

Subcutaneous injection



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Revised: May 19, 2025

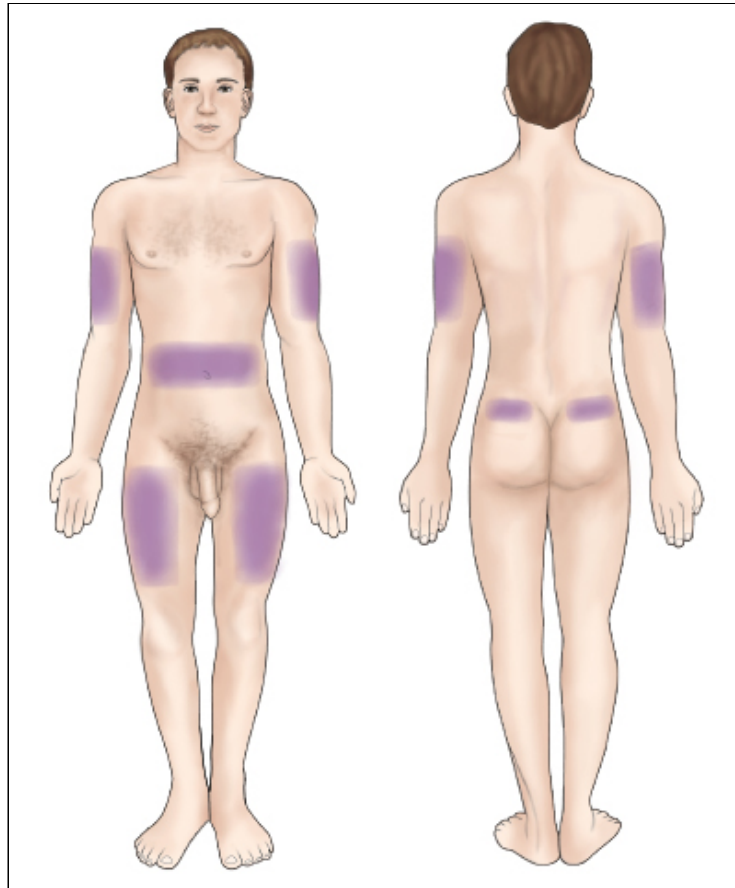
■ Introduction

Subcutaneous injection delivers a drug into the adipose (fatty) tissue beneath the skin.^[1] This method allows the drug to move into the bloodstream more rapidly than it would with oral administration because the body absorbs it mainly through the capillaries. When compared with intramuscular injection, subcutaneous injection provides slower, more sustained drug delivery; minimizes tissue trauma; and carries little risk of striking large blood vessels and nerves with the syringe needle.^[2]

Drugs recommended for subcutaneous injection include nonirritating aqueous solutions and suspensions in 0.5 to 2 mL of fluid.^[1] Larger volumes may cause discomfort and inadequate medication absorption. Heparin and insulin are usually administered subcutaneously; some patients with diabetes may benefit from an insulin infusion pump (see the "[Subcutaneous insulin infusion, continuous](#)" procedure).^[2] Some vaccines are also administered subcutaneously.

Subcutaneous injections use a relatively short needle. The most common sites are the outer aspect of the upper arm, anterior thigh, upper hips, buttocks, and loose tissue of the lower abdomen.^[2] (See [Locating subcutaneous injection sites](#).) Subcutaneous injections are contraindicated in sites that are inflamed, edematous, infected, scarred, or covered by a mole, birthmark, or other lesion.^[2] They may also be contraindicated in patients with impaired coagulation mechanisms.

LOCATING SUBCUTANEOUS INJECTION SITES
Subcutaneous injection sites include the fat pads on the abdomen, upper hips, buttocks, upper back, and lateral upper arms and thighs. For subcutaneous injections that are administered repeatedly such as insulin, rotate sites. Choose one injection site in one area, move to a corresponding injection site in the next area, and so on. When returning to an area, choose a new site in that area. Preferred injection sites for insulin (highlighted below) are the arms, abdomen, thighs, and buttocks. The preferred injection site for heparin is the lower abdominal fat pad, just below the umbilicus.



■ Equipment

- 1- to 3-mL syringe
- 25G to 30G $\frac{1}{2}$ " (1.3-cm) to $\frac{5}{8}$ " (1.6-cm) needle
- Antiseptic pads
- Gauze pads
- Patient's medication administration record
- Prescribed medication
- Optional: gloves, insulin syringe with attached 25G to 31G needle, label, other personal protective equipment

■ Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your facility.

■ Implementation

- Avoid distractions and interruptions when preparing and administering medication *to prevent medication errors*.^{3 4}
- Verify the practitioner's order.^{5 6 7 8}
- Reconcile the patient's medications at each care transition and when the practitioner prescribes a new medication *to reduce the risk of medication errors, including omissions, duplications, dosing errors, and drug interactions*.^{9 10}
- Gather and prepare the necessary equipment and supplies.
- Compare the medication label to the order in the patient's medical record.^{5 6 7 8}

- Check the patient's medical record for an allergy or a contraindication to the prescribed medication. If an allergy or a contraindication exists, don't administer the medication and notify the practitioner.^{5 6 7 8}
- Check the expiration date on the medication. If the medication is expired, return it to the pharmacy and obtain new medication.^{5 6 7 8}
- Visually inspect the medication for particles, discoloration, or other loss of integrity. Don't administer the medication if integrity is compromised.^{5 6 7 8}
- Discuss any unresolved concerns about the medication with the patient's practitioner.^{5 6 7 8}
- Calculate the dosage. Have another nurse verify your calculations, if necessary.

♦ **Clinical alert:** Insulin and heparin are considered high-alert medications *because they can cause significant patient harm when used in error.*¹¹ ♦

- If required by your facility, before administering insulin or heparin, have another nurse perform an independent double-check *to verify the patient's identity and make sure that you have the correct medication in the prescribed strength or concentration, the medication's indication corresponds with the patient's diagnosis, the dosage calculations are correct and the dosing formula used to derive the final dose is correct, the prescribed route of administration is safe and proper for the patient, and the prescribed time and frequency of administration are safe and proper for the patient.*¹²
- After comparing the results of the independent double-check with another nurse, administer the medication if there are no discrepancies. If discrepancies exist, rectify them before administering the medication.¹²
- Perform hand hygiene.^{13 14 15 16 17 18}

♦ **Clinical alert:** If your facility's hazardous drug list contains the drug you're about to administer, put on personal protective equipment as directed.¹⁹ ♦

- If you need to draw up the medication for injection, read the label again as you draw it up. (See [Drawing up medication for injection.](#)) If you aren't going to administer the medication immediately, label the syringe *to help prevent medication administration errors.* Immediate administration of a medication includes preparation, direct transport to the patient, and administration without any break in the process.^{20 21}

DRAWING UP MEDICATION FOR INJECTION

The technique to use for drawing up medication for injection will vary according to the type of medication container.

Single-dose ampules

To draw up the medication from a single-dose ampule, follow these steps:

- Disinfect the neck of the ampule with an alcohol pad before breaking it.²²
- Wrap a gauze pad around the ampule's neck and snap off the top, directing the force away from your body. Alternatively, insert the ampule's head into an ampule breaker.
- Attach a filter needle to the syringe and withdraw the medication, keeping the needle's bevel tip below the level of the solution.
- Tap the syringe *to clear air from it.*
- Cover the needle with the needle sheath.
- Before discarding the ampule, check the medication label against the patient's medication administration record.^{5 6 7 8}
- Detach the filter needle and discard the filter needle and ampule in a puncture-resistant sharps container.
- Attach the appropriate needle to the syringe.

Single-dose or multidose vials

Whenever possible, use a single-dose vial. If a single-dose vial isn't available, dedicate multidose medication vials to one patient whenever possible *to reduce the risk of bloodborne pathogen transmission and infection.*

If you must use multidose vials for more than one patient, keep and access them in a dedicated medication preparation area away from immediate patient treatment areas *to prevent inadvertent contamination of the vial through direct or indirect contact with potentially contaminated surfaces or equipment that could lead to infections in subsequent patients.* [22](#) [23](#) [24](#)

Reconstitute powdered medications according to the manufacturer's prescribing information.

To draw up the medication from a single-dose or multidose vial, follow these steps:

- Roll the vial between your palms *to ensure that the drug is mixed equally throughout.*
- Remove the vial lid.
- Disinfect the vial's rubber stopper with an antiseptic pad using friction; allow it to dry. [22](#) [25](#)
- Pull the syringe plunger back until the volume of air in the syringe equals the volume of drug you'll withdraw from the vial.
- Without inverting the vial, insert the needle into the vial.
- Inject the air, invert the vial, and keep the needle's bevel tip below the level of the solution as you withdraw the prescribed amount of medication.
- Tap the syringe *to clear any air from it.*
- Remove the needle from the vial.
- Cover the needle with the needle sheath.
- Check the medication label against the patient's medication administration record before discarding the single-dose vial or returning the multidose vial to the shelf. [5](#) [6](#) [7](#) [8](#)

- Perform hand hygiene. [13](#) [14](#) [15](#) [16](#) [17](#) [18](#)
- Confirm the patient's identity using at least two patient identifiers. [26](#)
- Provide privacy. [27](#) [28](#) [29](#) [30](#)
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation.* [31](#) Answer any questions the patient has about the procedure. [32](#) [33](#)
- If the patient is receiving the medication for the first time, teach the patient and family (if appropriate) about potential adverse reactions and discuss other concerns related to the medication. [5](#) [6](#) [7](#) [8](#)
- Verify that you're administering the medication at the proper time, in the prescribed dose, and by the correct route *to reduce the risk of medication errors.* [5](#) [6](#) [7](#) [8](#)
- If your facility uses bar-code technology, use it as directed by your facility. 
- Assess the patient's condition *to determine the need for the medication.*
- Select an appropriate injection site. Rotate sites according to a schedule for repeated injections using different areas of the body unless contraindicated. [34](#) (For example, you should inject heparin only in the abdomen if possible.)
- Position the patient and expose the injection site. If appropriate, raise the bed to waist level before providing care *to prevent caregiver back strain.* [35](#)
- Perform hand hygiene. [13](#) [14](#) [15](#) [16](#) [17](#) [18](#)
- Put on gloves if contact with blood or body fluids is likely or if your skin or the patient's skin isn't intact. [36](#) [37](#) [38](#) Gloves aren't required for routine subcutaneous injections *because they don't protect against needlestick injury.* [25](#) [39](#)

- Clean the injection site with an antiseptic pad, beginning at the center of the site and moving outward in a circular motion. Allow the skin to dry before injecting the drug *to avoid a stinging sensation caused by introducing antiseptic into the subcutaneous tissue.* ³⁹ ⁴⁰ 
- Remove the protective needle sheath. 
- With your nondominant hand, grasp the skin around the injection site firmly *to elevate the subcutaneous tissue*, forming a 1" (2.5-cm) fat fold. 
- While grasping the skin with your nondominant hand, use your dominant hand to position the syringe over the injection site with the needle bevel up. Don't touch the needle. 
- Tell the patient to expect to feel a needle prick.
- Insert the needle quickly in one motion at a 45- or 90-degree angle. (See [Technique for subcutaneous injection.](#)) 
- Release the patient's skin *to avoid injecting the drug into compressed tissue and irritating nerve fibers.* 

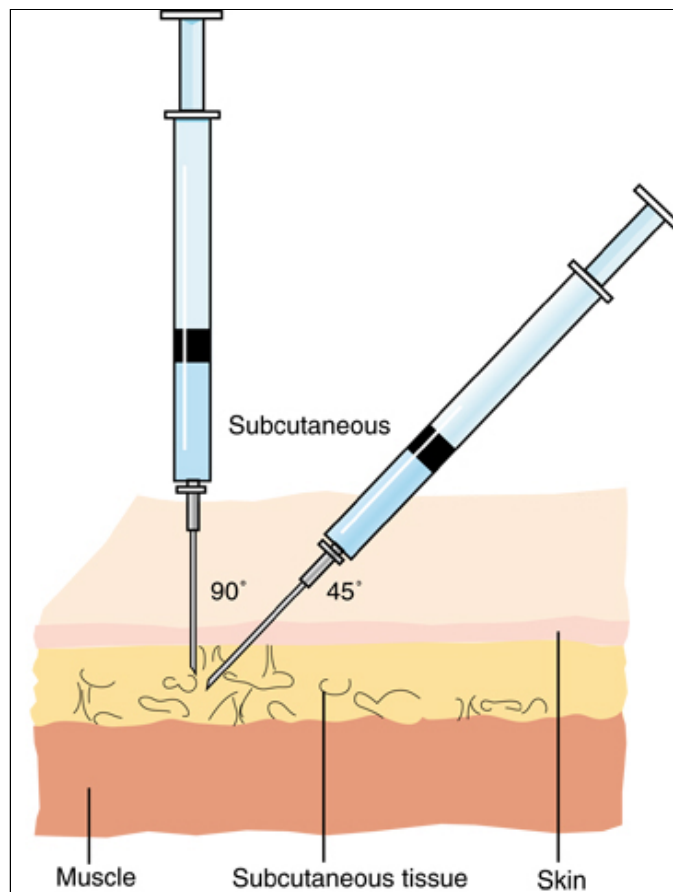
TECHNIQUE FOR SUBCUTANEOUS INJECTION

Follow these steps for correct subcutaneous injection technique.

Before giving the injection, elevate the subcutaneous tissue at the site by grasping it firmly (as shown below).



Insert the needle at a 45- or 90-degree angle to the skin's surface, depending on needle length and the amount of subcutaneous tissue at the site (as shown below). Some medications (such as heparin) always require injection at a 90-degree angle.



- Inject the medication.
- Remove the needle gently but quickly at the same angle you used for insertion and, if present, activate the safety mechanism, *to prevent accidental needlestick injury*.^[36]
- Cover the site with a gauze pad and apply gentle pressure. Don't massage the site.^[2]
- Remove and discard the gauze pad.^[36]
- Check the injection site for bleeding and bruising.
- Observe the patient carefully for a rash, pruritus, cough, and other signs of an adverse reaction to the medication.
- If appropriate, return the bed to the lowest position *to prevent falls and maintain the patient's safety*.^[41]
- Discard the syringe and needle in a puncture-resistant sharps container. *To avoid needlestick injuries, don't resheath the needle.*^[36]
- Remove and discard your gloves if worn.^[36]
- Perform hand hygiene.^{[13] [14] [15] [16] [17] [18]}
- Document the procedure.^{[42] [43] [44] [45]}

■ Special Considerations

- Note that aspiration for blood is no longer recommended *because subcutaneous injections rarely result in administration into the bloodstream*.^[2] Aspiration for blood also isn't recommended for immunization and vaccine administration.^[46]
- Don't draw up vaccine doses into a syringe until immediately before administration.^[39]
- When using a prefilled syringe, adjust the angle and depth of insertion according to the needle length.
- The Joint Commission issued a sentinel event alert concerning the transmission of pathogens related to the misuse of vials that have caused viral and bacterial infections, including hepatitis B, hepatitis C, meningitis, and epidural abscesses. These infections have been attributed to the reuse of single-dose

vials that don't typically contain preservatives, reentering multidose vials with used syringes and needles, and using multidose vials for multiple patients. To prevent these infections, follow evidence-based best practices, such as disinfecting the vial's rubber stopper before piercing, using single-dose vials only once and then discarding the vial, dedicating multidose vials to a single patient, and using a new syringe and needle when reentering a multidose vial. Assign the appropriate "beyond-use" date when first entering a multidose vial, and store multidose vials as directed by your facility and according to the manufacturer's instructions.^[24]

For insulin injections

- *To establish more consistent blood insulin levels*, rotate insulin injection sites within anatomic regions. Preferred insulin injection sites are the arms, abdomen, thighs, and buttocks.^[34]
- Make sure that the type of insulin, unit dosage, and syringe are correct.
- When combining insulins in a syringe, make sure they're compatible. Follow your facility's guidelines regarding which type of insulin to draw up first.
- Before drawing up an insulin suspension, roll and invert the bottle gently. Don't shake the bottle, *because shaking can cause foam or bubbles to develop in the syringe.*^[2]
- Insulin may be administered through an inserted insulin pump; however, before administering the drug, make sure that the patient doesn't already have a pump in place.

For heparin injections

- The preferred site for heparin injections is the lower abdominal fat pad 2" (5 cm) beneath the umbilicus between the right and left iliac crests. *Injecting heparin into this area, which isn't involved in muscle activity, reduces the risk of local capillary bleeding.* Always rotate the site from one side to the other.^[2]
- Inject the drug slowly into the fat pad.
- Remove the needle quickly after injection and apply an alcohol pad with pressure to the site for 5 to 10 seconds *to prevent loss of heparin.*^[47]
- Don't administer any injections within 2" (5 cm) of a scar, a bruise, or the umbilicus.^[2]
- Don't rub or massage the site after the injection *because doing so can cause localized minute hemorrhages and bruises.*
- If the patient bruises easily, apply a cold pack to the site for the first 5 minutes after the injection *to minimize local hemorrhage*, and then apply pressure.

■ Patient Teaching

If the patient will self-administer subcutaneous injections at home, teach the patient and family (if applicable) about the medication and the technique for performing the injection. Advise the patient to never share needles, syringes, prefilled pens, cartridges, or reusable pens with another person, even if the needle is changed, because sharing places the patient at risk for transmission of blood-borne pathogens.^[34] Have the patient perform a return demonstration to determine medication administration competency. (See [Using a subcutaneous injector.](#))



PATIENT TEACHING

USING A SUBCUTANEOUS INJECTOR

Available for use by patients at home, a subcutaneous injector features a disposable needle or pressure jet to deliver a dose of a prescribed medication, such as EPINEPHrine, insulin, and noninsulin diabetes medications. This device delivers medication safely and accurately. Some brands have disposable needles and replaceable cartridges. Others require the patient to draw medication from standard bottles. There are several types of subcutaneous injectors, including an EPINEPHrine autoinjector, a diabetes medication pen, and a pressure jet.

EPINEPHrine autoinjector

To use an EPINEPHrine autoinjector, the patient grasps the unit in the dominant hand. When ready to inject, the patient activates the unit by removing the gray activation cap. Then the patient thrusts the device into the outer thigh (through clothing if necessary) at a 90-degree angle and holds it in place for several seconds.

Diabetes medication pen

To use an insulin or a noninsulin diabetes medication pen, the patient attaches a needle to the pen and dials in the dose. Then the patient injects the needle into the site and presses and holds the button for several seconds to deliver the insulin or other diabetes medication.

Pressure jet

A pressure jet deposits the drug in subcutaneous tissue without a needle. This type of device is relatively expensive but is easy to use. The patient places the device against the skin and pushes a button, causing a jet of air to force the medication through the skin. Advise the patient to follow the manufacturer's instructions for preparation and use.

■ Complications

Complications associated with subcutaneous injection may include:

- adverse reaction (related to the action of the medication)
- sterile (abscess from concentrated and irritating solutions)
- lipodystrophy (a localized reaction that affects adipose tissue; from repeated injections at the same site).³⁴

■ Documentation

Documentation associated with subcutaneous injection includes:

- medication administered
 - medication name
 - medication strength
 - dose
 - route of administration
 - site of administration
 - date and time of administration
- adverse reactions
 - name of practitioner notified
 - date and time of practitioner notification
 - prescribed interventions
 - response to those interventions.⁴⁸
- teaching provided to the patient and family (if applicable)
 - understanding of that teaching
 - follow-up teaching needed.

This procedure has been reviewed by the Academy of Medical-Surgical Nurses.



■ Related Procedures

- [Midline catheter dressing change, pediatric](#)
- [Subcutaneous injection, ambulatory care](#)

- [Subcutaneous injection, home care](#)
- [Subcutaneous injection, pediatric](#)
- [Subcutaneous injection, pediatric, ambulatory care](#)

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([Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions](#))

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Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is adapted from *Evidence-Based practice in nursing & healthcare: A guide to best practice*, Fifth edition, by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt (2023).

Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)
Level II	Evidence from well-designed single RCTs (experimental)
Level III	Evidence from well-designed nonrandomized controlled trials (quasi-experimental), systematic reviews of a complete body of evidence, and intervention studies using mixed methods
Level IV	Evidence from well-designed case-control and cohort studies (observational)
Level V	Evidence from systematic reviews of qualitative and descriptive studies
Level VI	Evidence from single descriptive and qualitative studies, evidence-based practice implementation, and quality improvement projects
Level VII	Evidence from expert opinion, expert committee reports, and literature reviews

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