Parenteral Route of medication

• Rapid
• Produces a direct result
• Drugs are absorbed directly into the bloodstream

**Types of injections:**
• **Intravenous:** fastest effects
• **Intramuscular:** next fastest result
• **Subcutaneous:** slower than other two
• **Intradermal**
Advantages of Parenteral Route:

• Effective route for drug delivery when the patient’s physical or mental state would make other routes difficult
• Do not irritate the digestive system
• Can deliver a precise dose to a targeted area of the body (i.e. into a joint or within the spinal canal)
Disadvantages of the Parenteral Route:

- Patient may have allergic reaction
- Introduction of microorganisms
- Injections can cause injury to tissue, nerves, veins, and other vessels
- Needle can strike a bone
- Injections can traumatize a vein and cause a possible hematoma
Seven rights of proper drug administration:

• Right pt
• Right drug
• Right dose
• Right route
• Right time
• Right technique
• Right documentation
Important to Remember

**Prepare all medications in well lit area**

- Pay close attention to all steps
- No substitutions
- Store meds as ordered on package
- Administrator responsible for errors
- Order should be written out by the doc – keep it with you!
- Check expiration dates
- Ask about allergies to meds
- Discard meds w/damaged labels
- If dispensed but not given – discard
- Observe for untoward SE’s – report any to HCP, document
The art of good injection therapy
“The right medicine”,

“in the right quantity”,

“given in the right stop”,

“at the right time”.

Ethical – Legal Factors

- Right to refuse
- Liability
  - Nerve Damage
  - Into a vein or artery
  - Infiltration / Extravasation
  - Tissue Damage
  - Unapproved site
    - Dorsal Gluteal may be unacceptable at your facility
• Minimize Discomfort
• Position muscle for relaxed tone
• Distraction with conversation & instructions, visual imagery, relaxation techniques
• Dart-like quick entry for smooth tissue separation (it’s in the wrist action!!)
• What are other ways to Minimize Discomfort
Safety Considerations:

• When preparing multiple injections, always label the syringe immediately
  – Keep the medication container with the syringe
  – Do not rely on memory to determine which solution is in which syringe

• Carefully monitor the patient for any adverse effects for at least 5 minutes after administration of any medication

• Handle multi-dose vials carefully and with aseptic technique so that medicines are not wasted or contaminated
• Medication Name
• Medication Strength
• Medication Use
• Expiration Date
• Manufacturer
• Medication Information
IF YOU FIND MED WITHOUT LABEL ~ DISCARD THE MEDICATION
• What do you need to know about Injection Sites?
You must know the following information for each injection site:

– Name of the IM site
– Name of landmarks
– Name of the muscle injected at IM sites
– Name of major blood vessels & nerves to be avoided
– Location of all SQ and ID sites
Rational for injections

• Diagnostic
  1.) Joint Aspiration (confirm nature fluid)
  2.) Provide symptom relief of affected body part.

• Therapeutic
  1.) Increase mobility and decrease pain.
  2.) Medication
Patient Assessment

• Before administering any medication, you assess the patient. Your assessment should include:

  • Age
  • Physical condition
  • Body size
  • Sex
  • Injection site
Preparing Patient for Injection

• 1. Establish rapport with the patient
• 2. Let the patients ask questions
• 3. Ask the patient to relax the area that is to be used for the injection
• 4. Inform the patient that he/she will feel a slight stick
• 5. NEVER tell a patient that the injection will not hurt (especially children)
General guidelines:

• Check patient’s allergies
• Don’t forget “the patient” (discuss the procedure in patient friendly terms, side effects, what to expect, etc).
• Obtain informed consent! (verbal vs written)
• Place patient in comfortable position that allows easy access to area injected.
• Take time to identify structure being injected by locating pertinent anatomical landmarks.
• Be empathetic, and reassure patient.
• Document, Document, Document!!!
Equipment

- Safety (oxygen, anaphylaxis kit)
- Appropriate needles and syringes
- Medication with “in date” expirations!
• WHAT SIZE NEEDLE?
• WHAT GAUGE?
• HOW MANY CC’S?
• WHAT ROUTE?
Needles

- Sharp end of the needle is the point
- Slanted edge at top of needle is bevel
- Place where shaft of needle attaches to the hub is the hilt
- The gauge of the needle is determined by the diameter of its lumen
- Largest lumen is smallest number
- The amount and viscosity of the med ordered determines needle size
Needle length varies from 3/8” to 4”

- **Length of Needle**
  - Depends on size of patient
  - Which area of the body
  - Route of administration
    - ID ~ uses the shortest needles
    - SQ ~ a little longer than the ID needle
    - IM ~ remember ~ it has to reach the muscle to deposit medication in the muscle ~ remember the size of the patient and the location of the injection determine the length of the needle
Gauge of needles:

- 20 to 30 gauge needles are the most common gauges
- NEVER use an 18g unless someone in charge orders you to
- An 18g is has the largest lumen, or hole, and a 30g has the smallest lumen
Syringes
• You have to have room to aspirate, so the syringe must be larger than the quantity of fluid being drawn up
  • **Example:** 3 ml of Ampicillin IM requires a 5cc syringe
  • **Use a syringe calibrated in units for insulin**
  • **Unit syringes come in 50 – 100 U (units)**
Skin preparation

The skin should be prepared with povidone-iodine or similar antiseptic solution. (Alcohol)
The risk of infection with use of alcohol skin preparation alone is reportedly estimated at 1 in 10,000.
Injection Site Selection

- Intradermal injection
- Subcutaneous injection
- Intramuscular injection
- Intravenous injection
When choosing a injection site, avoid scar tissue, moles, burns, birthmarks, warts, tumors, lumps, bones
Fig. 7. Z track technique
Routes of administration

INTRAMUSCULAR: 90 degree approach to muscle.

SUBCUTANEOUS: Usually 45 degree angle to the skin; up to 90 degree angle is adequate if there is a thick layer of subcutaneous tissue.

INTRADERMAL: 10 – 15 degree angle to the skin.
Intradermal injection:
Fig. 2. Anatomical sites for intradermal and subcutaneous injections

- Subcutaneous and intradermal sites
- Intradermal sites only
Intradermal
- Site: the inner aspect of the forearm
- Needle size is 25 - 27 gauge, 1/2 to 5/8 inch
- Insert needle at 15° angle
- Injection made just below the outer layer of skin
- If injection does not form a wheal or if bleeding is noted, the injection was probably too deep and should be repeated
• Review the provider’s order for accuracy
• Ask the patient/parent if the patient is allergic to the medication
• Wash your hands and gather supplies, equipment
• Select proper needle size, length and gauge
• 6 Rights of medication administration
  • Check the expiration date of the medication
  • Check for discoloration etc., discard if questionable
• Explain procedure to patient/parent
• Ask for assistance with children
• Position patient appropriately
• Prepare injection site with alcohol - air dry
• Support skin with thumb
• With bevel up, completely insert bevel at a 15° angle
• Inject medication gently, place a cotton ball over the site after needle removal
• A visual wheal will be produced at the site
• Dispose of needle as per policy
• Wash hands
• Document procedure and patient’s response
Correct Technique

- Tip of needle can be seen directly beneath the surface of the skin
- Resistance should be felt when medication is injected
- Tense white wheal 5-10 mm in diameter appears at the point of the needle
Incorrect Technique

- Little resistance and a shallow bulge
- Needle inserted too deep
  - will cause an induration
  that is difficult to measure
  and interpret
Subcutaneous injection:
Fig. 2. Anatomical sites for intradermal and subcutaneous injections

- Subcutaneous and intradermal sites
- Intradermal sites only
a. General. The subcutaneous (hypodermic) injection is most commonly used for administering narcotics, sedatives, and immunizing materials. It may also be used for administering local anesthetic solution. The full effect of drugs given by this route usually is manifested within 20 to 30 minutes if the circulatory picture is near normal. The usual amount of medication is 2.0 ml or less. The outer aspect of the upper arm is the most common injection site for a subcutaneous injection.
b. Procedure for Giving Injection.
(1) Prepare a 2 ml syringe and a small-gauge needle (25 to 26 gauge needle no longer than 5/8 ml). Prepare the medication of administration.
(2) Expose and cleanse the site with an alcohol sponge.
(3) Expel the air from the syringe
(4) Grasp the flesh to make a cushion, and holding the syringe at a 45-degree angle to the skin, insert the needle quickly (about 1/2 inch) into the subcutaneous tissue.
• Clearing air bubbles from syringe.
• Administering a subcutaneous injection.
Fig. 3. ‘Pinch up’ of a skin fold during subcutaneous injection.
Fig. 4. ‘Bunch up’ of muscle in emaciated or older patients
(5) After inserting the needle, pull back slightly on the plunger. If no blood is aspirated, give the injection. If blood is aspirated, withdraw the needle, replace it with a sterile one, expel the air from the syringe, and inject into a different place. If no blood is aspirated, exert gentle, consistent pressure on the plunger, thus expelling the medication into the subcutaneous tissue.
(6) Use an alcohol sponge to apply pressure briefly over the site of injection.
(7) Record the administration of the injection, the name of the medication given, the dosage administered, the method of administration, and the site of the injection.
(8) Clean the equipment.
Intramuscular injection:
How to Give an Intramuscular Injection

1. Use an alcohol swab to clean the skin where you will give yourself the shot.

2. Hold the muscle firmly and insert the needle into the muscle at a 90° angle (straight up and down) with a quick firm motion.

3. After you insert the needle completely, release your grasp of the muscle.

4. Gently pull back on the plunger of the syringe to check for blood. (If blood appears, withdraw the needle and gently press the alcohol swab on the injection site. Start over with a fresh needle.)

5. If no blood appears, inject all of the solution by gently and steadily pushing down on the plunger.

6. Withdraw the needle and syringe and press an alcohol swab on the spot where the shot was given.
a. General. The intramuscular (IM) injection is used for the same purposes as the subcutaneous injection. This technique is selected in preference to the subcutaneous when the medication is irritating, when more rapid absorption is desired, and when there is a larger quantity of medication than can be readily absorbed by the subcutaneous tissues.
• In addition, medications for intramuscular injection sometimes are oily rather than watery, and oily solutions are not absorbed well by subcutaneous tissue. Since there is added risk of the needle striking a nerve, bone, or large blood vessel, the site of intramuscular injection must be chosen with care.
• The deltoid intramuscular injection:
• The deltoid intramuscular injection is easily accessible and is only for use with small volumes with a standard dose of 0.5ml and is never to go beyond 1.0ml. The deltoid muscle looks like and upside down tear drop with the muscle it-self being rather large.
• The actual injection site should be in the center of the muscle allowing for a small area on a large muscle to be the targeted area for the proper deltoid intramuscular injection site.

• the patient can be sitting, prone, supine, or lateral lying. The gauge of needle used can be a 23-25 with the length being 5/8-1.5 inches consideration must also be made for the size of the patient.
• Whether they are large or small will also determine the length of the needle. Once the injection site on the deltoid has been located make sure to inject at a 90 degree angle with a darting movement.
Should **not** be used in infants or children because of the muscle’s small size.

Injection volume should not exceed 1ml in the adult

Use a 23-28 gauge, 5/8 to 1 inch needle

Rarely used for hospitalized patients. Primarily used for immunizations.
• Deltoid Intramuscular injection-Considerations, Advantages, and Disadvantages: The deltoid intramuscular injection site is the preferred site to administer vaccines for infants that are older than 7 months and this is the only site where the Hepatitis B vaccine can be given.
Fig. 6. IM injection ensuring a 90º entry in the ventrogluteal position
• The advantages of the deltoid intramuscular injection is that as said before is easy accessible and patients are generally a lot more comfortable with exposing their arms as opposed to another body area.

• Disadvantages to this site are the size of the muscle mass is small in relation to other IM injection sites. The deltoid intramuscular injection is closely associated with nerves and vascular structures; this leaves a small margin for error with departure from the correct IM injection site. A deltoid intramuscular injection is not an apt site for repeated or large-volume injections.
Injection Sites - Ventrogluteal

Location: lateral (ventral) side of the hip
Landmarks: iliac crest, anterosuperior iliac spine, greater trochanter of femur
Muscle mass: Gluteus medius and minimus
Injection area: opposing palm of hand over greater trochanter, middle finger pointed toward the iliac crest, index finger toward anterosuperior iliac spine. Inject into the triangle created by these fingers. No major vessels / nerves.
Ventrogluteal

- Anterior superior iliac spine
- Injection site
- Iliac crest
- Greater trochanter of femur
Vastus Lateralis

**Location**: anterolateral aspect of the thigh

**Landmarks**: greater trochanter, lateral femoral condyle

**Muscle mass**: vastus lateralis muscle

**Injection area**: between one handbreadth below the greater trochanter and one handbreadth above the knee. Width of area is from the midline on the anterior surface of the thigh to midline on the lateral thigh. Best to inject into outer middle third of the thigh.

No major vessels or nerves to avoid.
Vastus Lateralis

- Identify the greater trochanter and the lateral femoral condyle
- Select the site using the middle third and the anterior lateral aspect of the thigh.
Dorsal Gluteal
Most Dangerous site,
Trend is away from use

- Location: Upper lateral aspect of the buttock
- Landmarks: Posterior superior iliac spine, greater trochanter
- Muscle mass: Gluteus maximus muscle
- Injection area: Draw an imaginary line between the anatomic landmarks listed above. Administer the injection lateral and slightly superior (2 inches) to the midpoint of this line.

Avoid the sciatic nerve & superior gluteal artery
Z - track

- Seals the medication into the muscle tissue.
- Minimizes subcutaneous tissue irritation from tracking of the medication as the needle is withdrawn.
- Used more frequently now to decrease discomfort and pain.
- Used for irritating medications (Vistaril) and tissue staining meds (iron dextran – Imferon).
- Use in ventrogluteal or dorsogluteal sites
• **Z - track**: An intramuscular injection technique designed to deposit medications deep into muscle tissue. Release the lateral slide of tissue ONLY after needle has been completely withdrawn.
Injecting the Buttock

- the outer side of the intersection of two lines dividing the buttock into four equal parts where the gluteal muscles are thick and where there is the least likelihood of striking bones, large nerves, and blood vessels. The appropriate anatomic site is the upper, outer quadrant area of the buttock.
Intravenous (IV) therapy

• *IV therapy*: administration of fluids, solutions, electrolytes, nutrients, or medications through the venous system.

• Types of IV infusions include: solutions, hypertonic preparations, and blood/blood components.
• Advantages of IV therapy
• Some advantages include:
  • Direct route for immediate delivery
  • Reliable route for the unconscious or uncooperative patient
  • Absorption of the drug is directly into the bloodstream
• Disadvantages of IV therapy
• Some disadvantages include:
• Fluid overload: circulatory system is overloaded with excessive fluids
• Air embolism: obstruction of a blood vessel by an air bubble
• Septicemia: pathogenic organisms are introduced into the patient’s bloodstream
• Infection: local and systemic
• Thrombophlebitis: blood clot in the vein
• Hematoma: leakage of blood into surrounding tissues
• Pain: burning or stinging sensation
• Hypersensitivity reaction: patient may be allergic to the IV materials or the medication itself; anaphylactic shock
INTRAVENOUS INJECTION

• General. Intravenous injection is the administration of a small amount of medication directly into the venous bloodstream. This method of administration is usually employed when very rapid action of the drug is desired. The specialist must check to see that the label indicates that the drug may be given intravenously. All drugs that may be given by this route are so marked.
Procedure:

(1) Prepare a syringe appropriate for the amount of fluid with a 1 1/2-inch needle of 20- to 23-gauge and withdraw the medication from the vial into the syringe.

(2) Place a tourniquet around the patient's upper arm and draw it tight enough to block the veins but not the arteries (see figure 3-9 A). (The radial pulse should be felt below the tourniquet.)
(3) Select the prominent vein in the skin over the antecubital space (front of the elbow,). If necessary, pat or rub the skin lightly and, if possible, have the patient close and open his hand to make the veins more visible.

(4) Cleanse the skin with alcohol

(5) With the thumb of the left hand on the skin below and to one side of the injection site, anchor the vein by stretching the skin toward the patient's hand.
A. Application of tourniquet

- Median basilic vein
- Medial cephalic vein

B. Palpation of vein

C. Application of antiseptic

D. Insertion of needle

E. Release of tourniquet

F. Completion of injection

G. Application of sterile pad prior to withdrawal of needle and syringe
(6) Hold the needle in the direction of venous blood flow with the needle point bevel up, parallel to and about 1/2 inch below the site of the venipuncture. Adjust the needle at approximately a 30 degree angle, insert it through the skin, lower it to a flat angle, then move it forward parallel to the vein for about 1/2 inch. With a slight sidewise movement, direct the needle point into the vein, extending it into the lumen of the vein about 1/4 inch.
(7) Pull back on the plunger slightly to be positive that the needle is in the vein. If blood is aspirated into the syringe, release the tourniquet and inject the medication. If blood is not aspirated, try once again to direct the needle into the vein. On repeated failure, release the tourniquet, withdraw the needle, replace it with a sterile one, expel the air from the syringe, tighten the tourniquet, and repeat the procedure at a different site.
(8) After injecting the medication, cover the injection site with a sterile pad, withdraw the needle, and press the pad firmly over the puncture site for about 2 or 3 minutes to prevent the extravasation of blood (the escape of blood into the tissues).

(9) Clean the equipment according to the local policy; destroy the disposable equipment.
(10) Record on a piece of paper the treatment done, sign it, and give it to the anesthetist. The recording includes writing the drug, dosage, the time given, and the method.