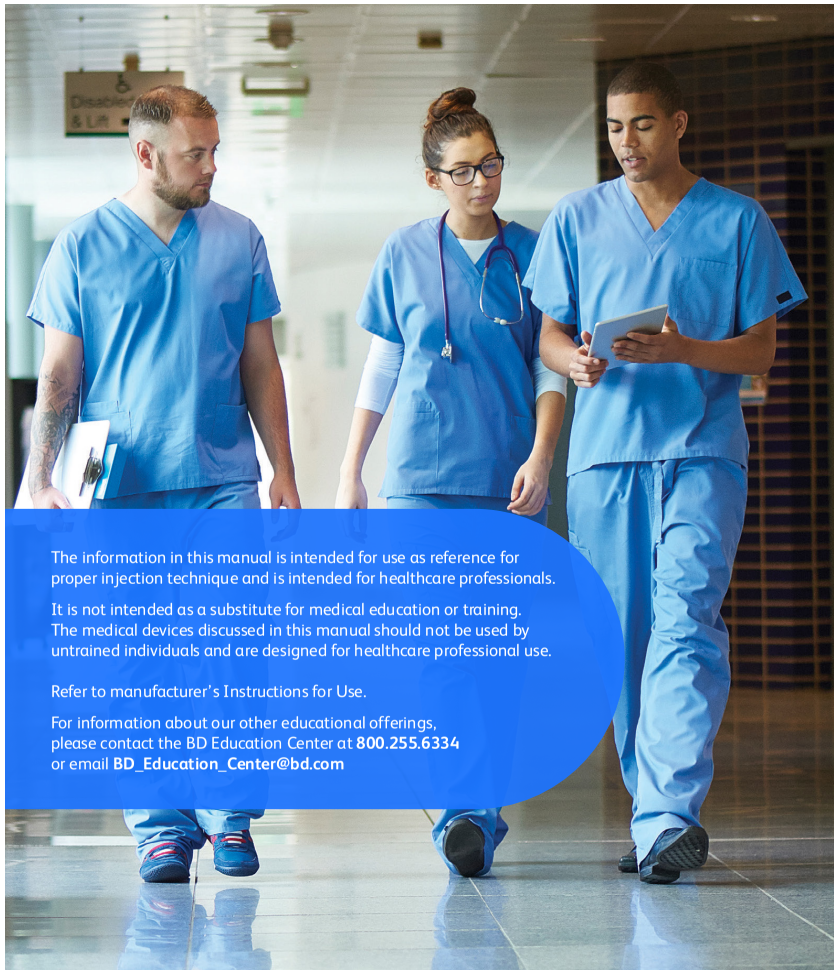
Principles of injection technique



BD



The information in this manual is intended for use as reference for proper injection technique and is intended for healthcare professionals.

It is not intended as a substitute for medical education or training. The medical devices discussed in this manual should not be used by untrained individuals and are designed for healthcare professional use.

Refer to manufacturer's Instructions for Use.

For information about our other educational offerings, please contact the BD Education Center at **800.255.6334** or email **BD_Education_Center@bd.com**

Table of contents

Introduction 3

Selection 4

- Selecting the devices
- Anatomy of the hypodermic needle
- Anatomy of the syringe
- Practice guidelines for needle length and gauge selection

Preparation 8

- Considerations before device assembly
- Devices and equipment
- Filling the syringe

Administration 11

- Skin preparation
- Injection routes
  - Intramuscular
  - Subcutaneous
  - Intradermal

Disposal 16

- Safe use and disposal of sharps
- Selecting, evaluating and using sharps disposal containers

References 18

Appendix 19

- Needlestick prevention
  - Needlestick Safety and Prevention Act
  - Safety-engineered device technologies

Introduction

The process for giving an injection includes some basic steps. This manual divides the injection process into four categories. Upon completion of this booklet, the participant should have an understanding of:

Selection

List factors that need to be considered when selecting a syringe and needle for an injection.

Preparation

Describe the following components of medication preparation, assembling, preparing and checking.

Administration

List the medication volumes that can safely be injected into the following areas: intramuscular, subcutaneous and intradermal.

Disposal

Describe the four safety performance criteria for sharps disposal containers.



This booklet is intended to educate healthcare workers with information on how to prepare and administer skin injections safely and correctly.

The basic topics, standard for all injections, discussed in the following pages, are:

- Assessment of patient—this manual assumes that the healthcare worker has basic knowledge and education on proper patient assessment
- Type of injection
- Site selection
- Selection and assembly of supplies and devices
- Injection administration
- Safe disposal of waste materials



Selection

Selecting the devices

There are many different syringes and needles suiting many different procedures. It is important to choose the needle and syringes carefully according to the type of injection to be administered. For example, the length and gauge of needle and type of syringe must be suitable for the injection site, viscosity and volume of medication. The BMI, age and condition of the patient are other key factors in the selection process.[1]

The anatomy of the hypodermic needle

Bevel

The bevel is the sharpened angular tip at the end of the needle.

Below are three types of bevels used for skin injection:

Regular bevel[1]
The most common bevel, used for a vast majority of applications. Typically used for intramuscular and subcutaneous injections.



Short bevel[2]
Used for specialty applications such as arterial blood gas sampling and nerve blocks.



Intradermal bevel[3]
This needle bevel is used primarily for skin testing (e.g., allergy tests).



Hub

Allows user to attach the needle to a syringe by either a luer lock or a luer slip connection. Safety-engineered needles are color coded to denote the gauge of the needle. (See chart on page 7.)



Product photo enlarged, not actual size

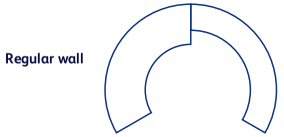
Needle

Most needles are made of stainless steel, which is lubricated to allow easier penetration force. Available in different lengths and gauges to suit individual clinical and patient needs.

There are two types of needle walls[4]**:**

Regular wall
This is the most common wall thickness. The thickness of the steel wall minimizes flexing when the needle is inserted into a vial stopper or patient.

Thin wall
As shown in the diagram, the thin wall needle has a narrower steel wall, allowing a greater volume of fluid to pass through it. The flow rate is typically equivalent to that of a regular wall needle one gauge larger. This is especially important with very thin needles.



Safety mechanism

Designed to protect healthcare workers from accidental needlestick injuries. Safety technology for hypodermic needles includes shielding and sliding mechanisms.

The anatomy of the syringe

Stopper

Prevents leakage of medication around the plunger, and acts as an indicator for measuring the syringe's contents (see diagram).



Align intended dosage here

Scale markings

Scale markings are typically in milliliters (mL).

Barrel

Reservoir for holding liquid, clearly graduated to allow accurate and visual measurement of the syringe's contents.

Flanges

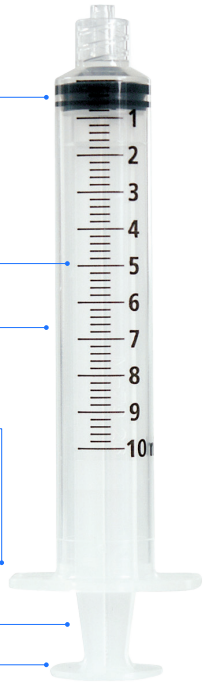
The "wings" that extend out from the side of the syringe barrel that provide an area or surface for the index finger and middle finger to grasp during aspiration or administration.

Plunger rod

A piston-like device inside the barrel.

Thumb press

Area where clinician presses to push plunger rod down into barrel to expel contents.





Luer lock tip
Generally used for injections requiring a secure connection of the syringe to another device. The tip is threaded for a "locking" fit and is compatible with a variety of needles, catheters and other devices.



Luer slip tip
A friction-fit connection that requires the clinician to insert the tip of the syringe into the needle hub or other luer connection in a push-and-twist manner. This will ensure a connection that is less likely to detach. Simply sliding the attaching device onto the syringe tip may not ensure a secure fitting.



Eccentric luer slip tip
Allows for work requiring closer proximity to the skin. Generally used for venipunctures and aspiration of fluids. (Also see luer slip instructions above.)



Catheter tip
Used for flushing (cleaning) catheters, gastrostomy tubes and other devices. Insert catheter tip securely into catheter or gastrostomy tube. If leakage occurs, refer to your facility's guidelines.



Permanently attached needle
Most commonly found in insulin and tuberculin syringes. Permanently attached needles, also known as integral needles.

Practice guidelines for needle length and gauge selection[5]

Intramuscular (IM)*	Location of injection	Needle length	Needle gauge	Needle angle
Pediatric				
Infants <12 months	Vastus lateralis muscle (<0.5 mL vol.)	22–25 mm	25–27 G	90°
Toddlers and children (12 months to 18 years)	Deltoid muscle Ventrogluteal site Dorsogluteal site (not recommended for <3 years) Vastus lateralis muscle	22–30 mm	22–25 G	90°
Adult				
>18 years	Deltoid muscle Ventrogluteal site (may be best site for cachectic adults) Dorsogluteal site (avoid in obese adults) Vastus lateralis muscle	25–40 mm (up to 76 mm for large adults)	19–25 G	90°
Subcutaneous (SubQ)	**Location of injection**	**Needle length**	**Needle gauge**	**Needle angle**
Pediatric to adult	Anterolateral thigh Upper outer tricep area; upper buttocks Abdomen (avoid 50 mm radius around umbilicus)	Insulin delivery: 4–13 mm Other injections: 13–16 mm	Insulin delivery: 29–32 G Other injections: 26–31 G	45–90°
Intradermal (ID)	**Location of injection**	**Needle length**	**Needle gauge**	**Needle angle**
Pediatric to adult	Anterolateral aspect of forearm Upper chest Upper back Back of upper arm	10–19 mm	26–28 G	10–15°

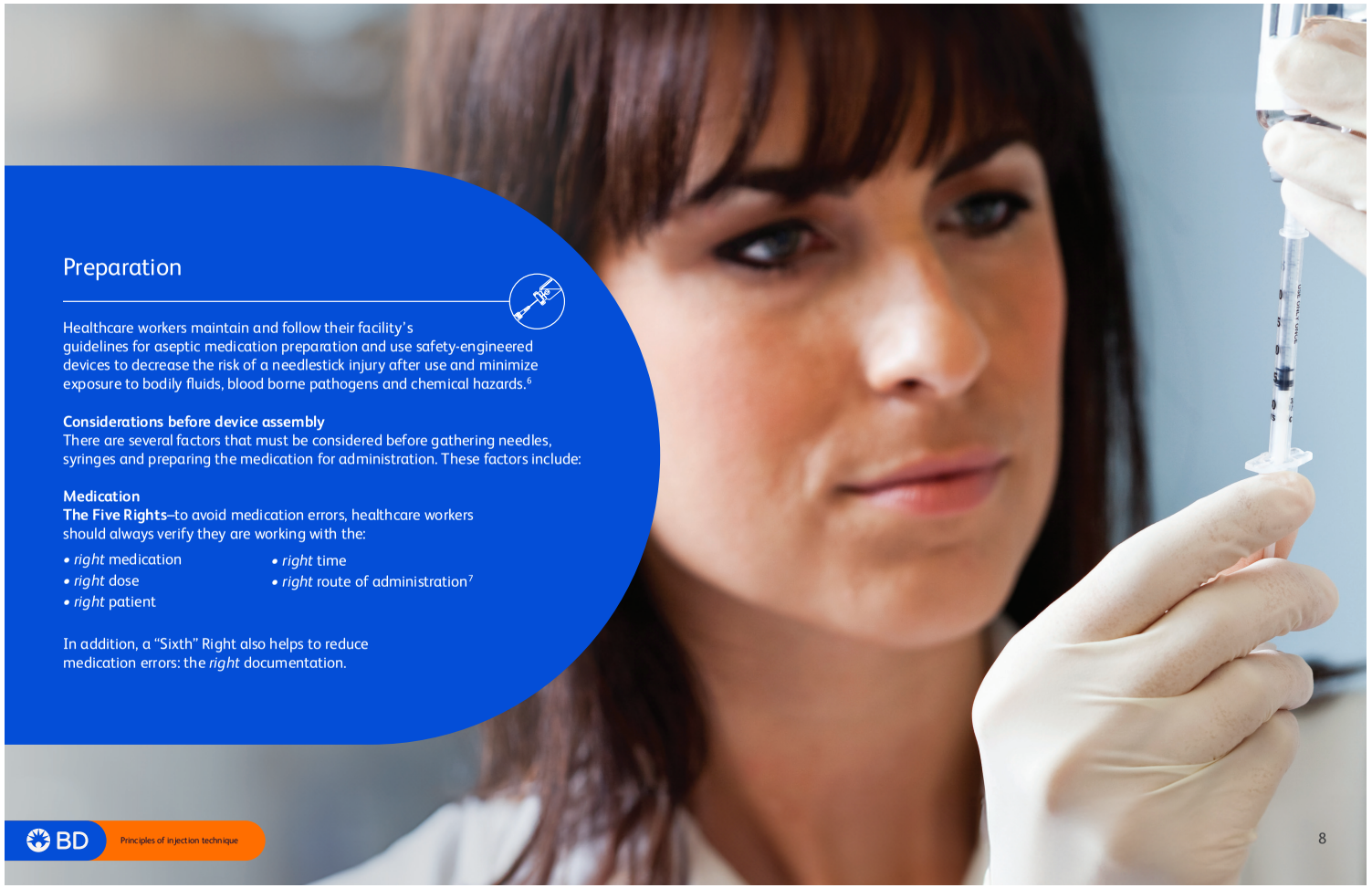
ISO hub color standards for safety-engineered needles



Needle length dependent on age, physical condition and medication requirements.

This information is being provided for convenience and is not intended to replace clinical decision making. Each clinician is solely responsible for determining the correct needle for each patient.

*Prior to administering an IM injection, refer to your procedure manual to determine the injection site utilizing body landmarks.



Preparation

Healthcare workers maintain and follow their facility's guidelines for aseptic medication preparation and use safety-engineered devices to decrease the risk of a needlestick injury after use and minimize exposure to bodily fluids, blood borne pathogens and chemical hazards.[6]

Considerations before device assembly
There are several factors that must be considered before gathering needles, syringes and preparing the medication for administration. These factors include:

Medication
The Five Rights–to avoid medication errors, healthcare workers should always verify they are working with the:

- *right* medication
- *right* dose
- *right* patient
- *right* time
- *right* route of administration[7]

In addition, a "Sixth" Right also helps to reduce medication errors: the *right* documentation.

Devices and equipment

Assembling devices and equipment[7]

In preparation for an injection, it is essential to assemble all the devices and equipment first at a sterile work area. This generally includes:

- Medication order
- Alcohol swabs
- Sharps disposal container
- Medication vial/ampule
- Gloves
- Syringe and needle of appropriate size

Preparing the devices and equipment

1. After the equipment has been assembled, perform hand hygiene. Medications are usually supplied as a liquid in a single-dose ampule, vial or multidose vial. A single-dose vial is intended for use in a single patient. If multidose vials are used, both the needle and syringe used to access the multidose vial must be sterile.

2. Before opening, read the information on the syringe and needle packages. Verify that length and gauge are appropriate. Check that the seals have not been broken; sterility is assured only if the packages are unopened and undamaged.

3. Open the syringe and needle packages **(Fig. 1)**. If the syringe and needle are not one unit, connect the syringe tip to the hub of the needle. Always ensure a secure connection between the needle and syringe. Avoid contamination by not touching the hub of the needle or tip of the syringe.



Fig. 1

Proper aseptic technique

Open the packages by holding the peel tabs, and peel them back only enough to expose the hub of the needle **(Fig. 1)** or the plunger rod of the syringe **(Fig. 2)**.

If presenting to a sterile field or performing a sterile transfer, be sure to peel the tabs back far enough to allow for easy access or release of the product. If necessary, you may open the packages but leave the products inside of them. Do not remove the syringe or needle from the sterile package and place on a nonsterile surface. This will reduce the likelihood of touch contamination. It will also reduce the potential for contamination of the fluid path.



Fig. 2

Connect the hub of the needle to the tip of the syringe using a clockwise twisting motion **(Fig. 3)**. If using a luer slip tip syringe, be sure to apply force to the needle hub when twisting to ensure a secure fit.



Fig. 3

Checking the medication

It is essential to:

1. Check medication against the prescription, including ensuring the correct dose/strength.
2. Check time and date the medication is to be given and that it is for the correct patient.
3. Check medication and diluent (if required) to ensure integrity (i.e., not cloudy or discolored, no particulate matter).
4. Check expiration date and concentration of medication and diluents (if applicable) **(Fig. 4)**.



Fig. 4

Passive recapping

If recapping is necessary for medication transport, it is preferred that clinicians use a one-handed technique.

The one-handed scoop technique uses the needle itself to pick up the needle shield, and then the shield is pushed up against a hard surface to ensure a tight fit onto the device.

If a hard surface is not available, when the cap covers the needle completely, use the other hand to secure the cap on the needle hub. Be careful to handle the cap at the bottom only (near the hub).

Never use two hands to begin the needle recapping process **(Fig. 5)**.



Fig. 5

Filling the syringe



Vial

Blunt fill and blunt filter needles help reduce the risk of needlestick injuries during medication preparation.[8]



For medication preparation.
Not for skin injection.



Ampule

A blunt fill needle with filter is designed to prevent large particles from being drawn into the syringe when preparing medications from ampules.[7]



For medication preparation.
Not for skin injection.

From an ampule or a multidose vial[7]

	Vial	Ampule
1.	Read label on vial/ampule, confirm correct medication/fluid, dose and concentration.	
2.	After removing vial cap, clean stopper with alcohol swab.	Tap head of ampule to unseat any fluid lodged at top.
3.	Remove needle shield from a blunt fill needle.	Clean neck with alcohol swab; holding the head of the ampule with both thumbs and pressing in the direction away from the body, snapping the neck open. Discard ampule head and swab in sharps collector.
4.	Draw into the syringe a volume of air equal to the amount of medication/fluid needed. Being careful to avoid touching the needle on any surface (to maintain sterility), insert the needle into the stopper and inject air.	Remove needle shield from a blunt filter needle.
5.	Hold vial upside down and draw back syringe plunger to correct dosage of the medication.	Tilt ampule down, and insert needle tip into opening. Draw back syringe plunger to correct dosage.

Clean the diluent and medication vial stoppers with an alcohol pad. Draw the diluent into the syringe as you would fill a syringe from a vial. Then inject diluent into powdered medication vial.[†] After passively recapping needle, invert vial until all powder is dissolved. Use caution when inverting vial; some medications should not be agitated vigorously. Clean vial stopper again, uncap needle and pierce stopper a second time to withdraw the prescribed dose.

6.	Withdraw needle. If using blunt filter needle, passively recap the needle, then remove and dispose properly according to the facility guidelines; attach a hypodermic needle of appropriate size.
7.	Gently tap side of syringe to dislodge air bubbles.
8.	Gently depress plunger to expel air from syringe.
9.	Recheck that correct volume has been drawn into syringe.

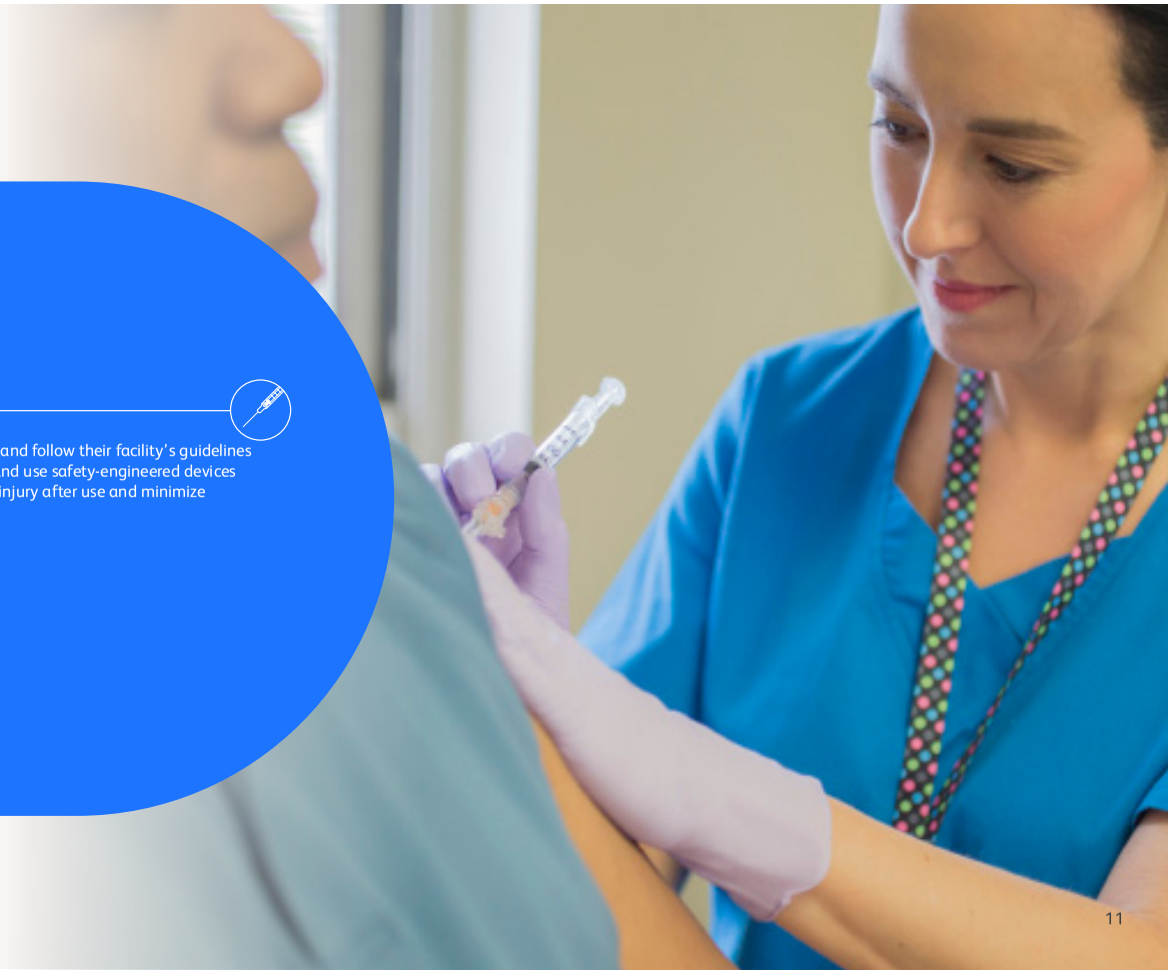
[†]Though most diluents come in vials, they will occasionally be packaged in ampules. Please follow instructions accordingly.

Administration

Healthcare workers should maintain and follow their facility's guidelines for aseptic medication preparation and use safety-engineered devices to decrease the risk of a needlestick injury after use and minimize exposure to blood/body fluid.

Injection routes

- Intramuscular
- Subcutaneous
- Intradermal



Skin preparation

Before administering an injection (intramuscular, subcutaneous or intradermal), the skin should be cleansed with an antiseptic swab.[7]

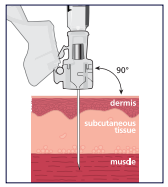
1. Apply swab at the center of injection site.
2. Rotate outward in a circular direction for about 5 cm (2 inches) around the injection site.
3. Allow to air dry.



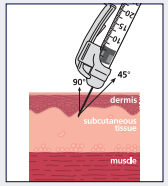
Injection routes[5,7]

Intramuscular (IM)
An injection into the muscle tissue. Large volumes require larger muscles (e.g., vastus lateralis), while smaller volumes (up to 1 mL) can be administered in smaller muscles (e.g., deltoid).

Muscle sites have a good blood supply, which helps the medication to be absorbed more rapidly than by the subcutaneous route. Some of the drugs given by this route are antibiotics, vitamins, vaccines and fertility drugs.

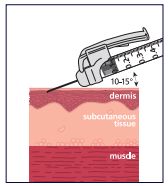


Subcutaneous (SubQ)
An injection into the fatty layer which lies beneath the dermis. This route is used for small volume injections (≤1 mL) and when the medication is not likely to irritate or damage the subcutaneous tissue. The blood supply to the subcutaneous tissue is less than in muscle tissue; therefore, the absorption rate is generally slower than with IM injections. This is desirable for some medications (e.g., insulin).



Intradermal (ID)
An injection into the dermis. Only a very small volume of fluid is given (0.1 mL or less).

This route is used to test a patient's sensitivity to allergens or for tuberculin testing.[†] It is also used for administering local anesthetics.



Before you start[5,7]

Intramuscular (IM)
Intramuscular injections require identification of anatomical markers to assure proper placement.
Important note: Infants <18 months old should not receive an IM injection of >0.5 mL.

Vastus lateralis muscle
Tolerates volumes up to 5 mL in adults. Maximum volume for ages between 3–13 years is 1.5 mL, 1½–3 years is 1 mL. <1½ years, 0.5 mL. Maximum needle length for children is 1 inch.

Deltoid muscle
Used for volumes of ≤1 mL in adults and 0.5 mL in children age >18 months. Risk: Proximal to the radial nerve and the brachial artery.

Ventrogluteal site
Maximum volume is 3 mL in adults, 2 mL for ages between 6–13 years, 1.5 mL for between 3–6 years, and 1 mL for ages between 1½–3 years. May be the safest and least painful IM injection site.

Dorsogluteal site:
Not recommended unless required by drug manufacturer; do not use in children less than 3 years old. Maximum volume is 3 mL in adults, 2 mL for ages between 6–13 years, and 1.5 mL for between 3–6 years. Risks: Proximal to the sciatic nerve, superior gluteal artery and the possibility of injecting medication into the thick layer of subcutaneous tissue over the muscle.

Subcutaneous (SubQ)
Skin/subcutaneous thickness
Appropriate needle length and injection technique is dependent on the patient's skin and subcutaneous fat thickness. Intramuscular injections can be avoided with the use of shorter needles.

Injection sites may have different absorption rates. With human insulins, the abdomen has been shown to have the most rapid absorption, the upper arms intermediate, and the thigh and buttocks the slowest absorption. Rotating insulin injections within a site (at least 1" from previous injection) and using needles only once may avoid the development of lipodystrophy while maintaining a more predictable absorption.

Intradermal (ID)
If used, allow the alcohol from an alcohol swab to dry completely prior to injection.

Following administration, do not apply pressure or massage injection site.

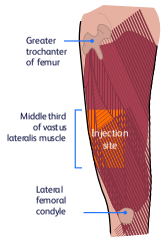
Inject with the needle bevel up.

If a wheal, or bleb, does not appear during administration, the medication is being delivered into the subcutaneous tissue.

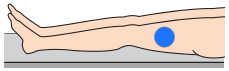
[†]Due to the risk of anaphylactic reaction, emergency medication and equipment should be available.

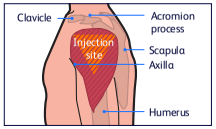
Injection sites[7] (refer to page 7 for needle length)

Intramuscular (IM)

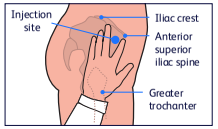


Vastus lateralis muscle
The vastus lateralis site is located in the lateral middle third of the thigh between the greater trochanter and the knee. When injecting, lift the vastus lateralis muscle away from the bone. Note: The rectus femoris muscle is located in the anterior middle third of the thigh.

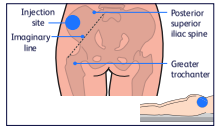




Deltoid muscle
The thickest part of the deltoid muscle is located 1–2" (1–3 fingerbreadths) below the lower edge of acromion process of the scapula over the midaxillary line.



Ventrogluteal site
The ventrogluteal site is located by placing the palm of the hand over the greater trochanter with the middle finger reaching toward the iliac crest and the index finger angled toward the anterior superior iliac spine, forming a "V." Inject within the center of the "V," below the anterior superior iliac crest.

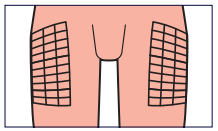


Dorsogluteal site
The dorsogluteal site is located above an imaginary line between the greater trochanter and the posterior superior iliac crest. The injection is administered laterally and superior to this imaginary line.

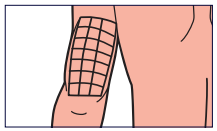
Subcutaneous (SubQ)

Recommended injection technique (all sites)
4- and 5-mm (.157"–.2") lengths should be inserted straight-in (90°) without a raised skin fold (skin pinch) in most patients. Young children and lean adults may also require a raised skin fold. 6 mm (.24") and longer, a raised skin fold should always be used. Thin patients may also require a 45° insertion with 6 mm (.24") and longer needles.

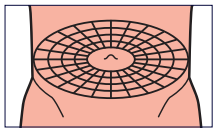
To avoid accidental needlestick, a raised skin fold should be wide (>1" between finger and thumb).



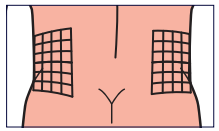
Outer aspect of the upper thigh



Outer aspect of the upper arm
(not preferred site)

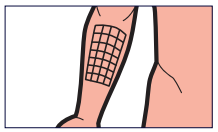


Abdomen—avoid injecting within 1–2" around the umbilicus

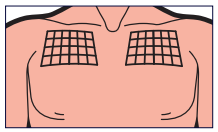


Upper buttocks

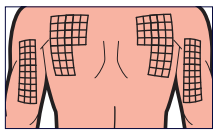
Intradermal (ID)



Anterior aspect of the forearm



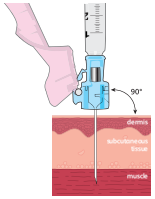
Upper chest

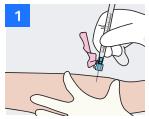


Upper back/back of arm

Standard injection procedures[7]

Intramuscular (IM)





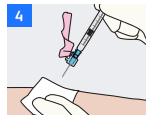
Inject the needle quickly at a 90˚ angle.



Pull back on plunger from 5 to 10 seconds. If blood appears in syringe, remove needle, dispose properly and prepare a new injection.

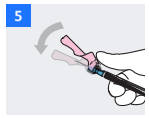


Inject medication slowly.

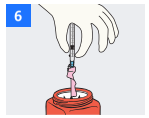


Withdraw needle, and place sterile gauze firmly over site.

Please refer to hospital guidelines for Z track procedures.

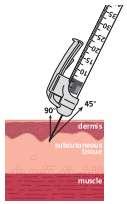


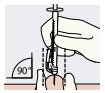
Engage safety mechanism on needle or syringe.



Dispose of properly. Record injection on medication administration record.

Subcutaneous (SubQ)





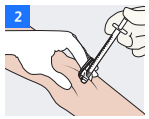
Proper pinch



Improper pinch



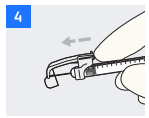
Pinch skin. Insert the needle at a 90˚ or 45˚ angle.



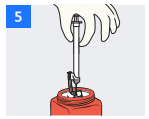
Inject medication slowly.



Withdraw needle, and place sterile gauze over site.



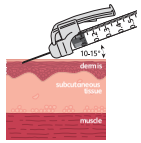
Engage safety mechanism on needle or syringe.

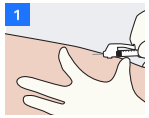


Dispose of properly. Record injection on medication administration record.

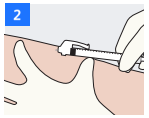
If raised skin fold is used, avoid accidental needlesticks by maintaining a distance of >1" between your finger and thumb. Plus, the raised skin fold must be maintained throughout the injection until the needle is removed from the skin.

Intradermal (ID)





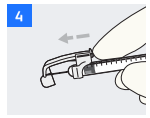
Spread the skin taut, and insert the needle tip at a 10–15˚ angle.



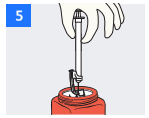
Inject medication slowly; a small fluid bleb (wheal) forms. If a wheal does not appear, it was administered in the subcutaneous tissue.



Withdraw needle, and place sterile gauze over site. Do not massage.



Engage safety mechanism on needle or syringe.



Dispose of properly. Record injection on medication administration record.



Disposal

Each facility has its own policy and method for safe disposal of used needles, syringes, glass vials and ampules. To the extent consistent with a facility's policies and the availability of proper disposal options, sharps should be disposed of as soon as possible after use. Universal precautions should always be applied.

Safe use and disposal of sharps equipment
Sharps waste is a form of medical waste composed of used sharps, which include any device or object with the ability to puncture or lacerate the skin. Sharps waste is classified as biohazardous waste and must be carefully handled.

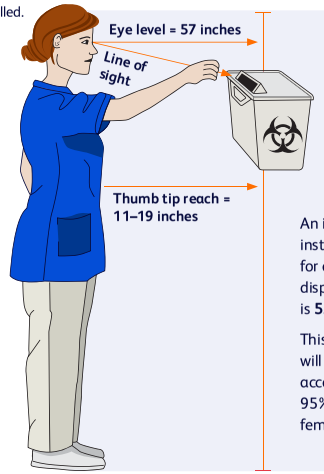
Common medical materials treated as sharps waste are:

- Needles
- Syringes
- Glass (ampules)
- Vials (empty/partial)
- Razor blades
- Surgical blades

Safe use and disposal of sharps[9]

Care must be exercised during the use and disposal of sharps.
Good practice in the disposal of sharps includes the following key points:

- All staff must dispose of sharps correctly.
- The person using the sharp is responsible for disposing of it in an approved sharps disposal container. The facility is responsible for ensuring the disposal of the container.
- The sharps container should be at the place where sharps are used so that they can be disposed of immediately after use.
- Sharps containers should NEVER be overfilled.
- Used needles should NEVER be recapped, cut or bent.
- All incidents or accidents involving needlestick injuries and/or accidents involving body fluids should be recorded and reported in line with local policies.



An ideal standing installation height for a fixed sharps disposal container is **52–56 inches**.

This height will comfortably accommodate 95% of all adult female workers.

Selecting, evaluating and using sharps disposal containers

Safety performance criteria for sharps disposal containers are divided into four areas[9]:

1. Functional
Sharps disposal containers should be durable, leak resistant and puncture resistant.

2. Accessible
Sharps disposal containers must be accessible to workers who use, maintain or dispose of sharps devices. This includes sufficient number, sufficient container volume, and safe access to the disposal opening on individual containers. Other important factors include convenient placement and (if necessary) portability of containers within the workplace.

3. Visible
Sharps disposal containers should be visible to the workers who must use them. Container fill status and warning labels are also important visibility criteria.

4. Accommodative
The sharps disposal container should accommodate the user, the facility and the environment.



References

1. Centers for Disease Control and Prevention (CDC). *2023 Vaccine recommendations and guidelines of the ACIP*. Accessed in Nov 2024, at https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/administration.html.

2. Prakash S, Kumar A. Needle tip and peripheral nerve blocks. *J Anaesthesiol Clin Pharmacol*. 2018;34(1):129-130. doi:10.4103/0970-9185.227375

3. Love GH. Administering an intradermal injection. *Nursing*. 2006;36(6):20. doi:10.1097/00152193-200606000-00016

4. International Organization for Standardization. *2016 Sterile hypodermic needles for single use—Requirements and test methods.* Accessed on Sept 23, 2024, at https://www.iso.org/obp/ui#iso:std:iso:7864:ed-4:v1:en.

5. Craven R, Hirnle C, Henshaw CM. *Fundamentals of Nursing Human Health and Function*. 8th ed. Wolters Kluwer; 2017.

6. Alberta Health Services (AHS). *2024 Safety Engineered Devices (SED)*. Accessed on August 26, 2024, at https://www.albertahealthservices.ca/info/page1980.aspx.

7. Potter P, Perry A, Stockert P, et al. *Basic Nursing*, 7th ed. Mosby Inc., an affiliate of Elsevier; 2010.

8. Administration of Parenteral Medications. In: Ernstmeyer K, Christman E, eds. *Nursing Skills*. 2nd ed. Eau Claire (WI): Chippewa Valley Technical College; 2023. Accessed November 21, 2024. https://www.ncbi.nlm.nih.gov/books/NBK593210/pdf/Bookshelf_NBK593210.pdf

9. United States Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Selecting, evaluating and using sharps disposal containers. Atlanta, GA: Centers for Disease Control and Prevention; January 1998:Publication 97-111.

Needlestick Safety and Prevention Act

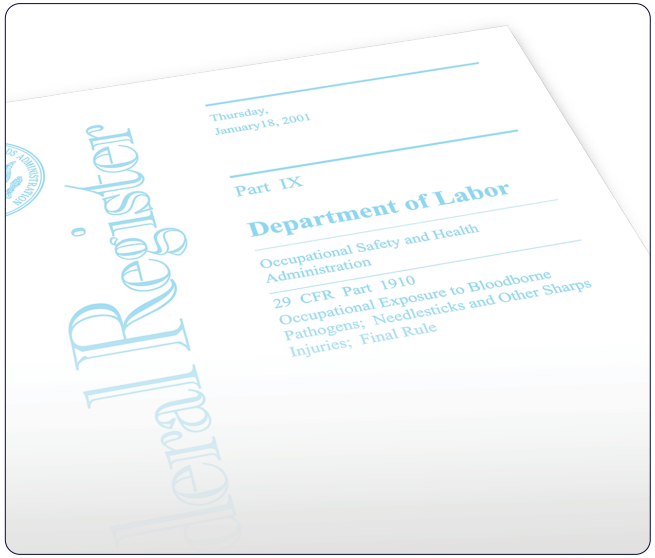
In November 2000, the Needlestick Safety and Prevention Act (NSPA) was signed into law, requiring that healthcare providers comply with a variety of actions designed to improve the occupational safety of clinicians. The law became effective in April 2001.

The law requires employers to evaluate, select and use safety-engineered medical devices to eliminate or minimize occupational exposure to bloodborne pathogens. This would include all devices used for skin injections. Moreover, the law intends that frontline healthcare workers are to be part of the evaluation and selection process.

To better prepare clinicians to participate in the process, and to provide a safer work environment, the following pages are designed to explain the differences in the types of safety-engineered technologies available for hypodermic syringes and needles.

In addition to converting conventional devices to those with safety-engineered features, there are other steps clinicians can take to minimize the potential for needlesticks:

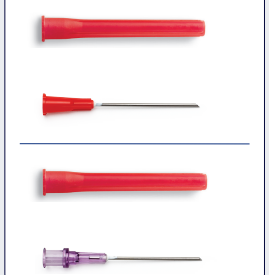
- Eliminate the unnecessary use of needles on "needleless" IV systems
- Implement safety-engineered prefilled syringes when possible



Safety-engineered device technologies

Preparation

BD® Blunt Fill Needle and
BD® Blunt Filter Needle



- Needle-based safety feature
- Compatible with any ISO-compliant conventional luer syringe
- The BD® Blunt Filter Needle has a 5-micron filter to remove foreign matter, such as glass particles from ampules
- BD® Blunt Fill and BD® Blunt Filter Needles help reduce the risk of needlestick injuries during medication preparation due to a higher skin penetration force[1§]

Administration

BD® SafetyGlide™ Needle



Shielding needle mechanism

- Needle-based safety feature
- Compatible with any ISO-compliant conventional luer syringe
- Safety mechanism slides over needle after use
- Devices have assisted or fully manual activation
- Available as needle only, or as a needle/syringe combo

BD® Eclipse™ Needle



Pivoting needle mechanism

- Needle-based safety feature
- Compatible with any ISO-compliant conventional luer syringe
- Safety shield pivots around hub to lock onto needle
- Fully manual activation
- Available as needle only, or as a needle/syringe combo

[1]As compared to a BD 18 G conventional hypodermic needle.
[§]Bench test results may not necessarily be indicative of clinical performance.

This information is being provided for convenience only and is not intended to replace clinical decision making. Each clinician is solely responsible for determining the correct needle for each patient.

This guide is not intended as a replacement for the detailed information contained in the IFU.

Please consult BD product labels and package inserts for any contraindications, hazards, warnings, cautions and instructions for use.



bd.com

BD, the BD Logo, Eclipse and SafetyGlide are trademarks of Becton, Dickinson and Company or its affiliates. © 2024 BD. All rights reserved. BD-2125 (12/24)