IAW your local MTF SOP—usually by asking them to state their name and DOB,
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. Check with the MO to see if the patient described an allergy that would contraindicate use of the medication.

2. Don PPE. The minimum PPE for reconstituting a drug is exam gloves and eye protection.
3. Check and assemble equipment.
 - a. Select the correct medication from the storage area.

- i. Conduct the first verification by ensuring that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - ii. Normally, powdered medication is packaged with its diluent in the same box. If no diluent is included, check the powdered medication label for instructions on what diluent should be used.
- b. Obtain the required equipment.
 - c. Ensure that all packaging is properly sealed and undamaged. Verify that nothing is expired.
 - d. If possible, check the diluent vial for floating particles and changes in color and consistency by holding the vial up to light.
 - e. If there is any evidence of medicine or package contamination or damage, or if the vial is outdated, discard the product into the sharps container and obtain a new vial.
 - f. Open the packaging on both the 18 G (or blunt) and administration (depending on type of injection) needles, as well as both syringes. Connect the hub of the needles to the needle adapters on the syringes.
 - g. Open the alcohol prep pads.
4. Remove the cap from the diluent and medication vials and cleanse both with an alcohol prep pad.
 5. Safely remove the protective cap from the 18 G (or blunt) needle and syringe unit by pulling it straight off without bending or touching the needle.
 6. Pull back on the plunger to draw air into the syringe for injection into the diluent vial.
 - a. The amount of air to draw up equals the amount of fluid in the diluent vial.
 - b. Recheck to ensure that the medication being drawn up into the syringe is the correct medication and concentration (if applicable) ordered by the MO. This is the second check for accuracy.

7. Insert the 18 G (or blunt) needle into the diluent vial on the table.
 - a. Place the diluent vial upright on a table. Insert the 18 G (or blunt) needled syringe through the rubber stopper, ensuring the needle tip passes completely through.
 - b. Pick up the 18 G (or blunt) needle and syringe and diluent vial and turn them upside down.
 - c. Elevate the syringe and vial to eye level.
8. Push the plunger forward to inject air from the syringe into the diluent vial. The amount of air injected should be equal to the total amount of fluid in the diluent vial. All fluid must be withdrawn.
9. Pull back on the plunger, drawing up the correct amount of diluent fluid from its vial.
10. Withdraw the 18 G (or blunt) needle from the diluent vial and insert it into the medication vial on the table.
11. Inject the diluent into the medication vial. If the vial with powdered medication contains air, the diluent may be difficult to inject; air may have to be withdrawn to allow injection.
12. Withdraw the needle and syringe from the medication vial and discard it into a sharps container.
13. Mix the medication well.
 - a. Check the medication vial label or package because some medications should only be inverted gently, while others require vigorous mixing. Mix the contents IAW package instructions until all the power is dissolved.
 - b. Visually inspect the solution to ensure it is well mixed.
 - i. Check the medication for abnormalities such as undissolved crystals.
 - ii. Refer to the enclosed manufacturer's insert for acceptable variations in medication. If the insert is unavailable or if you have any questions, stop the process and check with your MO or noncommissioned officer in charge (NCOIC) prior to injecting the patient with the medication.

14. After conducting the third medication check, withdraw the prescribed amount (using the 21 G needle-syringe unit), verify the correct dosage, and administer properly.
 - a. Remove the protective cap from the 21 G needle-syringe unit safely. Pull the needle cover safely off without bending or touching the needle.
 - b. Place the medication vial onto the table and insert the 21 G needle into the vial. Pick up the syringe and medication vial and turn them upside down. Elevate the syringe and vial to eye level.

Note: Cleanse the rubber stopper again with an alcohol prep pad if it is touched by anything unsterile during the preparation (mixing) of the medication.

- c. Pull back on the plunger of the syringe, drawing up the correct amount of medication from the medication vial.
- d. If any air bubbles are visible in the syringe, point the needle up and tap the syringe to move the air bubbles to the needle. Slightly depress the plunger to expel the air from the needle-syringe.
- e. Verify the correct dosage.

Check on Learning

9. While attempting to dilute powdered medication, the diluent is difficult to inject. What should you do?
10. How do you determine whether to mix reconstituted medication gently or vigorously?

Drawing Medication from an Ampule

An ampule is a glass container of medication that resembles a small bottle. The neck of an ampule consists of a break line, which is the spot where the glass ampule is broken to access the medication inside (Figure 5-9). A filter needle is normally used when drawing medications from ampules. This prevents small glass particles, which may be in the ampule after opening, from being drawn up into the syringe and injected into the patient. When filter needles are used to draw up medication, the needle must be changed before the medication is given to the patient.

Use the items listed below for drawing medication from an ampule:



Figure 5-9. An ampule of 1:1,000 epinephrine.

- blue chux pad
- filter needle
- appropriate size needle for desired type of injection
- alcohol prep pad
- 2 × 2 gauze pad
- 3 to 5 mL syringe

Use the following steps for drawing up medication from an ampule:

1. After receiving the MO's order to administer a drug from an ampule, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers IAW your local MTF SOP—usually by asking them to state their name and DOB,
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. Check with the MO to see if the patient described an allergy that would contraindicate use of the medication.

2. Don PPE. The minimum PPE required for drawing medication from an ampule is exam gloves and eye protection.
3. Check and assemble the equipment.
 - a. Select the correct medication from the storage area and conduct the first verification that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - i. Verify that the medication was properly stored (eg, refrigerated).
 - ii. Premixed medications may have to be shaken or rolled in your hands to ensure that the medication is resuspended in the solution; always check the medication label for instructions.
 - b. Obtain the required equipment.
 - c. Ensure that all packaging is properly sealed and undamaged. Verify that nothing is expired.
 - d. If possible, check the medication for floating particles and changes in color and consistency by holding the ampule up to light. If it is a dark, light-obscuring ampule, this check must be done when drawing up the medication into the syringe. Discard any ampules with contents that appear corrupted or deteriorated into a sharps container.
 - e. Open and place a blue chux pad on the table.
 - f. Open the needle packaging on both the filter and administration needles, as well as the 3 to 5 mL syringe. Connect the hub of the filter needle to the needle adapter on the syringe.
 - g. Open the alcohol prep pad.

4. Cleanse the neck of the ampule with the alcohol prep pad.
 - a. Place the ampule upright and lightly tap to force any trapped medication out of the top of the ampule.
 - b. Remove the alcohol prep pad from the open package and place it on the break line of the ampule.
 - c. Clean the entire circumference of the ampule's neck and break line.
5. Using your nondominant hand, pick up the ampule, and with your dominant hand, place the 2 × 2 gauze pad on the ampule, covering the neck and break line.
 - a. The 2 × 2 gauze pad should be on the side of the ampule facing you, and held in place by the thumbs of both hands. The 2 × 2 gauze pad protects you from any small glass pieces.
6. Break the neck of the ampule, directing the breaking away from your body.
7. Inspect the ampule for glass.
 - a. Raise the broken ampule to eye level, toward a light source, and look for any small shards of glass that may have fallen into the ampule accidentally.
 - b. If any small shards of glass are visible inside of the ampule, discard it into a sharps container, obtain another ampule of the same medication, and repeat steps 1 through 7.
8. Using the syringe with the attached filter needle, withdraw the prescribed amount of verified medication from the ampule.
 - a. Pick up the assembled needle and syringe with your dominant hand. Safely remove the protective cover with your free hand by pulling it straight off without bending or touching the needle.
 - b. Do **not** pull the plunger back and draw air into the syringe in preparation for drawing medication.
 - c. Hold the ampule vertically with your nondominant hand or place the ampule upright on a flat surface, insert the filter needle and syringe, and withdraw the prescribed dose of medication. Be careful not to touch the outside edge or bottom of the ampule with the needle while drawing up the medication.
 - d. Withdraw the needle from the ampule and verify the dosage. Check the syringe for air bubbles.
 - e. Hold the syringe with the filter needle pointing up and pull back on the plunger slightly to clear all the medication from the needle shaft.
 - f. Tap the barrel lightly to force bubbles to the top.
 - g. Pull slightly back on the plunger to remove any medication in the filter needle.
9. Recap the needle (using the correct technique) to prevent an accidental needlestick. Then twist the filter needle to remove it from the syringe and put the needle into a sharps container.
10. Attach the appropriate size needle and administer the medication properly.
 - a. Once the administration needle has been connected to the needle adapter of the syringe, advance the plunger slightly forward to expel any air bubbles and fill the administration needle with the medication.
 - b. Verify the medication and dosage again, then cover the needle with the protective cover if not administering the medication immediately. Recap the administration needle if the cap had been removed.
11. Discard the needle and attached syringe into the sharps container immediately after administering the medication.

Caution: The needle recapping technique is only performed on clean needles. Never recap a dirty needle.

Check on Learning

11. You snapped the neck of the ampule and are inspecting the ampule. What are you looking for?
12. What should you do if you find something in the ampule?

Prefilled Syringe

A prefilled syringe provides a single medication dose or unit dose medication prepared by a manufacturer or pharmacy. Prefilled syringes are convenient and easy to use. They improve health care by minimizing microbial contamination and reducing medication dosing errors.

Despite their advantages, prefilled syringes are not widely used. There are no prefilled syringes with integrated safety features, and some medications cannot be packaged in a prefilled syringe.

If the entire amount of medication in a prefilled syringe is not needed, the excess should be discarded into a designated receptacle before administration. This is done by pushing the plunger until the correct quantity is obtained.

TYPES OF INJECTIONS

Intradermal Injections

ID injections are used to test for exposure to diseases (eg, tuberculosis or mumps), and for sensitivity to environmental allergens and medications. Because little systemic absorption of intradermally injected agents takes place, this type of injection is used primarily to produce a localized effect.

ID injections are administered in small volumes, usually 0.5 mL or less, into the outer layers of the skin. Intradermal injections require a 1/4 to 1/2 in. needle, from 25 to 27 G. A **tuberculin syringe** or other 1 mL syringe will also be necessary. Ensure the injection site is free of hair, tattoos, and scars. Do not inject over a vein or bony area. Place medication just below the epidermis.

The primary injection site for ID injection is the ventral forearm (on the inner, flat portion). This site is most commonly used because it is easily accessible and lacks hair (Figure 5-10). Other appropriate sites include the back of the upper arm and on the back below the shoulder blades.

Preparing and Administering an Intradermal Injection

Use the items listed below for administering an ID injection:

- blue chux pad
- tuberculin or other 1 mL syringe

- 18 G or blunt needle used for drawing the medication from the vial
- 25 to 27 G needle, 1/4 to 1/2 in.
- two alcohol prep pads



Figure 5-10. An example of a proper intradermal injection with wheal formation. The needle is inserted at a 5° to 15° angle.

Use the following steps for administering an ID injection:

1. After receiving the MO's order to administer a drug as an ID injection, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers IAW your local MTF SOP—usually by asking them to state their name and DOB,
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. Check with the MO to see if the patient described an allergy that would contraindicate use of the medication.

2. Don PPE and perform a patient care hand wash. The minimum PPE for administering an ID injection is exam gloves and eye protection.
3. Check and assemble equipment.
 - a. Select the correct medication from the storage area.
 - i. Conduct the first verification by ensuring that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - ii. Verify that the medication vial was stored properly (eg, refrigerated).
 - iii. Premixed medications may have to be shaken or rolled in your hands to ensure that the medication is resuspended in the solution; always check the medication label for instructions.
 - b. Obtain the required equipment.
 - c. Ensure that the packaging of all items is properly sealed, not damaged, and not expired.
 - i. Examine the medication container. If it is a multi-dose vial that has been opened, check the rubber stopper for defects, such as small holes or torn plugs.

Note: If the vial being used is not a multi-dose vial, the protective cap should be in place and not removed. If the protective cap has been removed, discard the vial and select a new one from the medication storage area.

- ii. Check the date the multi-dose vial was opened and check the expiration date of the medication. Multi-dose vials should have the following information written on the label once opened: time, date, and initials detailing first use. Multi-dose vials are good for 28 days from the date of first use unless the manufacturer specifies otherwise.

- d. Inspect the vial by holding it up to light to check for foreign particles and changes in color and consistency. If it is a dark, light-obscuring vial, this check must be done when drawing up the medication into the syringe.

Note: If there is any evidence of medicine or package contamination or damage, or if the vial is outdated, discard the product into the sharps container and obtain another.

- e. Open the packaging on the 18 G (or blunt) needle and syringe. Some 1 mL syringes come with the appropriate 25 G needle already attached. If this is the case, separate the 25 G needle from the 1 mL syringe and attach the 18 G (or blunt) needle.
 - f. Open the alcohol prep pad.
 4. Remove the cap from the medication and cleanse the vial with an alcohol prep pad.
 5. Remove the cap from the needle safely by pulling it straight off without bending or touching the needle.
 6. Pull back on the plunger of the syringe to draw in air for injection into the vial.
 - a. The amount of air to draw up equals the amount of fluid to be administered.
 - b. Follow the directions on the medication vial, if provided.
 - c. Recheck to ensure that the medication being drawn up into the syringe is the correct medication and concentration (if applicable) ordered by the MO. This is the second check for accuracy.
 7. Insert the 18 G (or blunt) needle into the medication vial on the table.
 - a. Place the medication vial upright on a table. Insert the needled syringe through the rubber stopper, ensuring the needle tip passes completely through, and that the hub of the needle does not touch the rubber stopper.
 - b. Pick up the syringe and vial and turn them upside down.
 - c. Elevate the syringe and vial to eye level.

8. Push the plunger forward to inject air from the syringe into the vial. The amount of air injected should equal the amount of fluid that must be withdrawn.
 9. Withdraw the prescribed amount of medication from the vial. Pull back on the plunger to the desired milliliter mark, withdrawing the correct amount of medication.
 10. Remove the 18 G (or blunt) needle and recap the needle using the scoop method. Replace the 18 G (or blunt) needle with the administration needle.
 - a. Withdraw the plunger slightly to remove any medication in the 18 G (or blunt) needle.
 - b. Discard the needle used to withdraw the medication into the sharps container.
 - c. Connect the administration needle (25 G) to the medicine-filled syringe and slightly push on the plunger to fill the administration needle with medication.
 - d. Perform a final recheck prior to administration. Ensure that the medication and concentration (if applicable) match the MO's order. This is the third and final check prior to administration.
 11. Ensure that the proposed injection area (forearm) is completely exposed and the muscle is relaxed. Have the patient sit down and place the forearm on a table with the anterior side facing up.
 12. Identify the injection site (anterior mid-forearm). Ensure that the injection site is free of hair, tattoos, and scars.
 13. Clean the injection site with an alcohol prep pad.
 - a. Clean in a spiral motion outward to 3 in. from the injection site.
 - b. Allow the skin to dry completely before administering the injection.
 14. Remove the cap from the needle safely by pulling it straight off without bending or touching the needle.
 15. Using your nondominant hand, pull the skin taut toward the patient's hand.

16. Advise the patient of the stick, then insert the needle at a 5° to 15° angle.
 - a. With your dominant hand, position the syringe, with the needle bevel up, at a 5° to 15° angle to the skin surface.
 - b. Advance until the bevel is under the skin surface.
 - i. Insert the needle just until the bevel disappears under the skin's surface, about 1/8 in. (0.3 cm) below the epidermis.
 - ii. If more than one ID injection is required, ensure that the injections are 2 in. (5 cm) apart.
 17. With the thumb of your nondominant hand, push the plunger forward slowly until all the medication has been injected and a **wheel** appears at the injection site. Remove the needle-syringe and place it into a sharps container.

Note: Do not **aspirate** when performing an intradermal injection.

- a. The appearance of a wheal indicates the medication has entered the area between the epidermis and the dermis.
 - b. If a wheal does not appear, withdraw the needle completely from the arm at the angle of insertion, and discard the needle and syringe into a sharps container. Prepare a new set, and repeat the procedure at another site at least 2 in. away from the initial test site.
 - c. If the injection is successful and a wheal does appear, finish injecting the remaining medication. When finished, quickly withdraw the needle at the same angle in which it was inserted.
 - d. Without applying pressure to the skin's surface, cover the injection site with dry, sterile gauze.

Caution: Instruct the patient not to rub, scratch, or wash the injection site. Scratching could irritate the area and cause the injected material to be absorbed systemically, as well as give a false positive or negative reading.

18. Monitor the patient for 20 minutes; watch for signs and symptoms of a developing allergic reaction.

- a. Check the site for bleeding, then circle the test with a marking pen, and label the skin according to the test given.
- b. Document the injection in the patient's medical record. On the appropriate forms, record the date, time the injection was given, amount of medication given, site of administration, patient's response to the injection, and any adverse reactions to the injection.
- c. Instruct the patient when and where to have the test read IAW the local SOP.

Warning: Have an emergency tray available for the immediate treatment of serious reactions. Include a syringe containing a 1:1,000 solution of epinephrine.

Check on Learning

13. What are the recommended sites for intradermal injections?
14. At what angle should the needle be inserted to deliver an intradermal injection?
15. If a wheal does not appear, what is your next course of action?
16. Do intradermal injections require aspiration?

Subcutaneous Injections

SQ injections place the medication within the tissue under the skin (Figure 5-11). They are used when the desired absorption rate is slower than that achieved via the IM route. SQ injections also cause minimal tissue trauma and carry little risk of striking large blood vessels and nerves. Absorbed mainly through the capillaries, drugs recommended for SQ injection include nonirritating aqueous solutions and suspensions in small amounts (up to 2 mL) of fluid (eg, heparin and insulin). SQ medications must be soluble and of sufficient strength to be effective, yet safe for surrounding tissues. The absorption rate for SQ injection is 15 to 30 minutes. The duration is hours to weeks (comparable to that of the IM route). Drugs and solutions for SQ injection are injected through a relatively short needle, using sterile technique. SQ injections are given in areas where bones and blood vessels are not near the skin's surface. Injection is contraindicated in sites that are inflamed, edematous, scarred, or covered by a mole, birthmark, or other lesion. It may also be contraindicated in patients with impaired coagulation mechanisms.



Figure 5-11. A combat medic preparing to administer a subcutaneous injection.

When administering SQ injections, use needles that range from 25 to 27 G, with a length of 5/8 to 1/2 in., or an insulin syringe. Needle length and gauge will vary depending on the amount of SQ tissue and the patient's age, size, and condition. It is important to have a needle that is short enough to just reach the SQ tissue.

Note: Injection at the correct angle is important. The usual rule is a 45° angle for a 5/8 in. needle. Always check your local SOP.

SQ injections are usually given in the rear lateral aspect of the upper arm, halfway between the shoulder and the elbow and one-third of the way around laterally (see Figure 5-11). Medication volume should not exceed 0.5 mL. Take care not to inject the medication too close to the skin's surface because doing so may cause faster absorption and onset of action of the medication, possibly causing local irritation. Tell the patient where you will be giving the injection and position them sitting or standing, with the area completely exposed, muscle relaxed, and arm at the side.

The **vastus lateralis** is another appropriate site for an SQ injection (Figure 5-12). This injection site extends from the middle of the anterior thigh to the middle of

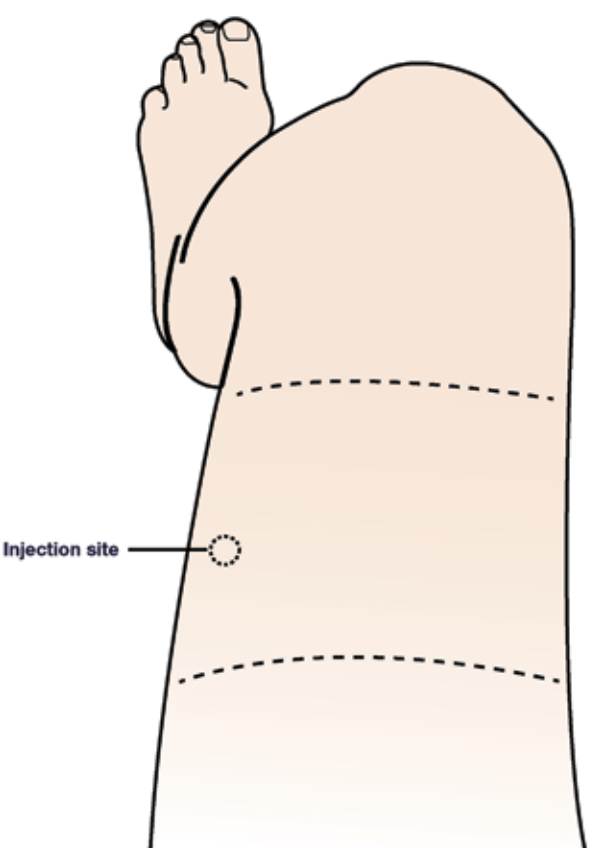


Figure 5-12. The vastus lateralis injection site, appropriate for subcutaneous and intramuscular injections.

the lateral thigh, and from one hand's width below the hip joint to one hand's width above the knee. Medication volume at this site should not exceed 2 mL. Tell the patient where you will be administering the injection and position them lying face up or seated.

SQ injections of medications such as insulin and heparin can be administered in the abdomen. Tell the patient where you will be administering the injection and position them lying face up.

Note: The amount of medication given will vary according to the needs of the patient; a physician will prescribe the dosage.

Caution: Seated or lying positions are preferred for injections. Although it is permissible to use a standing position, some patients (even young, healthy soldiers), may experience a vasovagal response to an injection. A **vasovagal** response can lead to dizziness or syncope (loss of consciousness).

Note: Do not administer an injection within 2 in. of a scar, a bruise, or the umbilicus. Do not aspirate to check for blood return because this can cause bleeding into the tissues at the site. Do not rub or massage the site after injection. Rubbing can cause localized small hemorrhages or bruising.

Preparing and Administering Subcutaneous Injections

Use the items listed below for administering an SQ injection:

- blue chux pad
- 3 to 5 mL syringe—appropriate size for type of medication
- 18 G or blunt needle used for drawing the medication
- 25 G or 27 G needle, 5/8 to 1/2 in.
- two alcohol prep pads
- 2 × 2 gauze pad

Use the following steps for administering an SQ injection:

1. After receiving the MO's order to administer a drug as an SQ injection, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers IAW your local MTF SOP—usually by asking them to state their name and DOB,
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. If there is a known allergy, do not administer the medication; contact your supervisor or the prescribing MO.

2. Don PPE and perform a patient care hand wash. The minimum PPE for SQ injection is exam gloves and eye protection.
3. Check and assemble equipment.
 - a. Select the correct medication from the storage area.
 - i. Conduct the first verification by ensuring that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - ii. Verify that the medication was properly stored (eg, refrigerated).
 - iii. Premixed medications may have to be shaken or rolled in your hands to ensure that the medication is resuspended in the solution; always check the medication label for instructions.
 - b. Ensure that all items are properly packaged and sealed, not damaged, and not expired.
 - i. Examine the medication container. If it is a multi-dose vial that has been opened, check the rubber stopper for defects, such as small holes or torn plugs.
4. Remove the cap from the medication and cleanse the vial with alcohol prep pad.
5. Remove the cap from the needle safely by pulling it straight off without bending or touching the needle.
6. Pull back on the plunger of the syringe to draw in air for injection into the vial.
 - a. The amount of air to draw up equals the amount of fluid to be administered.
 - b. Follow the directions on the medication vial, if provided.
 - c. Recheck to ensure that the medication being drawn up into the syringe is the correct medication and concentration (if applicable) ordered by the MO. This is the second check.
7. Insert the 18 G (or blunt) needle into the medication vial on the table.
 - a. Place the medication vial upright on a table. Insert the 18 G (or blunt) needled syringe through the rubber stopper, ensuring the needle tip passes completely through and that the hub of the needle does not touch the rubber stopper.
 - b. Pick up the syringe and vial and turn them upside down.
 - c. Elevate the syringe and vial to eye level.
8. Push the plunger forward to inject air from the syringe into the vial. The amount of air injected should equal the amount of fluid that must be withdrawn.
9. Withdraw the prescribed amount of medication from the vial. Pull back on the plunger to the desired milliliter mark, withdrawing the correct amount of medication.
 - iv. If there is any evidence of medicine or package contamination or damage, or if the vial is outdated, discard the product into the sharps container and obtain another.
10. Remove the cap from the needle safely by pulling it straight off without bending or touching the needle.

Note: If the vial being used is not a multi-dose vial, the protective cap should be in place and not removed. If the protective cap has been removed, discard the vial and select a new vial from the medication storage area.

- ii. Check the date the multi-dose vial was opened and check the expiration date of the medication. Multi-dose vials should have the following information written on the label once opened—time, date, and initials detailing first use. Multi-dose vials are good for 28 days from the date of first use unless the manufacturer specifies otherwise
- iii. If possible, check the medication for floating particles and changes in color and consistency by holding the vial up to light. If it is a dark, light-obscuring vial, this check must be done when drawing up the medication into the syringe.

10. Remove the 18 G (or blunt) needle and recap the needle using the scoop method. Replace the 18 G (or blunt) needle with the administration needle.
 - a. Withdraw the plunger slightly to remove any medication in the 18 G (or blunt) needle.
 - b. Discard the needle used to withdraw the medication into the sharps container.
 - c. Connect the administration needle (23 G) to a medicine-filled syringe and slightly push on the plunger to fill the administration needle with medication.
 - d. Perform a final check prior to administration. Ensure that the medication and concentration (if applicable) match the MO's order. This is the third and final check prior to administration.
11. Ensure that the proposed injection site (lateral aspect of the upper arm or the vastus lateralis of the anterior thigh) is completely exposed and the muscle is relaxed. Have the patient sit in a manner that will allow easy access to either injection site. Remember that sitting is the preferred position.
12. Identify the injection site—lateral aspect of the upper arm (halfway between the shoulder and the elbow and one-third of the way around laterally) or the vastus lateralis of the anterior thigh.
 - a. Ensure that the injection site is free of hair, tattoos, and scars.
 - b. If the patient requires SQ injections routinely, always rotate the injection sites, which will prevent injury to the subcutaneous tissue due to multiple SQ injections at the same site.
13. Clean the injection site with an alcohol prep pad.
 - a. Clean in a spiral motion outward 3 in. from the injection site.
 - b. Allow the skin to dry completely before administering the injection.
14. Remove the cap from the needle safely by pulling it straight off without bending or touching the needle.
15. Using your nondominant hand, reach over the top of the site, placing the index finger and thumb on each side of the injection location. Squeeze the fingers and thumb together, slightly pinching the skin. This technique will elevate the subcutaneous tissue, forming a 1 in. (2.5 cm) fat fold.
16. Advise the patient of the stick, then insert the needle, in an upward motion at a 45° angle.
 - a. With your dominant hand, position the syringe 1/2 in. from the skin surface with the needle bevel up at a 45° angle to the skin surface.
 - b. Plunge the needle firmly and quickly through the skin and into the subcutaneous tissue.
 - c. Using a slow, continuous movement, completely depress the plunger and inject the medication.

Caution: Do not administer the injection if an air bubble is in the syringe. Syringes are calibrated to administer the correct dose of medication, which will be altered if an air bubble exists.

- d. Place either an alcohol pad or sterile gauze pad lightly over the injection site and withdraw the needle at the same angle in which it was inserted.
- e. Discard the used needle into a sharps container.

Warning: Never attempt to recap a dirty needle.

17. Rub the area in a circular motion using the 2 × 2 gauze to disperse the medication into the tissue.
 - a. Ensure that this is not contraindicated for the type of medication injected.
 - b. Remove the gauze and check the injection site for bleeding or bruising.
 - c. Place an adhesive bandage over the site.
18. Monitor the patient for 20 minutes; watch for signs and symptoms of a developing allergic reaction. Document the injection in the patient's medical record. On the appropriate forms, record the date, time the injection was given, amount of medication given, site of administration, patient's response to injection, and any adverse reactions to the injection.

Warning: Have an emergency tray available for the immediate treatment of serious reactions. Include a syringe containing a 1:1,000 solution of epinephrine.

Check on Learning

- 17. When should SQ injections be used rather than ID or IM injections?
- 18. What are possible sites for SQ injections?
- 19. At what angle should the needle be inserted for SQ injections?
- 20. Into what type of tissue is the medication being delivered in SQ injections?

Intramuscular Injections

IM injections (Figure 5-13) are used when rapid absorption rate (10–20 min) and long duration (hours to weeks) are desired. They are preferred when administering viscous or irritating medications and when a large volume of medication is needed for a stronger effect.

Caution: Because absorption of medications administered by the IM route relies on adequate blood flow to the muscles, IM injections should not be used in individuals with poor circulation or symptoms of shock.



Figure 5-13. A combat medic administering an intramuscular injection.

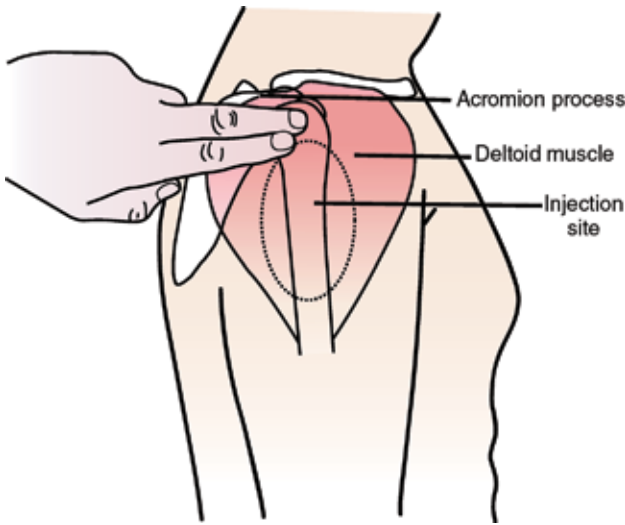


Figure 5-14. The deltoid intramuscular injection site.

For IM injections, choose a needle that is no less than 1 in. long for an adult (unless the patient is thin, in which case you may use a smaller size). For obese patients, needles up to 2 in. may be needed. Selecting a needle long enough to reach the muscle is essential; using a needle that is too short will cause the medication to be injected into SQ tissue, potentially reducing absorption and effectiveness. Needle bore diameter should range from 20 to 22 G. The exact length and gauge selected will vary depending on the patient's amount of muscle mass, age, size, and overall condition.

Primary IM injection sites include the deltoid, vastus lateralis, **ventrogluteal**, and **dorsogluteal** muscles. The deltoid muscle, located in the outer one-third of the arm between the shoulder bone (acromion process) and axilla, is used for medication volumes from 0.5 to 1 mL in adults and allows for faster absorption than other IM sites. The injection site is approximately two or three finger widths below the shoulder bone, in the middle of the deltoid muscle mass (Figure 5-14). When administering the injection, position the patient standing or sitting with the area completely exposed, muscle relaxed, and the arm at the side.

The safest site to perform an IM injection is the vastus lateralis. This site is the muscle mass located on the lateral thigh, extending from the middle of the anterior thigh to the middle of the lateral thigh, and from one hand's width below the hip joint to one hand's width above the knee (see Figure 5-12). This site is considered the safest because there are no major nerves or blood vessels. An injection up to 5 mL of fluid can be

given at this site. This IM injection site may be more painful than the other sites due to a larger number of small nerve endings located there. Although it is permissible to use a standing position for injections, seated or lying positions may be preferable to avoid a vasovagal response.

The ventrogluteal site is used for larger medication volumes (up to 5 mL) and may require a long needle (2 in. or longer in large adults). The ventrogluteal site is preferred for IM injections in anyone over the age of 7 months. This site provides the greatest thickness of gluteal muscle, does not have nerves and blood vessels, and has the most consistent and thinnest layer of adipose tissue. Because of these characteristics, injuries from IM injections at the ventrogluteal site are rare. An injection given in an area outside this site could cause damage to the sciatic nerve or puncture the superior gluteal artery, causing either paralysis or severe bleeding.

When administering an IM injection, position the patient in a ventrogluteal position. The patient can be placed in the prone position with the toes pointing inward. This will help relax the gluteal muscle. Another form of the ventrogluteal position is to have the patient lying on their side and flexing the upper legs.

Identify the ventrogluteal area by placing the patient in the prone or side position. If identifying an injection site on the patient's right hip, use your left hand. If identifying the injection site on the patient's left hip, use your right hand. With the heel of your hand on the lateral portion of the greater trochanter of the patient's hip, point your thumb toward the patient's groin. Point your index finger toward the anterior iliac spine, and extend your middle finger along the iliac crest (toward the buttocks as far as possible). This hand position will create a V shape with the index and middle fingers. The injection site is directly in the middle of the V shape (Figure 5-15).

Preparing and Administering Intramuscular Injections

Use the items listed below for administering an IM injection:

- blue chux pad
- 3 to 5 mL syringe—appropriate size for type of medication
- 18 G or blunt needle
- 20 to 22 G needle, 1 1/2 to 2 in.
- two alcohol prep pads
- 2 × 2 gauze pad

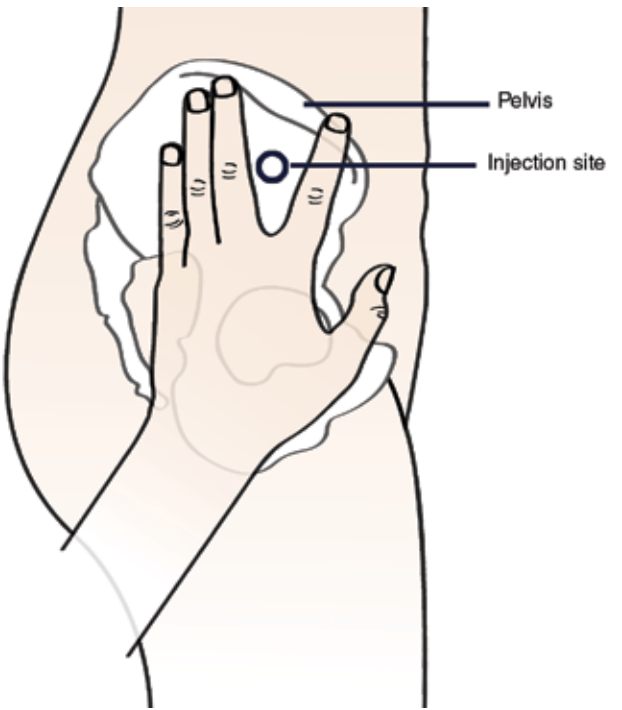


Figure 5-15. The ventrogluteal intramuscular injection site.

Use the following steps for administering an IM injection:

1. After receiving the MO's order to administer a drug as an IM injection, ask the patient if they have known allergies, ask female patients if they could be pregnant (some medications can harm the fetus), and verify the 6 Rights. Verifying the 6 Rights ensures that the combat medic has the correct:
 - a. patient—confirm the patient's identity using two patient identifiers IAW your local MTF SOP—usually by asking them to state their name and DOB,
 - b. medication,
 - c. dosage,
 - d. route,
 - e. time, and
 - f. documentation.

Caution: If a female patient believes there is a chance she could be pregnant, contact your supervisor or the prescribing MO. Do not administer the injection without written authorization.

Caution: Always check allergies before administering any medication. Have the patient describe the reactions in their own words. If there is a known allergy, do not administer the medication; contact your supervisor or the prescribing MO.

2. Don PPE and perform a patient care hand wash. The minimum PPE for IM injection is exam gloves and eye protection.
3. Check and assemble equipment.
 - a. Select the correct medication from the storage area.
 - i. Conduct the first verification by ensuring that the medication and concentration (if applicable) are exactly what was ordered by the MO.
 - ii. Verify that the medication was properly stored (eg, refrigerated).
 - iii. Premixed medications may have to be shaken or rolled in your hands to ensure that the medication is resuspended in the solution; always check the medication label for instructions.
 - b. Obtain the required equipment.
 - c. Ensure that the packaging of all items is properly sealed, not damaged, and not expired.
 - i. Examine the medication container. If it is a multi-dose vial that has been opened, check the rubber stopper for defects, such as small holes or torn plugs.

Note: If the vial being used is not a multi-dose vial, the protective cap should be in place and not removed. If the protective cap has been removed, discard the vial and select a new vial from the medication storage area.

- ii. Check the date the multi-dose vial was opened and check the expiration date of the medication. Multi-dose vials should have the following information written on the label once opened—time, date, and initials detailing first use. Multi-dose vials are good for 28 days from the date of first use unless the manufacturer specifies otherwise.

- iii. If there is any evidence of medicine or package contamination or damage, or if the vial is outdated, discard the product into a sharps container and obtain a new vial.
 - d. If possible, check the medication for floating particles and changes in color and consistency by holding the vial up to light. If it is a dark, light-obscuring vial, this check must be done when drawing up the medication into the syringe.
 - e. Open the packaging on the needle and syringe. If the needle and syringe are packaged separately, open both and attach the needle to the syringe.
 - f. Open the alcohol prep pad.
4. Remove the cap from the medication vial and cleanse with the alcohol prep pad.
 5. Remove the protective cap from the needle safely by pulling it straight off without bending or touching the needle.
 6. Pull back on the plunger of the syringe to draw in air for injection into the vial.
 - a. The amount of air to draw up equals the amount of fluid to be administered.
 - b. Follow the directions on the medication vial, if provided.
 - c. Recheck to ensure that the medication being drawn up into the syringe is the correct medication and concentration (if applicable) ordered by the MO. This is the second check for accuracy.
 7. Insert the 18 G (or blunt) needle into the medication vial on the table.
 - a. Place the medication vial upright on a table. Insert the 18 G (or blunt) needled syringe through the rubber stopper, ensuring the needle tip passes completely through and that the hub of the needle does not touch the rubber stopper.
 - b. Pick up the syringe and vial and turn them upside down.
 - c. Elevate the syringe and vial to eye level.
 8. Push the plunger forward to inject air from the syringe into the vial.

9. Withdraw the prescribed amount of medication from the vial. Pull back on the plunger to the desired milliliter mark, withdrawing the correct amount of medication.
10. Remove the 18 G (or blunt) needle and recap the needle using the scoop method. Replace the 18 G (or blunt) needle with the administration needle.
 - a. Withdraw the plunger slightly to remove any medication in the 18 G (or blunt) needle.
 - b. Discard the needle used to withdraw the medication into a sharps container.
 - c. Connect the administration needle (23 G) to the medicine-filled syringe and slightly push on the plunger to fill the administration needle with medication.
 - d. Perform a final recheck prior to administration. Ensure that the medication and concentration (if applicable) matches the MO's order. This is the third and final check prior to administration.
11. Ensure that the proposed injection area (deltoid, ventrogluteal, or the vastus lateralis) is completely exposed and the muscle relaxed.
 - a. Remove all clothing at the injection site.
 - b. Place the patient in the proper position to receive the specific type of IM injection.
 - i. For an IM injection into the deltoid muscle, the patient can either stand or sit.
 - ii. For an IM injection into the vastus lateralis muscle, the patient should sit or lie in the supine position.
 - iii. For an IM injection into the ventrogluteal muscles, the patient should lie straight on their side.
12. Identify the injection site.
 - a. Deltoid muscle IM injection site (see Figure 5-14):
 - i. Locate the acromion process located on the lateral, superior aspect of the shoulder.
 - ii. Place two or three fingers below the acromion process and in the middle of the deltoid muscle mass.

- b. Vastus lateralis IM injection site (see Figure 5-12):
 - i. Locate the anterior thigh and place one hand just below the hip to identify one hand's width below the hip (this identifies the superior landmark border). Place one hand above the knee to identify one hand's width above the knee (this identifies the inferior landmark border).
 - ii. After locating the superior and inferior landmarks, draw an imaginary vertical line down the center of the anterior thigh, and an imaginary vertical line down the center of the lateral thigh.
 - iii. The space between the superior and inferior landmarks, as well as between the anterior and lateral vertical lines, indicates the vastus lateralis IM injection site.
- c. Ventrogluteal IM injection site (see Figure 5-15):
 - i. If providing an IM injection into the patient's right hip, identify the injection site with your left hand. If providing an IM injection into the patient's left hip, identify the injection site with your right hand.
 - ii. Identify the greater trochanter of the hip, and place the heel of your opposite hand on the lateral portion of the greater trochanter with your fingers pointing toward the patient's head.
 - iii. Your middle finger should point directly vertical along the lateral midline of the patient.
 - iv. Spread your index finger from the middle finger toward the patient's anterior iliac spine and spread your thumb from your index finger toward the patient's groin. The V shape formed between your middle and index finger identifies the IM injection site (directly in the middle of the V).
13. Clean the injection site with an alcohol prep pad in a spiral motion outward 3 in.

14. Remove the cap from the needle safely. Pull the needle cover straight off without bending or touching the needle.
15. Using your nondominant hand, stabilize the site.
 - a. If providing an IM injection into the deltoid muscle or vastus lateralis, take your nondominant hand and reach over the top of the site with your index finger and thumb on each side of the injection location. Squeeze your thumb and index finger together, slightly pinching the skin and underlying muscle.
 - b. If providing an IM injection into the ventrogluteal site, use your non-dominant hand to identify proper landmarks before inserting the needle.
16. Advise the patient of the stick, then insert the needle at a 90° angle.
 - a. Hold the syringe in your dominant hand between your thumb and index finger, and position the needle bevel up, at a 90° angle to the skin surface and about 1/2 in. from the skin's surface.
 - b. Plunge the needle firmly and quickly into the muscle.

Note: Always encourage the patient to relax the muscle you will be injecting because injections into tense muscles are more painful and may bleed more readily.

Caution: Do not administer the injection if an air bubble is in the syringe. Syringes are calibrated to administer the correct dose of medication, which will be altered if an air bubble exists.

17. Using your nondominant hand, grasp the plunger and slowly aspirate. Look for blood in the syringe. Release your hold on the skin with the nondominant hand and use it to support the syringe while you aspirate by pulling back slightly on the plunger of the syringe with your dominant hand.
18. If there is no blood in the syringe, inject the medication, remove the needle-syringe, hold pressure, and discard the needle and syringe into a sharps container.

Warning: The presence of blood indicates that you have entered a blood vessel. If blood is present, remove the needle, hold pressure on the injection site, discard the needle and syringe into a sharps container, and identify a new injection site.

Warning: Never inject medication into a sensitive muscle, especially a muscle that may be twitching or trembling when assessed. An injection into a sensitive, twitching muscle may cause sharp or referred pain; such as the pain caused by nerve trauma.

- a. Using a slow, continuous movement, completely depress the plunger and inject the medication.
- b. Place either an alcohol pad or sterile gauze pad lightly over the injection site and withdraw the needle at the same angle in which it was inserted.
- c. Discard the used needle into a sharps container.

Warning: Never attempt to recap a dirty needle.

19. Rub the area in a circular motion using the 2 × 2 gauze to disperse the medication into the tissue.
 - a. Ensure that this is not contraindicated for the type of medication injected.
 - b. Remove the gauze and check the injection site for bleeding or bruising.
 - c. Place an adhesive bandage over the site.
20. Monitor the patient for 20 minutes; watch for signs and symptoms of a developing allergic reaction. Document the injection in the patient's medical record. On the appropriate forms, record the date, time the injection was given, amount of medication given, site of administration, patient's response to injection, and any adverse reactions to the injection.

Warning: Have an emergency tray available for the immediate treatment of serious reactions. Include a syringe containing a 1:1,000 solution of epinephrine.

Check on Learning

21. When administering an IM injection, should you aspirate? Why or why not?
22. At what angle should the needle be inserted for IM injections?
23. When should IM injections be used rather than SQ or ID injections?
24. What are the preferred IM injection sites?

ALLERGIC REACTIONS

Allergic reactions (Figure 5-16), including anaphylaxis (the most extreme form of an allergic reaction), are always possible when administering an injection to a patient. Patients who suffer an anaphylactic allergic reaction are experiencing a life-threatening event that if untreated may quickly lead to death. Definitive signs of anaphylaxis are **stridor**, **bronchospasms**, and **hypotension**. Symptoms of an allergic reaction may begin within seconds or up to one hour; however, typical allergic reactions begin within minutes of exposure and may affect the skin, cardiovascular, and respiratory systems.



Figure 5-16. A patient displaying urticaria, an allergic reaction. Photograph by James Heilman, MD. Reproduced from Wikimedia Commons. <https://commons.wikimedia.org/wiki/File:EMminor2010.JPG>

Standard Approach to Anaphylactic Treatment

When treating a patient experiencing anaphylaxis, perform or provide the following:

- A primary assessment addressing all immediate life threats.
- High-flow oxygen (15 L/min) via a non-rebreather (NRB) or bag valve mask (if the patient requires manual ventilation).
- Baseline vital signs (blood pressure, pulse, and respirations).
- Albuterol at 2.5 mg nebulized for minor dyspnea or wheezing.
- Cardiac monitoring if capable.
- If systolic blood pressure is greater than 90 mmHg, establish an IV with normal saline at “to keep open” (TKO).

Note: If systolic blood pressure is lower than 90 mmHg, administer a 10 to 20 mL/kg fluid bolus to maintain a systolic blood pressure greater than 90 mmHg.

Note: Patients suffering true anaphylaxis rarely present with normal blood pressure.

- Diphenhydramine. For adults with moderate allergic reactions, administer 25 mg IM or IV push. For adults with severe allergic reactions or anaphylaxis, administer 50 mg IM or IV push.
- Epinephrine. For adults with respiratory distress indicators (eg, wheezing or stridor), administer an adult dose of epinephrine or 0.3 mg (1:1,000 concentration) SQ or IM.

Note: If treating a pediatric patient, consult the MO for dosages.

Note: For patients suffering severe allergic reactions, subcutaneous injections are absorbed very slowly and may not provide the needed medication fast enough to help the patient. Slow absorption is made worse when the patient is hypotensive. These patients should have medication administered via intramuscular injection.

Check on Learning

- 25. What are definitive signs of anaphylaxis?
- 26. Symptoms of an allergic reaction may begin within (time) _____ or up to _____.
- 27. What concentration of epinephrine is used to treat a patient suffering from anaphylaxis, through SQ or IM injection?
- 28. What is the dose of epinephrine to administer through SQ or IM injection to a patient suffering from anaphylaxis?
- 29. What is the dose of diphenhydramine to administer to a patient suffering from anaphylaxis?

SUMMARY

The ability to provide an injection is a basic skill for a combat medic. Proficiency in performing injections is paramount to ensuring that medication is provided properly and no harm is caused. Because significant harm can be caused by improper technique, standardization in preparation and administration is critical for patient protection. Proper selection of equipment, proper preparation of the patient, sterile technique during administration, proper disposal of contaminated equipment, and proper documentation will minimize risk of injury to both patients and combat medics.

ASSEMBLING THE NEEDLE AND SYRINGE



STEP 1: Don PPE.



STEP 2: Select and inspect equipment. Ensure that all packaging is properly sealed, not damaged, and not expired.



STEP 3: Unpack the syringe. Peel the sides of the wrapper and expose the rear end of the syringe.



STEP 4a: Inspect the syringe. Pull on the plunger and feel for the distinct “pop.”

ASSEMBLING THE NEEDLE AND SYRINGE, CONT.



STEP 4b: Grasp the flared end of the syringe and move the plunger back and forth to test for smooth, easy movement. Visually check the rubber stopper (inside the syringe) to ensure that it is attached securely to the top end of the plunger, forming a seal.



STEP 5b: If it is packaged in a hard plastic tube, twist the cap of the tube until a “pop” is felt and remove the cap to expose the needle hub.



STEP 6: To assemble the needle and syringe, first join them together by inserting the needle adapter of the syringe into the hub of the needle. Tighten the needle by turning it 1/4 of a turn to ensure that it is securely attached.



STEP 5a: Unpack the needle. Peel the sides of the flexible wrapper apart to expose the needle hub.



STEP 7: Place the assembled needle and syringe on the work surface, leaving the protective cover on the needle. Leave the plunger pushed fully into the barrel. Keep the assembled needle and syringe within sight.

RECAPPING THE NEEDLE



STEP 1: Prepare to slide the needle into the cap by placing the cap on a hard, cleared surface.



STEP 2: Insert the needle into the open end of the cap and lift the cap up, causing it to slide onto the needle.



STEP 3: Cover the needle with the cap, ensuring that the cap is secured to the needle hub.

DRAWING AND ADMINISTERING MEDICATION FROM A VIAL



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3a: Check and assemble equipment. Select the proper medication. Ensure that all packaging is properly sealed, not damaged, and not expired.



STEP 3b: Examine the vial. Inspect and ensure that the medication is not discolored and does not contain floating particles.



STEP 4a: Remove the cap from the medication.



STEP 4b: Clean the rubber stopper with an alcohol prep pad.

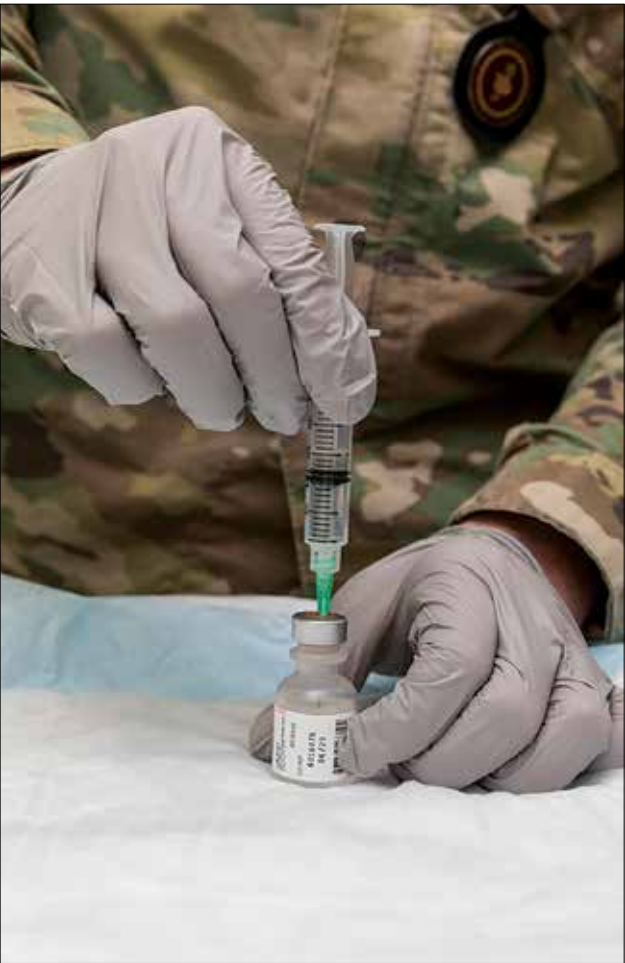
DRAWING AND ADMINISTERING MEDICATION FROM A VIAL, CONT.



STEP 5: Remove the cap from the needle safely.



STEP 6: Pull back on the plunger of the syringe, drawing up the correct amount of air into the syringe. Follow the directions on the vial, if provided.



STEP 7: Insert the needle into the medication vial on the table, pick up the needle and vial, and turn them upside down. Elevate the syringe and vial to eye level.



STEP 8: Push the plunger forward so air is pushed into the vial (see directions on insert of medication).



STEP 9: Withdraw the prescribed amount of medication from the vial.

DRAWING AND ADMINISTERING MEDICATION FROM A VIAL, CONT.



STEP 10: Remove the needle from the vial and recap it using the scoop method.



STEP 11a: Detach the 18 G needle and discard it into a sharps container. Attach the administration needle.



STEP 11b: Slowly advance the plunger of the syringe to expel the air bubble from the new administration needle prior to injecting the medication.



STEP 11c: Administer the injection.



STEP 12: Discard both the needle and the attached syringe; place them into a sharps container.

RECONSTITUTING MEDICATION



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3a: Check and assemble equipment. Select the proper medication from the storage area. Ensure that all packaging is properly sealed, not damaged, and not expired.



STEP 3b: Open the packaging on both the needle-syringe units and connect the hubs of the needles to the needle adapters on the syringes.



STEP 4a: Remove the caps from the diluent and medication vials.



STEP 4b: Cleanse both vials with alcohol prep pads.

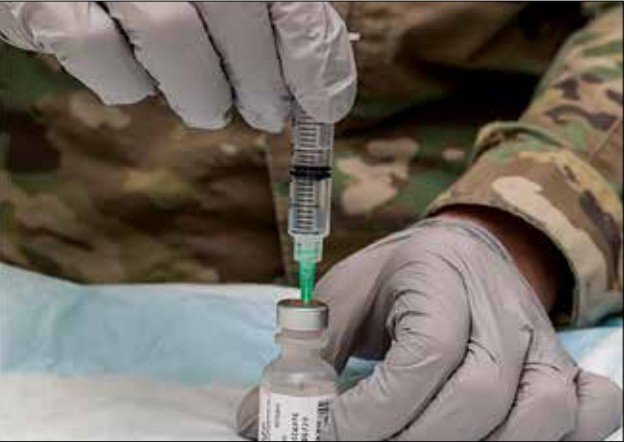
RECONSTITUTING MEDICATION, CONT.



STEP 5: Remove the protective cap from the 18 G needle-syringe unit safely.



STEP 6: Pull back on the plunger of the syringe, drawing up the correct amount of air into the syringe. Follow the directions on the vial, if provided.



STEP 7a: Insert the 18 G (or blunt) needle into the diluent vial on the table.



STEP 7b: Pick up the syringe and vial and turn them upside down. Elevate the syringe and vial to eye level.



STEP 8: Push the plunger forward so air is pushed into the diluent vial.



STEP 9: Pull back on the plunger, drawing up the correct amount of diluent from the vial.

RECONSTITUTING MEDICATION, CONT.



STEP 10: Withdraw the needle from the diluent vial and insert it into the medication vial on the table.



STEP 11: Inject the diluent into the medication vial.



STEP 12: Withdraw the needle and syringe from the medication vial and discard it into a sharps container.



STEP 13: Mix the medication well.

RECONSTITUTING MEDICATION, CONT.



STEP 14a: Safely remove the protective cap from the unused needle-syringe unit.



STEP 14c: Pick up the syringe and medication vial and turn them upside down. Elevate them to eye level. Pull back on the plunger and draw up the correct amount of medication from the vial.



STEP 14b: Place the medication vial on the table and insert the unused needle-syringe unit into vial.



STEP 14d: Verify the correct dosage.

DRAWING MEDICATION FROM AN AMPULE



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3: Check and assemble equipment. Select the correct medication from the storage area. Ensure that all packaging is properly sealed, not damaged, and not expired. Inspect and ensure that the medication is not discolored and does not contain floating particles.



STEP 4: Cleanse the neck of the ampule with an alcohol prep pad.



STEP 5: Using your nondominant hand, pick up the ampule. With your dominant hand, place the 2 × 2 gauze pad on the ampule, covering the neck and break line.



STEP 6: Break the neck of the ampule away from your body.

DRAWING MEDICATION FROM AN AMPULE, CONT.



STEP 7: Inspect the ampule for glass particles.



STEP 8: Using a syringe with an attached filter needle, withdraw the prescribed amount of medication from the ampule.



STEP 9: Remove the filter needle from the syringe and place it into a sharps container.



STEP 10: Attach the appropriate size administration needle to the syringe and administer the medication properly.



STEP 11: Directly after medication administration, discard the needle and attached syringe into a sharps container.

INTRADERMAL INJECTION



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3: Check and assemble equipment. Select the correct medication from the storage area. Ensure that all packaging is properly sealed, not damaged, and not expired. Inspect and ensure that the medication is not discolored and does not contain floating particles.



STEP 4: Remove the cap from the medication and cleanse the vial with an alcohol prep pad.



STEP 5: Remove the cap from the needle safely.



STEP 6: Pull back on the plunger of the syringe, drawing up the correct amount of air in the syringe.

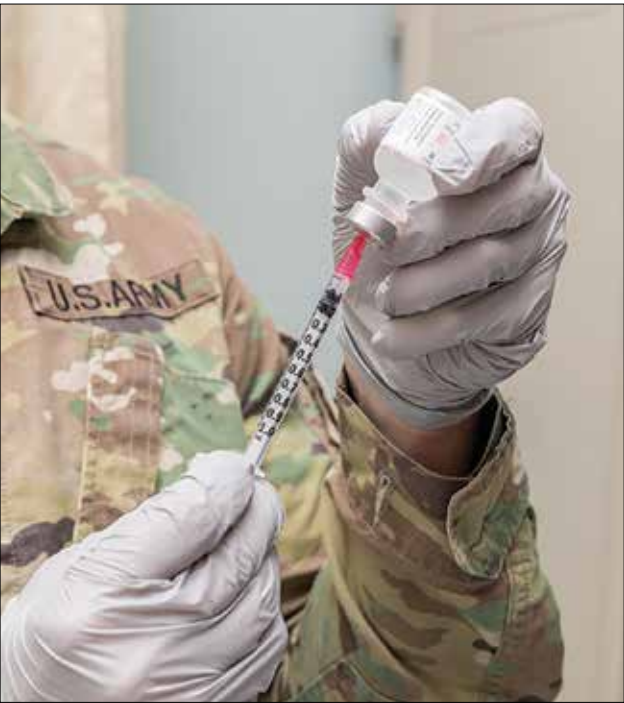
INTRADERMAL INJECTION, CONT.



STEP 7a: Insert the needle into the vial on the table, pick up the syringe and vial, and turn them upside down.



STEP 7b: Elevate the syringe and vial to eye level.



STEP 8: Push the plunger forward so air is pushed into the vial.



STEP 9: Withdraw the prescribed amount of medication from the vial by pulling back on the plunger to the desired milliliter mark.

INTRADERMAL INJECTION, CONT.



STEP 10: Remove the needle and recap it using the scoop method. Replace the 18 G (or blunt) needle with the administration needle.



STEP 11: Ensure the proposed injection area (forearm) is completely exposed with the muscle relaxed.



STEP 12: Identify the injection site (anterior mid-forearm). Ensure the site is free of hair, tattoos, and scars.



STEP 13: Clean the injection site with an alcohol prep pad in a spiral motion outward 3 inches.

INTRADERMAL INJECTION, CONT.



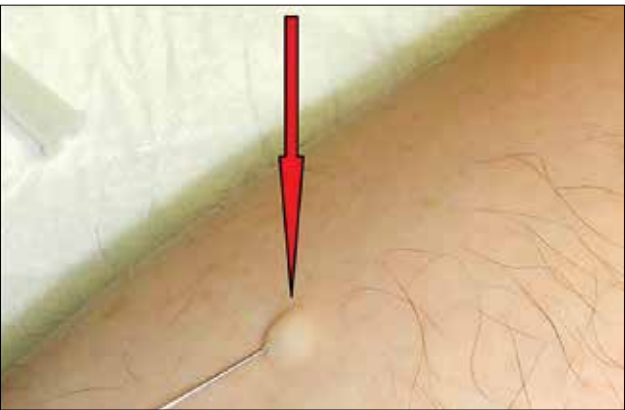
STEP 14: Remove the cap from the needle safely.



STEP 15: Using your nondominant hand, pull the skin taut toward the patient's hand.



STEP 16: Advise the patient of the stick, then insert the needle at a 5°–15° angle. Advance until the bevel is under the skin surface.



STEP 17: Inject the medication, ensuring the presence of a wheal. **Do not aspirate.** Remove the needle-syringe and place it into a sharps container. Do not rub the site.



STEP 18: Monitor the patient for 20 minutes and document the injection in the patient's medical record.

SUBCUTANEOUS INJECTION



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3: Check and assemble equipment. Select the correct medication from the storage area. Ensure that all packaging is properly sealed, not damaged, and not expired. Inspect and ensure that the medication is not discolored and does not contain floating particles.



STEP 4b: Cleanse the vial with an alcohol prep pad.



STEP 4a: Remove the cap from the medication.

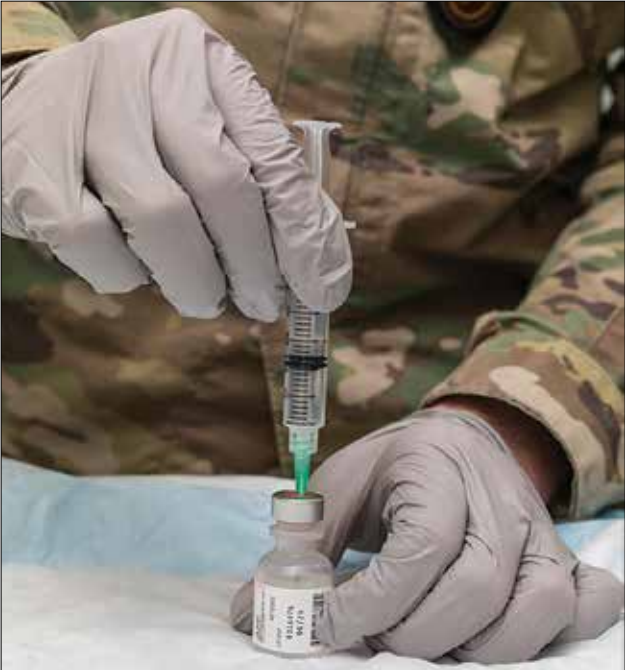


STEP 5: Remove the cap from the needle safely.

SUBCUTANEOUS INJECTION, CONT.



STEP 6: Pull back on the plunger of the syringe, drawing up the correct amount of air. Follow the directions on the vial, if provided.



STEP 7a: Insert the needle into the vial, pick up the syringe and vial, and turn them upside down.



STEP 7b: Elevate the syringe and vial to eye level.



STEP 8: Push the plunger forward so air is pushed into the vial.

SUBCUTANEOUS INJECTION, CONT.



STEP 9: Pull back on the plunger, drawing up the correct amount of medication.



STEP 11: Ensure the proposed injection area is completely exposed, with the muscle relaxed.



STEP 10: Remove the 18 G (or blunt) needle and recap it using the scoop method. Replace the 18 G (or blunt) needle with the administration needle.



STEP 12: Identify the injection site (halfway between the shoulder and the elbow, 1/3 of the way around laterally). The vastus lateralis of the anterior thigh is an alternate site.

SUBCUTANEOUS INJECTION, CONT.



STEP 13: Clean the injection site with an alcohol prep pad in a spiral motion outward 3 inches.



STEP 15: Using your nondominant hand, reach over the top of the site, placing your index finger and thumb on each side of the injection location. Squeeze your fingers together, slightly pinching the skin.



Step 14: Remove the cap from the needle safely.



STEP 16a: Advise the patient of the stick, then insert the needle in an upward motion at a 45° angle.

SUBCUTANEOUS INJECTION, CONT.



STEP 16b: Inject the medication.



STEP 16c: Remove the needle-syringe and place it into a sharps container.



STEP 18: Monitor the patient for 20 minutes and document the injection in the patient's medical record.



STEP 17: Rub the area in a circular motion, using the 2 × 2 gauze to disperse the medication into the tissue.

INTRAMUSCULAR INJECTIONS



STEP 1: Verify the 6 Rights. If the patient is female, ask if she could be pregnant.



STEP 2: Don PPE.



STEP 3: Check and assemble equipment. Select the correct medication from the storage area. Ensure that all packaging is properly sealed, not damaged, and not expired. Inspect and ensure that the medication is not discolored and does not contain floating particles.



STEP 4a: Remove the cap from the medication.



STEP 4b: Cleanse the vial with an alcohol prep pad.



STEP 5: Remove the cap from the needle safely.

INTRAMUSCULAR INJECTION, CONT.



STEP 6: Pull back on the plunger of the syringe, drawing up the correct amount of air into the syringe.



STEP 8: Push the plunger forward so air is pushed into the vial.



STEP 7: Insert the 18 G (or blunt) needle into the vial on the table, pick up the needle and vial, and turn them upside down. Elevate the syringe and vial to eye level.



STEP 9: Pull back on the plunger, drawing up the correct amount of medication.



STEP 10: Remove the 18 G (or blunt) needle and recap it using the scoop method. Discard the needle into a sharps container and replace it with the administration needle.

INTRAMUSCULAR INJECTION, CONT.



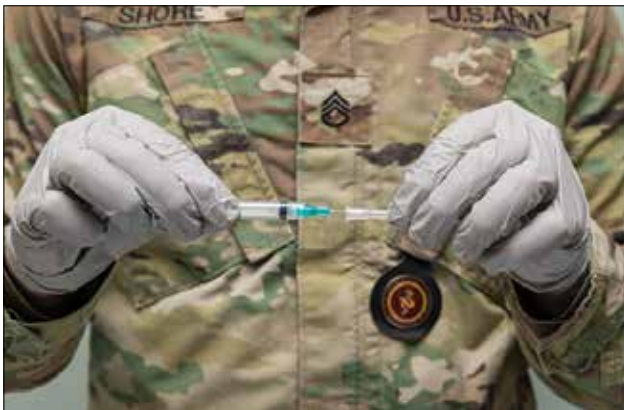
STEP 11: Ensure the proposed injection area is completely exposed, with the muscle relaxed.



STEP 12: Identify the injection site.



STEP 13: Clean the injection site with an alcohol prep pad in a spiral motion outward 3 inches.



STEP 14: Remove the cap from the needle safely.



STEP 15: Using your nondominant hand, reach over the top of the site with your index finger and thumb on each side of the injection location. Squeeze your finger and thumb together, slightly pinching the skin and underlying muscle.



STEP 16: Advise the patient of the stick, then insert the needle at a 90° angle.

INTRAMUSCULAR INJECTION, CONT.



STEP 17: Using your nondominant hand, grasp the plunger and slowly aspirate, observing for blood in the syringe.



STEP 18: If there is no blood in the syringe, inject the medication, remove the needle-syringe, hold pressure, and discard it into a sharps container.



STEP 19: Rub the area in a circular motion using the 2 × 2 gauze pad to disperse the medication into the tissue.



STEP 20: Monitor the patient for 20 minutes and document the injection in the patient's medical record.

KEY TERMS AND ACRONYMS

- Ampule.** A small glass container that can be sealed and its contents sterilized. This is a French invention for containing hypodermic solutions; it holds a premeasured, single medication dose.
- Anaphylaxis.** A systemic hypersensitivity reaction to an antigen, which can be life threatening if not treated quickly.
- Aspirate.** To draw in or out by suction.
- Atrophy.** A decrease in size or wasting away of a body part or tissue.
- Bronchospasms.** Contractions of smooth muscles in the airways that line the lungs. This narrows the airways.
- Diluent.** An agent that dilutes the substance or solution when mixed together.
- DOB.** Date of birth.
- Dorsogluteal.** Pertaining to the buttocks; the anatomic area just behind the back of hip.
- Enteral.** Through the gastrointestinal tract.
- G.** Gauge.
- Gauge.** The needle's inner diameter (also known as the bore), through which medication is administered. The gauge is stated using numbers; the larger the number, the smaller the bore or hole of the bevel.
- Hub.** The sterile piece that attaches to the tip of the syringe, also known as the hilt.
- Hypotension.** Abnormally low blood pressure.
- IAW.** In accordance with.
- Injection.** The forcing of a fluid into a vessel, tissue, or cavity.
- Intracutaneous.** Injection into the skin; used in giving serums and vaccines when a local reaction is desired.
- Intradermal.** Intracutaneous, or more specifically, within the dermis (ID); often used for diagnostic testing (skin tests). ID injections are shallow, given just beneath the epidermis. The inner aspect of the forearm is the most common injection site.
- Intramuscular.** Injection into muscle tissue (IM); usually the anterior thigh, deltoid, or buttocks. IM injection is used primarily in the administration of vaccines, immune globulins, corticosteroids, some antibiotics, some hormones, and sedatives.
- MO.** Medical officer.
- MTF.** Military treatment facility.
- Needlestick.** Accidental puncturing of the skin with an unsterilized needle; health care workers are especially at risk for injury while handling needles. Prevention of needlestick injury is essential because of the danger of exposure of those involved to infection from diseases transmitted by blood (eg, HIV, hepatitis B or C).
- Parenteral.** Medication administration through any other route other than the mouth and gastrointestinal tract.
- Prefilled syringe.** A single medication dose prepared by a manufacturer or pharmacy. If the entire amount of medication is not needed, the excess is discarded into a designated receptacle before dose administration.
- Reconstituted.** To restore to a former condition by adding liquid.
- Sharps container.** A container for disposal of needles, syringes, vials, ampules, and prefilled syringes according to local protocols.
- SOP.** Standard operating procedures.
- Stridor.** A harsh, high-pitched breath sound that occurs when there is obstruction of the airways.
- Subcutaneous.** An injection beneath the skin, into the adipose (fatty) tissues located below the dermis (SQ); typical sites include the abdomen, upper or outer arm, or the thigh.
- Syringe.** An instrument for injecting fluids into the body or its cavities.

Tuberculin syringe. A syringe commonly used for intradermal (ID) injections. The turberculin syringe has a very small diameter and can measure in hundredths of a milliliter, resulting in a very accurate measurement of very small amounts of liquid medication.

Vasovagal. Concerning the action of stimuli from the vagus nerve on blood vessels.

Vastus lateralis. One of the three large muscles of the thigh.

Ventrogluteal. An anatomic area of the upper lateral thigh.

Vial. A glass container equipped with a self-sealing rubber stopper; it may contain a single premeasured medication dose, or it may be a multi-dose vial.

Wheal. An elongated mark or ridge, such as a ridge produced by an intradermal injection.

CHECK ON LEARNING ANSWERS

1. What parts of the needle are sterile?
All parts of the needle (except the protective cover).
2. Put these needles in order from the largest to smallest diameters: 25 G, 18 G, 22 G.
18 G > 22 G > 25 G.
3. What factors influence the length of the needle that should be used for a particular injection?
Type of injection, size of the patient, injection site.
4. What parts of the syringe are sterile?
Needle adapter, inside the barrel, plunger.
5. How do you know which syringe to select?
The syringe should be large enough to hold the entire dose and the calibration small enough to draw up an accurate dose.
6. While preparing to administer an injection, the needle is removed from the flexible wrapper. Inadvertently, you drop the needle on the floor. The protective cap was in place when the needle touched the floor. Can the needle still be used? Why or why not?
No, the needle should not be used. All parts of the needle are considered sterile, including the hub. If the sterile hub touches the floor, it is no longer sterile. The contaminated hub could cause an infection.
7. How are clean needles recapped?
Place protective cover on work surface. With your dominant hand holding the syringe, scoop the needle into the cover. DO NOT hold the protective cover with your nondominant hand.
8. How do you determine that the correct amount of medication has been drawn?
Ensure the forward edge of the plunger is on the prescribed milliliter mark.
9. While attempting to dilute powdered medication, the diluent is difficult to inject. What should you do?
If the vial with the powdered medication contains air, some air may have to be withdrawn to allow the diluent to be injected.
10. How do you determine whether to mix reconstituted medication gently or vigorously?
Check the medication label or package insert.

11. You snapped the neck of the ampule and are inspecting the ampule. What are you looking for?
Small glass particles.
12. What should you do if you find something in the ampule?
Discard the ampule and get a new one.
13. What are the recommended sites for intradermal injections?
The ventral forearm (most common), the back of the upper arm, and on the back below the shoulder blade.
14. At what angle should the needle be inserted to deliver an intradermal injection?
A 5° to 15° angle.
15. If a wheal does not appear, what is your next course of action?
If a wheal does not appear, withdraw the needle completely from the arm at the angle of insertion and discard the needle and syringe into a sharps container. Prepare a new set, and repeat the procedure at another site at least 2 in. away from the initial test site.
16. Do intradermal injections require aspiration?
No.
17. When should SQ injections be used rather than ID or IM injections?
SQ injections should be used when an absorption rate slower than that of IM injections is desired. SQ absorption rate is slower than that achieved via the IM route.
18. What are possible sites for SQ injections?
SQ injections are usually given in the rear lateral aspect of the upper arm, halfway between the shoulder and the elbow and one-third of the way around laterally; in the vastus lateralis muscle; and in the abdomen.
19. At what angle should the needle be inserted for SQ injections?
Bevel up, at a 45° angle to the skin surface.
20. Into what type of tissue is the medication being delivered in SQ injections?
Subcutaneous tissue.
21. When administering an IM injection, should you aspirate? Why or why not?
Yes. Aspiration of the syringe will determine if the needle unintentionally entered a blood vessel, which could harm the patient if the drug or vaccine is directly injected into the blood vessel.
22. At what angle should the needle be inserted for IM injections?
A 90° angle.
23. When should IM injections be used rather than SQ or ID injections?
IM injections are used when rapid absorption rate (10–20 minutes) and long duration (hours to weeks) are desired. They are also preferred when administering viscous or irritating medications and when a large volume of medication is needed for a stronger effect.
24. What are the preferred IM injection sites?
Deltoid, vastus lateralis, and ventrogluteal muscles.

25. What are definitive signs of anaphylaxis?
Stridor, bronchospasm, and hypotension.
26. Symptoms of an allergic reaction may begin within (time) _____ or up to _____.
Seconds or up to 1 hour.
27. What concentration of epinephrine is used to treat a patient suffering from anaphylaxis, through SQ or IM injection?
1:1,000.
28. What is the dose of epinephrine to administer through SQ or IM injection to a patient suffering from anaphylaxis?
0.3 mg of 1:1,000 epinephrine.
29. What is the dose of diphenhydramine to administer to a patient suffering from anaphylaxis?
50 mg IV/IM.

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