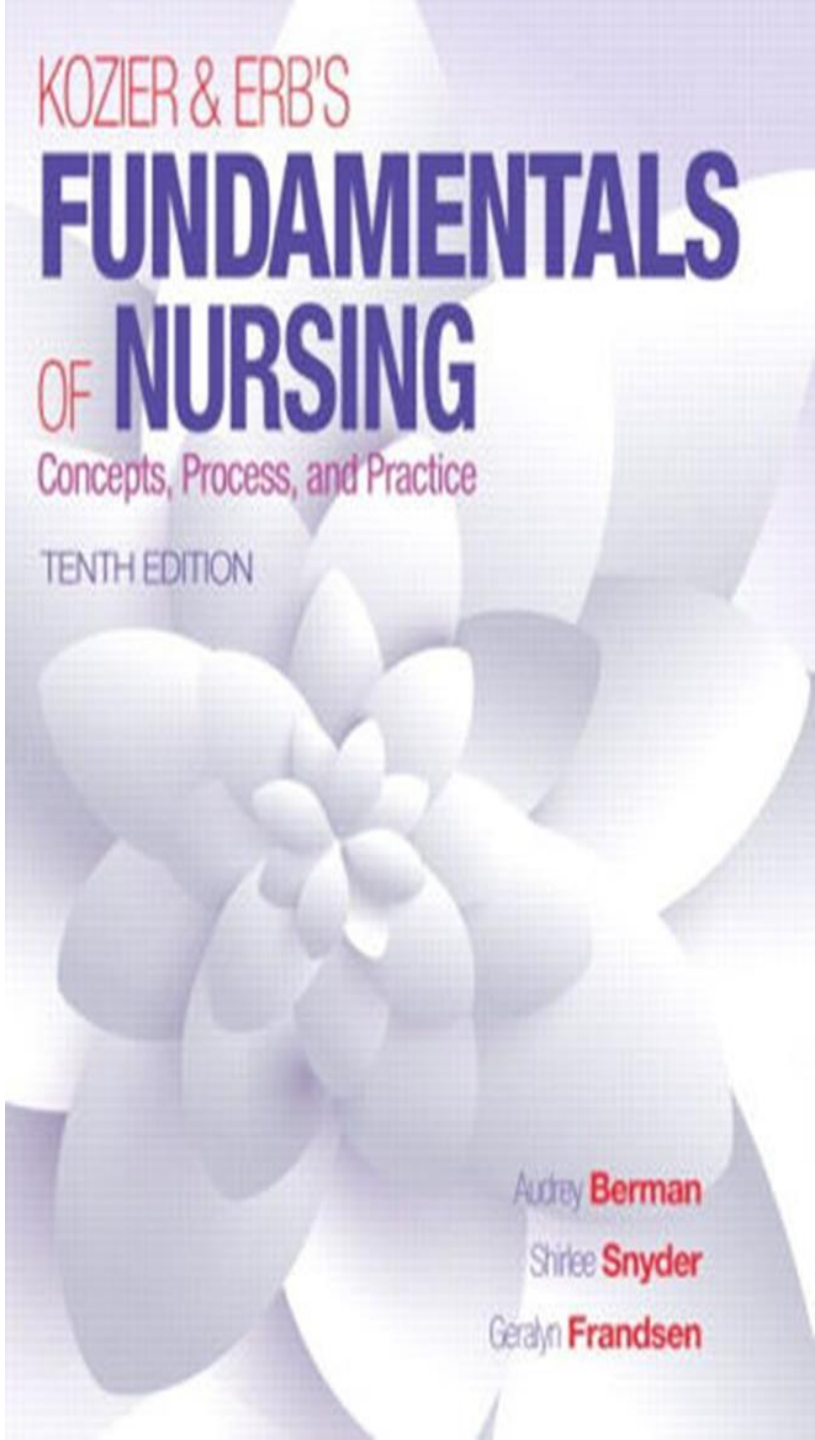
Unit4
Medications

Definitions & terminology
Rights
Effects
Factors affect action
Routes
Reaction assessment
Prescribing
Administration
Calculation



Definitions

Medication: Is a substance administered for diagnosis, cure, treatment, relief, or prevention of disease.

Drug: Has association of obtained substances such as heroin, cocaine

Prescription: is the written direction for the preparation and a administration of drug.

Generic name: Is given before a drug becomes official.

Official name: Is name under which it is listed in one of official publications (e.g., pharmacopoeia).

Trademark or brand name: Is the name given by the drug manufacturer.

Pharmacology: Is study of effect of drugs on living organisms.

Pharmacist: A person licensed to prepare and dispense drugs and to make up prescriptions.

Types of Drug Preparation

- **Aqueous مائيsolution:** One or more drugs dissolved in water.
- **Aerosol spray or foam:** A liquid, powder, or foam deposited in a thin layer on the skin by air pressure.
- **Aqueous suspension**: One or more drugs finely divided in a liquid such as water.
- **Capsule:** A gelatinous container to hold a drug in powder, liquid, or oil form.
- **Cream:** A non greasy, semisolid preparation used on the skin.
- **Elixir:** A sweetened and aromatic solution of alcohol used as a vehicle for medicinal agents.

Types of Drug Preparation

- **Gel or Jelly:** A clear or translucent semisolid that liquefies when applied to the skin.
- **Liniment:** An oily liquid used on the skin.
- **Lotion:** An soothing liquid that may be a clear solution, suspension, or emulsion used on the skin.
- **Lozenge (troche):** A flat, round, or oval preparation that dissolves & releases a drug when held in the mouth.
- **Ointment:** A semisolid preparation of one or more drugs used for application to the skin & mucous membranes.
- **Paste:** A preparation like an ointment, but thicker and stiffer, that penetrates the skin less than an ointment.

Types of Drug Preparation

- **Pill:** One or more drugs mixed with a cohesive material, in oval, round, or flattened shapes.
- **Powder:** A finely ground drug or drugs; some are used internally, other externally.
- **Suppository:** One or several drugs mixed with a firm base such as gelatin and shaped for insertion into body; base dissolves gradually at body temperature, releasing drug
- **Syrup:** An aqueous solution of sugar often used to disguise unpleasant tasting drugs.
- **Tablet:** A powdered drug compressed into a hard small disc; some are readily broken along a scored line; others are enteric-coated to prevent them from dissolving in the stomach.
- **Transdermal patch**: A semi permeable membrane shaped in the form of a disk or patch that contains a drug to be absorbed through the skin over a lengthy period of time.

Aspects of Nursing Practice Governed by Law

- The administration of drugs is controlled by law.
- Under the law, nurses are responsible for their own actions regardless of whether there is a written order.
- Nurses should question any order that appears unreasonable and refuse to give the medication until the order is clarified.

Aspects of Nursing Practice Governed by Law

- The use of controlled substances.
- ✓In hospitals, controlled substances are kept in a locked drawer, cupboard, medication cart, or computer-controlled dispensing system.
- ✓Agencies have special forms for recording the use of controlled substances. **Includes:**

1. Name of client,
2. Date and time of administration,
3. Name of drug, dosage,
4. Signature of person who prepared and gives drug.
5. Name of physician who ordered drug

Effects of Drugs

❖**Therapeutic effect** (desired effect): Is primary effect intended

❖**A side effect** : Secondary effect that is unintended, are usually predictable and may be either harmless or potentially harmful.

❖**Drug toxicity**: Harmful effects on an organism or tissue results from:

✓Over dosage,

✓Ingestion of a drug intended for external use,

✓Build up of drug in blood due to impaired metabolism or excretion (cumulative effect).

❑Some toxic effects are apparent immediately; some are not apparent for weeks or months.

Effects of Drugs

❖**Drug allergy**: Is an immunologic reaction to a drug.

- Allergic reaction can be mild or severe (Anaphylactic reaction) usually occurs immediately after administration of drug.

❖**Drug tolerance**: Occurs in a person who has unusually low physiologic activity in response to a drug and who requires increases in dosage to maintain therapeutic effect.

❖**Accumulative effect**: Is increasing response to repeated doses of drug

- Occurs when of administration exceeds rate of metabolism or excretion.

❖**Idiosyncratic effect**: Is unexpected and individual.

- It is under response or over response to a drug.

Effects of Drugs

❖**Drug interaction:**

- Occurs when administration of one drug before, at same time as, or after another drug alters effect of one or both drugs.
- The effect of one or both drugs may be either increased or decreased

❖**Iatrogenic disease:** disease caused unintentionally by medical therapy and can be due to drug therapy.

Factors Affecting Medication Action

1- Age:

2- Body weight.

3- Sex-linked differences.

4- Genetic factors: sensitive or may metabolize a drug differently than most people

5- Psychological factors: how one feels and believes a drug what drug can do.

6- Illness and disease. altered drug action circulatory, liver, or kidney dysfunction

7- The time of administration : Orally medications are absorbed more quickly on empty stomach

- Some medications irritate GI should be given after a meal.

8- Environment. Temperature

Types of Medication Orders

1-Stat order: Medication is to be given immediately and only once (e.g. Demerol 100mg I.M stat).

2-Single order (one-time order): Medication to be given once at a specified time (e.g. Pethidine 100 mg hour before surgery).

3-Standing order: Carried out indefinitely until an order is written to cancel it, or may be carried out for a specified number of days.

4-PRN order, As needed order: Permits nurse to give a medication when, in nurse's judgment, client requires it.

Essential Parts of A Drug Order(prescription)

- Full name of the client
- Date and time the order is written
- Name of the drug to be administered
- Dosage of the drug
- Route of administration
- Frequency of administration
- Signature of the person writing the order.

Calculating Dosages (Dose Calculation)

There are several formulas that can be used to calculate drug dosages.

One formula uses ratios:

$$\frac{\text{Dose on hand}}{\text{Quantity on hand}} = \frac{\text{Desired dose}}{\text{Quantity desired (x)}}$$

Calculating Dosages

e.g. Erythromycin 500 mg is ordered. It is supplied in a liquid form containing 250 mg in 5 ml.

To calculate the dosage, the nurse uses the formula:

$$\frac{\text{Dose on hand (250 mg)}}{\text{Quantity on hand (5 ml)}} = \frac{\text{Desired dose (500 mg)}}{\text{Quantity desired (x)}}$$

$$250\ x = 5\text{ ml} \times 500$$

$$x = \frac{5\text{ ml} \times 500}{250\text{ mg}} = 10\text{ ml (therefore, the dose ordered is 10 ml)}$$

Administering Medication Safety

Nursing Responsibilities regarding Administering Medications

1-Nurses are responsible for their own actions. They should question any order that consider incorrect.

2-Be knowledgeable about medications they administer.

3- Laws govern uses of **Narcotics**. Keep **Narcotics** in a locked place.

4- Use only medications that are in a clearly labeled container.

5- Return liquid medications that are cloudy or have changed color to pharmacy

6- Before administering a medication, identify client correctly using the appropriate means of identification

Nursing Responsibilities regarding Administering Medications

7- Don’t leave medication at bedside, except (e.g. nitroglycerin, cough syrup).

8- If a client vomits after taking an oral medication, report

9-Take special precautions when administering certain medications; for example, have another nurse checks dosages of anticoagulants, insulin, IV preparations.

10- When a medication is omitted for any reason; record fact together with the reason.

11- When a medication error is made; report it immediately to the nurse in charge or doctor.

Process of Administering Medication

1- Identify the client

2- Administer the drug

3- Provide adjunctive interventions as indicated

4- Record the drug administered

5- Evaluate client's response to drug

“Rights” of Drug Administration

1. Right drug
2. Right dose
3. Right time and Frequency
4. Right route
5. Right client
6. Right documentation
7. Right of refusal
8. Right History and Assessment
9. Right Drug-Drug Interaction and Evaluation.
10. Right Education and Information **(right to know)**

Routes of Administration

- Orally,
- Sublingual,
- Buccal,
- Rectally,
- Subcutaneous,
- Intramuscular
- Intravenous

Routes of Administration

1- Topical Medications

Topical applications are applied to a circumscribed surface area of the body.

They affect only the area to which they are applied, and include:

1. Dermatologic preparations or medications
2. Instillations and irrigations

a. Dermatologic Preparations or Medications

Applied to skin include:

- Ointments,
- Pastes,
- Creams,
- Lotions,
- Powders,
- Sprays
- Patches that used transdermal to provide sustained action (e.g., nitroglycerin patches and anti-motion sickness preparation).

b. Instillations and Irrigations

Instillations:

Is the insertion of a medication into a body cavity cavities or orifices, such as the urinary bladder, eyes, ears, nose, rectum, or vagina.

Irrigation (lavage):

Is washing out of a body cavity by a stream of water or other fluid.

Ophthalmic Instillations

- It is medications for the eyes.
- They are instilled in form of liquids or ointments.
- Eye drops are packaged in mono-drip plastic containers
- Ointments are supplied in small tubes.
- All containers must state that medication is for ophthalmic use.
- Ophthalmic instillations are used to provide an eye medication (e.g., an antibiotic) Sterile preparations and sterile technique are indicated.

Otic Instillation

It is medications for ear

Ear drops are used to:

1- Soften earwax

2-To relieve pain

3-Provide local therapy to inflammation and/or infection

- In child, ear canal straighten by pulling the pinna **down and back)**
- In adult, ear canal straighten by pulling the pinna **up and back**

Nasal Instillations

Nasal instillations (nose drops and sprays) usually are instilled to:

- ✓Shrink swollen mucous membranes
- ✓Loosen secretions and facilitate drainage
- ✓Treat infections of the nasal cavity or sinuses.

Rectal Instillation

- Insertion of medications into the rectum in form of suppositories
- It is a convenient and safe method of giving certain medications.

Advantages include the following:

1- It avoids irritation of upper gastrointestinal

2- When the medication has an objectionable taste or odor.

3- Drug is released at a slow but steady rate.

4- Provide higher blood stream levels (titers) of medications, because venous blood from lower rectum is not transported through the liver.

Respiratory Inhalation

- Medications administered by inhalation such as bronchodilators
- It is administered with the use of nebulizers that deliver a fine spray or mist of medications to client.
- A metered- dose inhaler (MDI) is a handheld nebulizer that can be used by clients to self-administer measured doses of an aerosol medication.
- Client needs to be instructed about how to use inhalers.

Oral Medication

- It is used to provide a medication that has systemic effects and/or local effects on gastrointestinal tract.
- Oral medications could be in the form of tablets and capsules and liquids (syrup and suspension).

Sublingual Medication

- It is placed under tongue, where it dissolves, absorbed into blood vessels in short time
- The medication should not be swallowed. e.g. Nitroglycerine

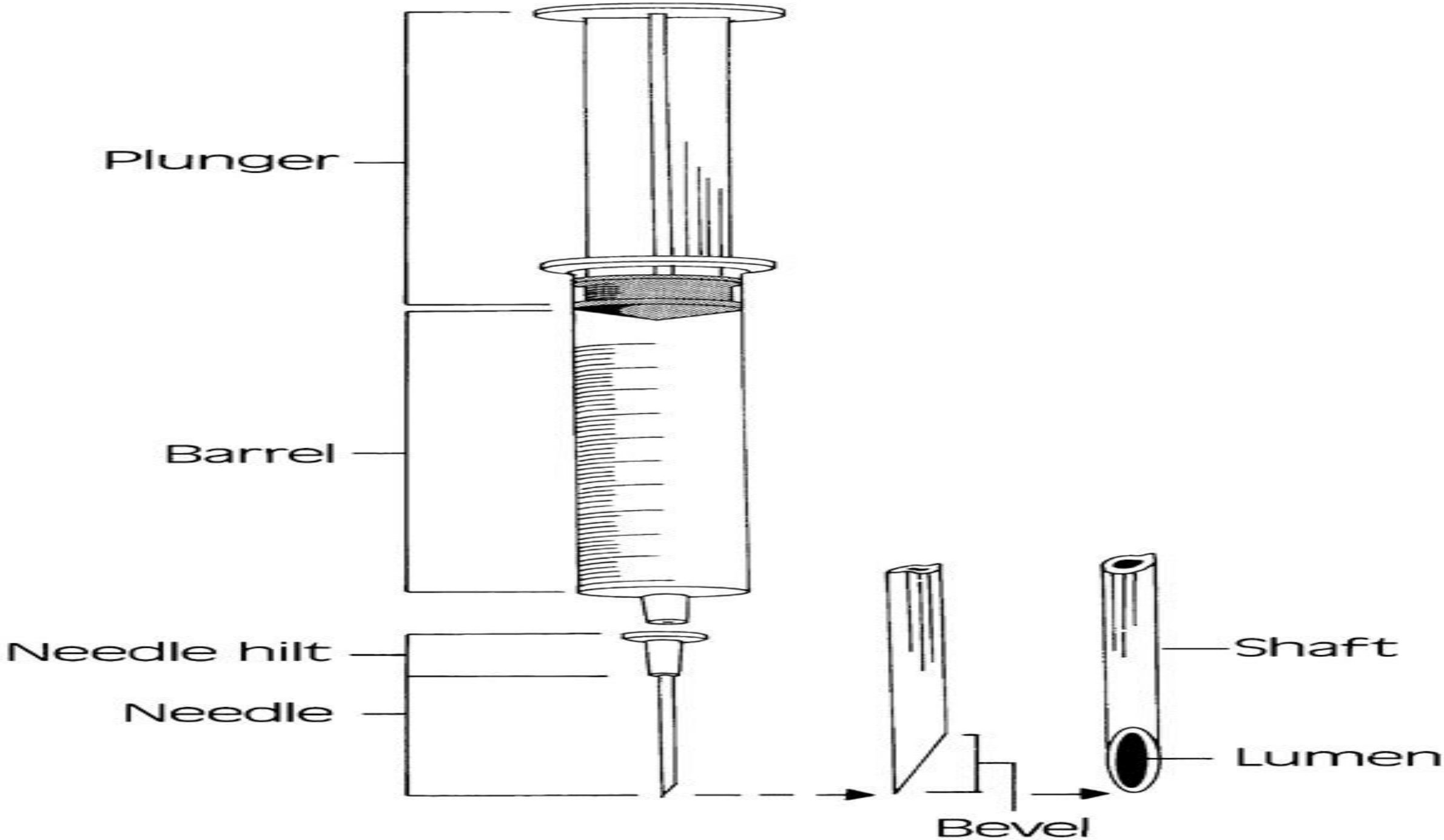
Buccal Medications:

- It means apply to cheek.
- A medication is held in mouth against mucous membranes of cheek until drug dissolves.
- The drug may act locally on the mucous membranes of mouth
- Or systemically when it is swallowed in the saliva.

Parenteral Medications

It is administered by needle.

- **Intradermal**: under the epidermis (into dermis)
- **Intramuscular**: into a muscle
- **Subcutaneous (hypodermic):** into subcutaneous tissue, just below the skin
- **Intravenous**: into a vein**.**

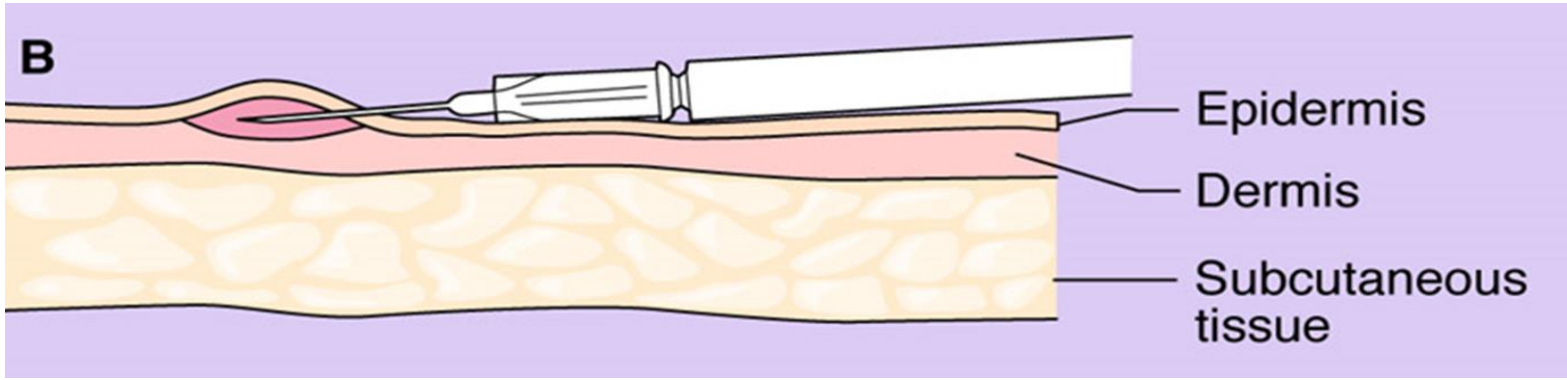

Plunger
Barrel
Needle hilt
Needle
Shaft
Lumen
Bevel

1- Intradermal (ID)

- Administration of a drug into dermal layer of the skin beneath epidermis.
- Only small amount of liquid is used 0.1 ml.
- It is **indicated** for allergy, tuberculin tests and administering BCG vaccine.
- Common **sites** for intradermal injections are inner lower arm, upper chest and back beneath scapulae
- Left arm is used for tuberculin tests and right arm is used for all other tests.
- 1 ml syringe needle is short and fine, gauge is 25, 26 or 27, ¼ to 5/8 inch along

1- Intradermal (ID)

- Syringe is held at about a 15 degree angle to skin, with level of needle upward.
- Needle is then inserted through epidermis into dermis, and fluid is injected.
- Area is **not massaged** because medication may disperse into tissue or out through needle insertion site
- It is absorbed slowly through blood capillaries in area.

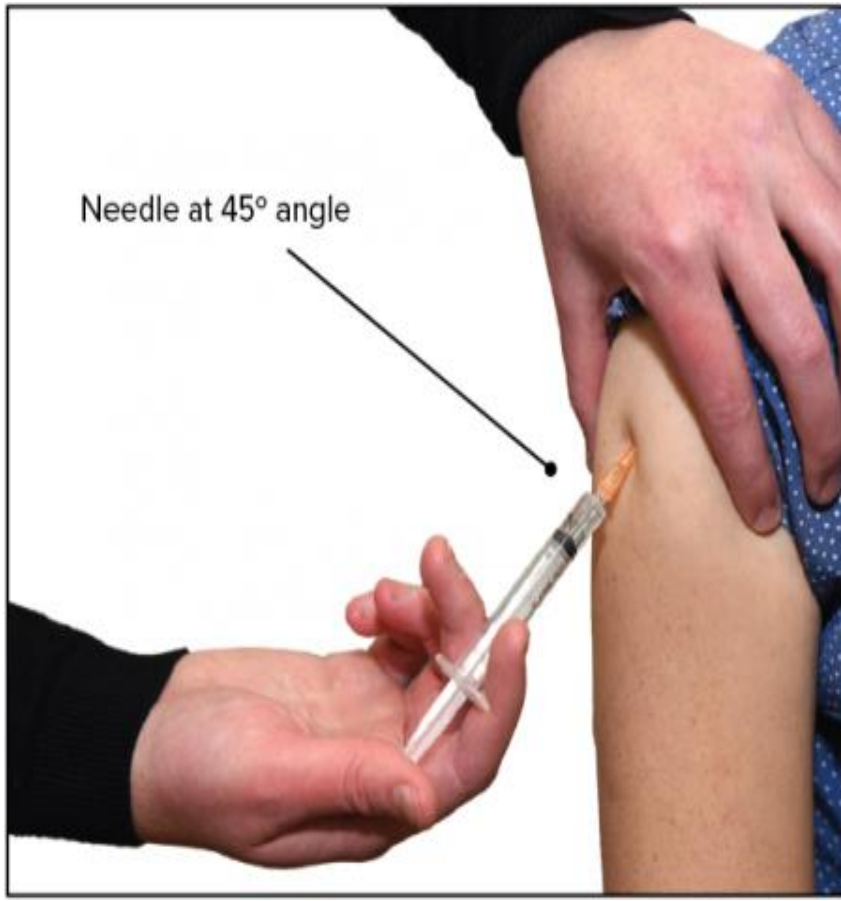


2- Subcutaneous (SC)

- Administered S/C (just beneath the skin) e.g. vaccines, pre operative medications, narcotics, insulin and heparin.
- Common sites for S/C are outer aspect of upper arms and anterior aspect of thighs
- It is convenient and has good blood circulation, other areas can be used are abdomen, scapular areas of the upper back and upper ventrogluteal and dorsogluteal areas.

2- Subcutaneous (SC)

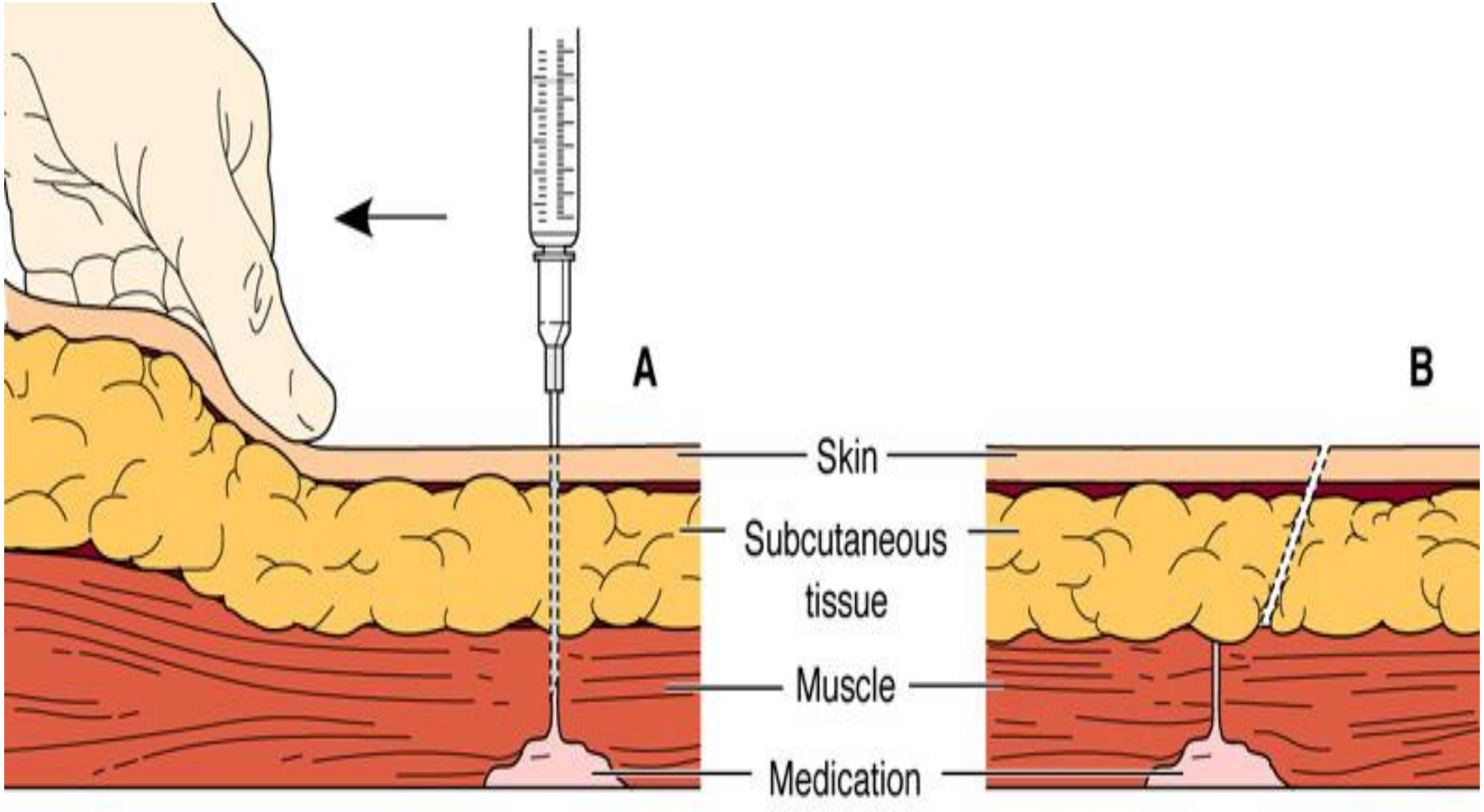
- Only small doses (0.5-1 ml) of medication are usually injected via the S/C route.
- Type of syringe depends on medication to be given.
- Generally 2 ml syringe is used.
- If insulin is administered, insulin syringe is used. Generally 25 gauge, 5/8 inch needle is used for adults, and needle is inserted at a 45 degree



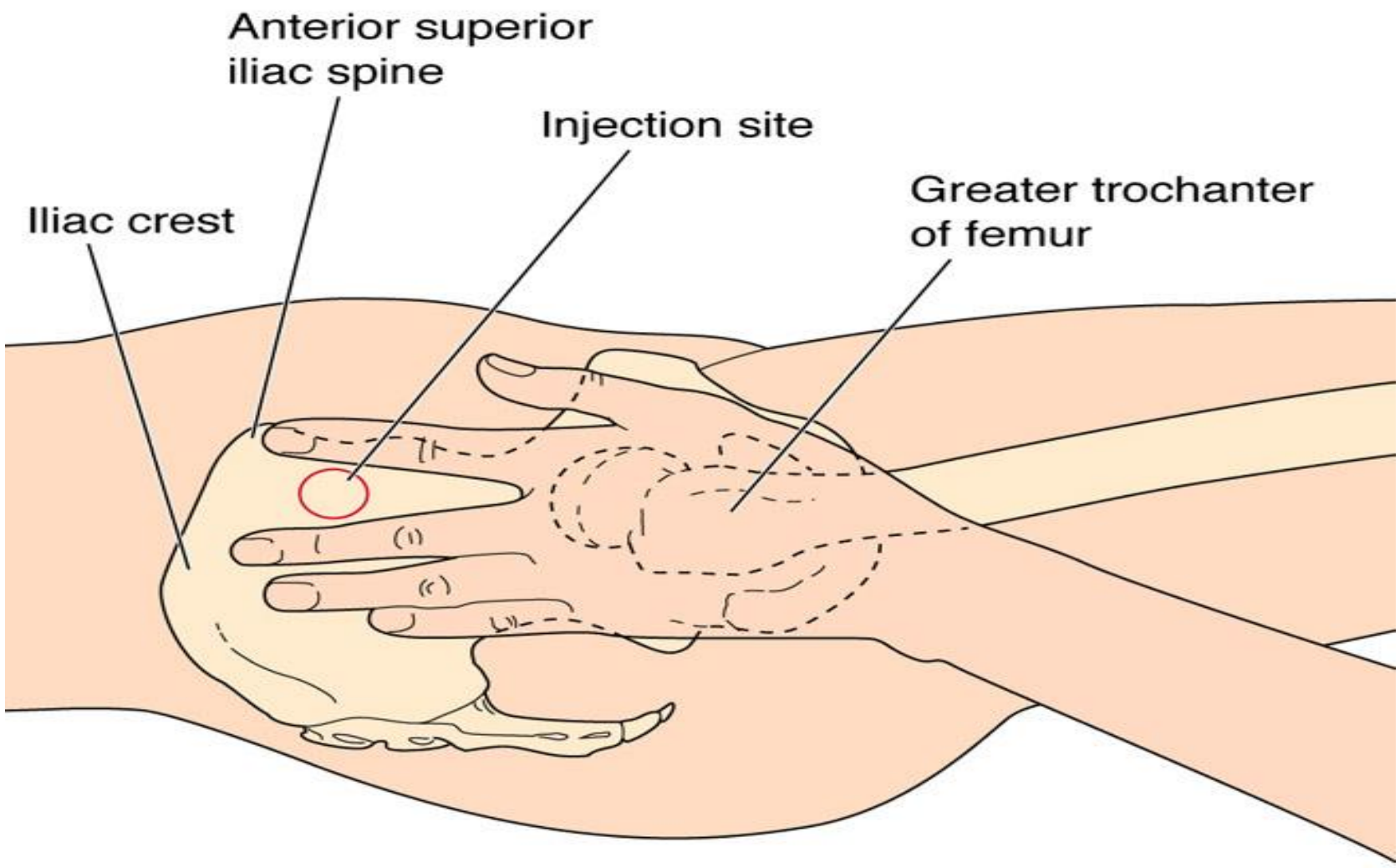
3- Intramuscular (IM)

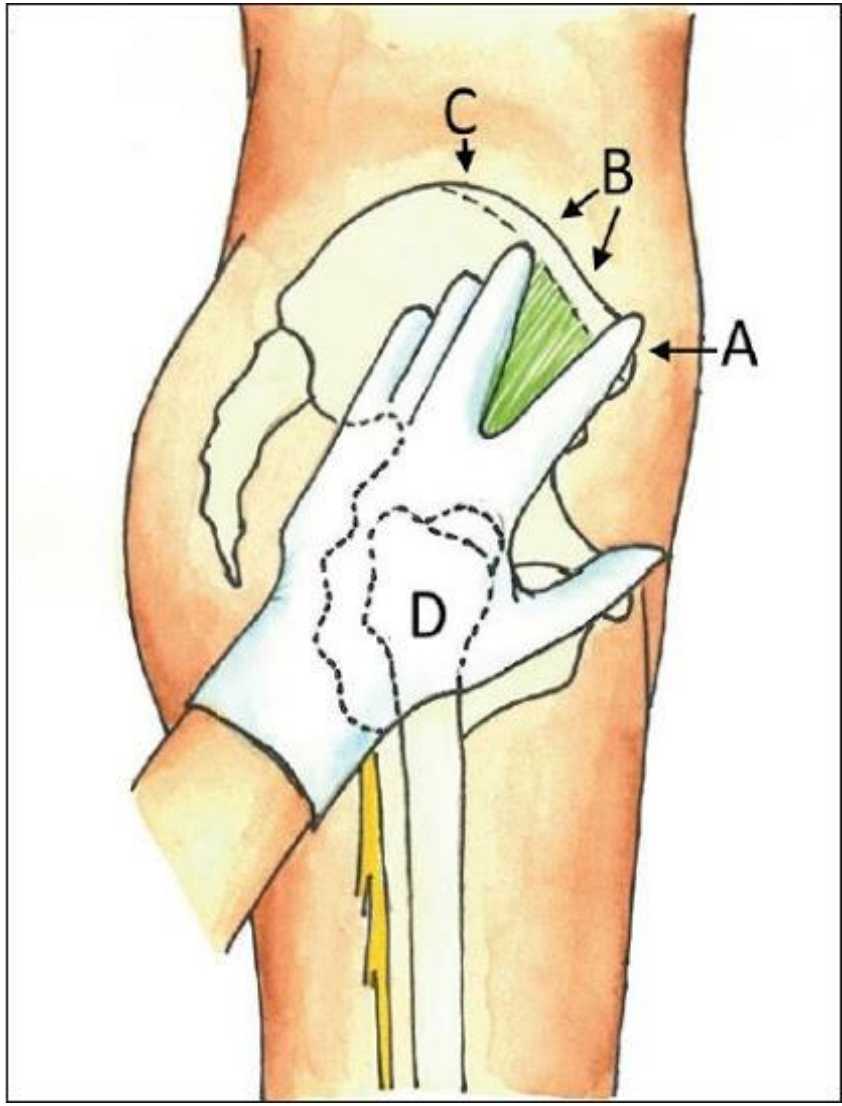
- Injections into muscle tissue are absorbed more faster than subcutaneous injections because of the greater blood supply to the body muscles.
- Muscles can take a larger volume of fluid without discomfort
- Usually a 2-5 ml syringes are needed. Needle is 11/2 inches and 21 or 22 gauge.
- Selection of safe site located away from large blood vessels, nerves and bones
- Several body sites can be used for IM injection. Preferred site is Ventrogluteal site.
- Vastus lateralis is the proffered for children under 7 months of age.
- Other sites such as Dorosgluteal, Deltoid, and Rectus femoris are used.

An Intramuscular needle inserted into the muscle layer

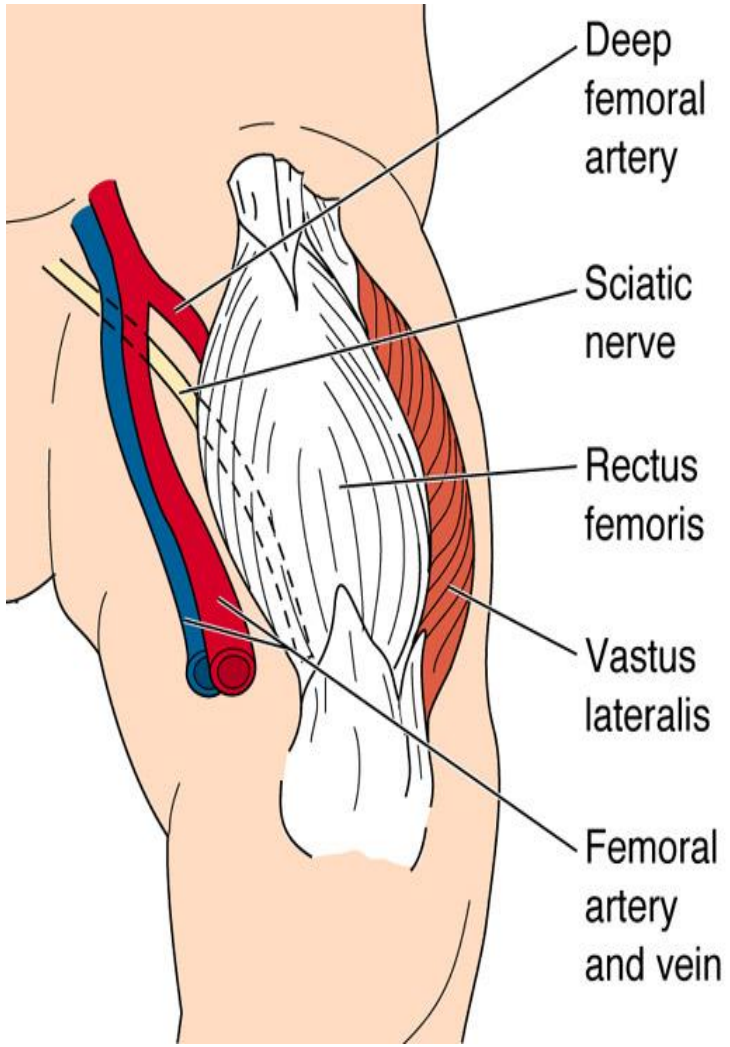


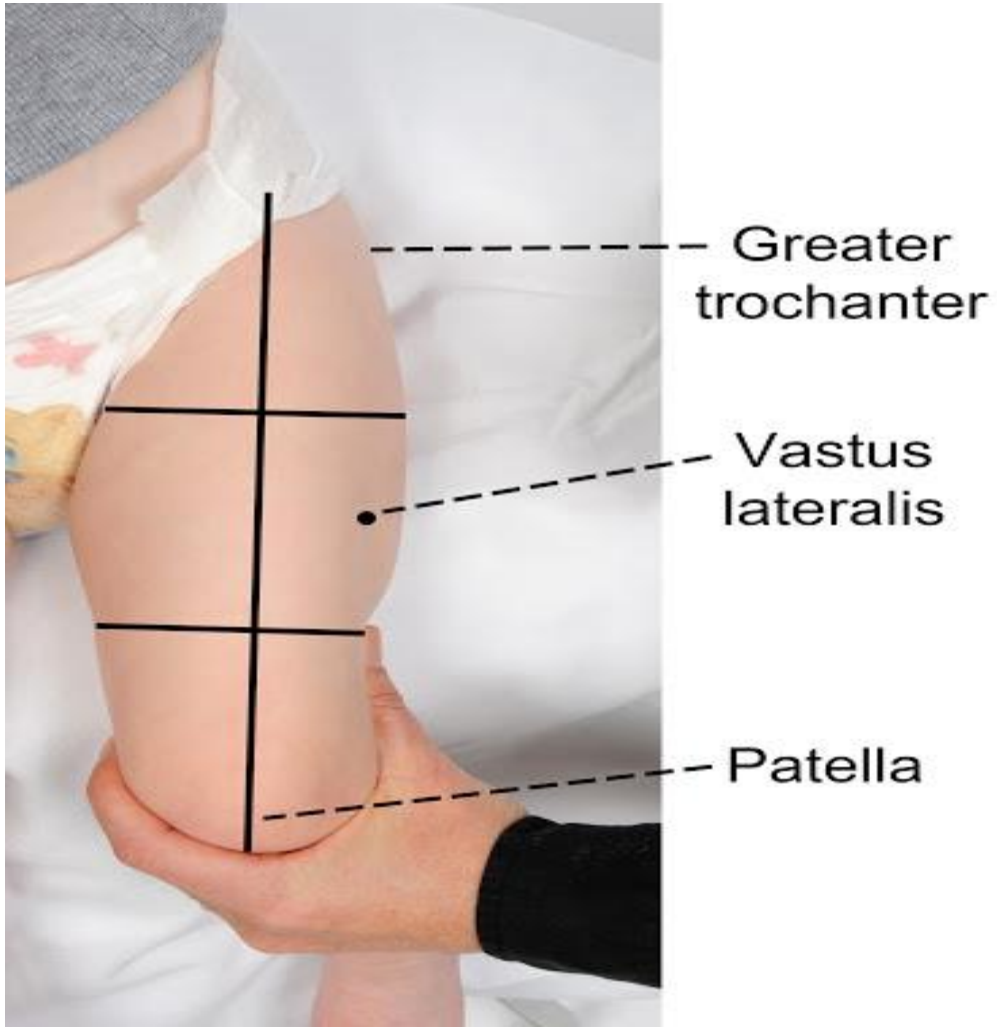
Ventrogluteal site for an intramuscular injection



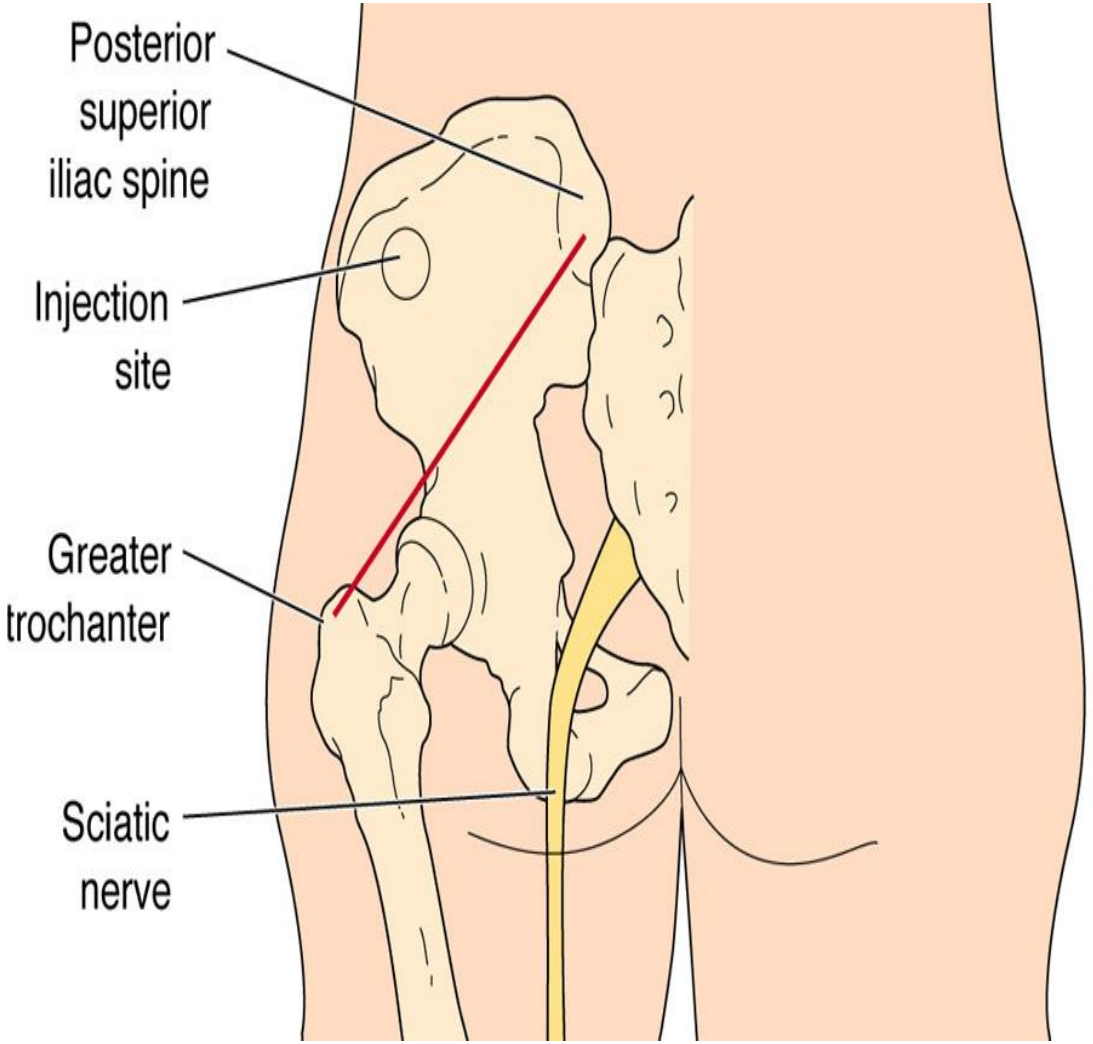


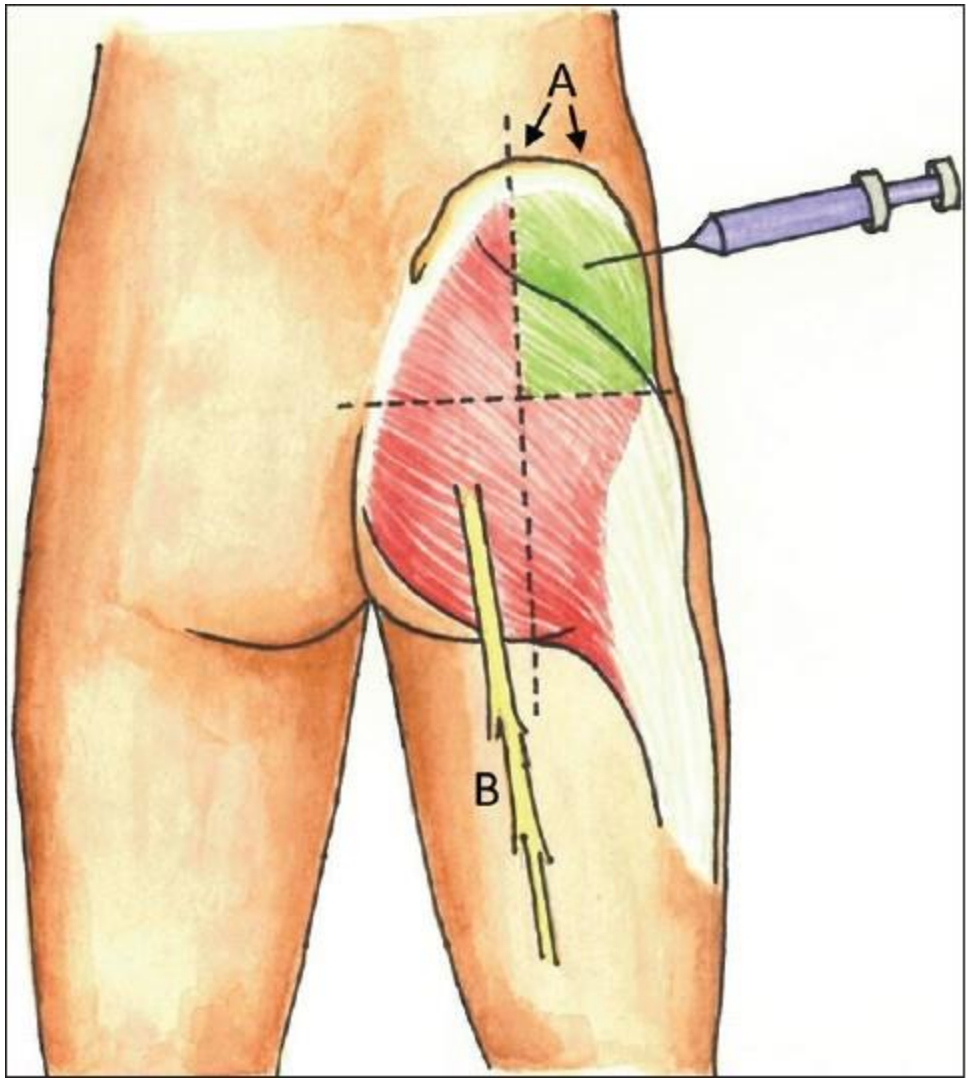
The Vastus Lateralis site for an Intramuscular injection



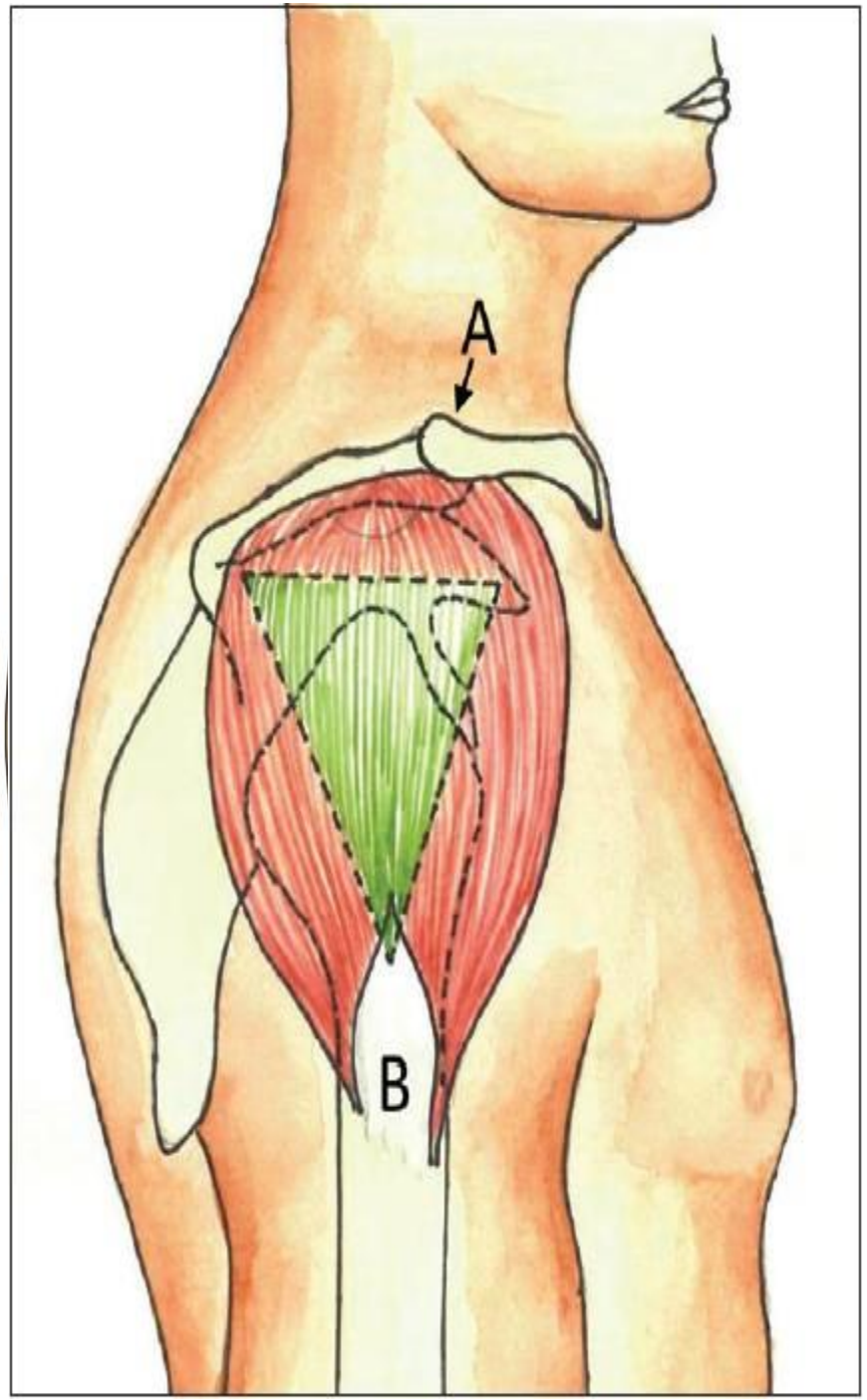


One method of establishing the Dorsogluteal site for an Intramuscular Injection

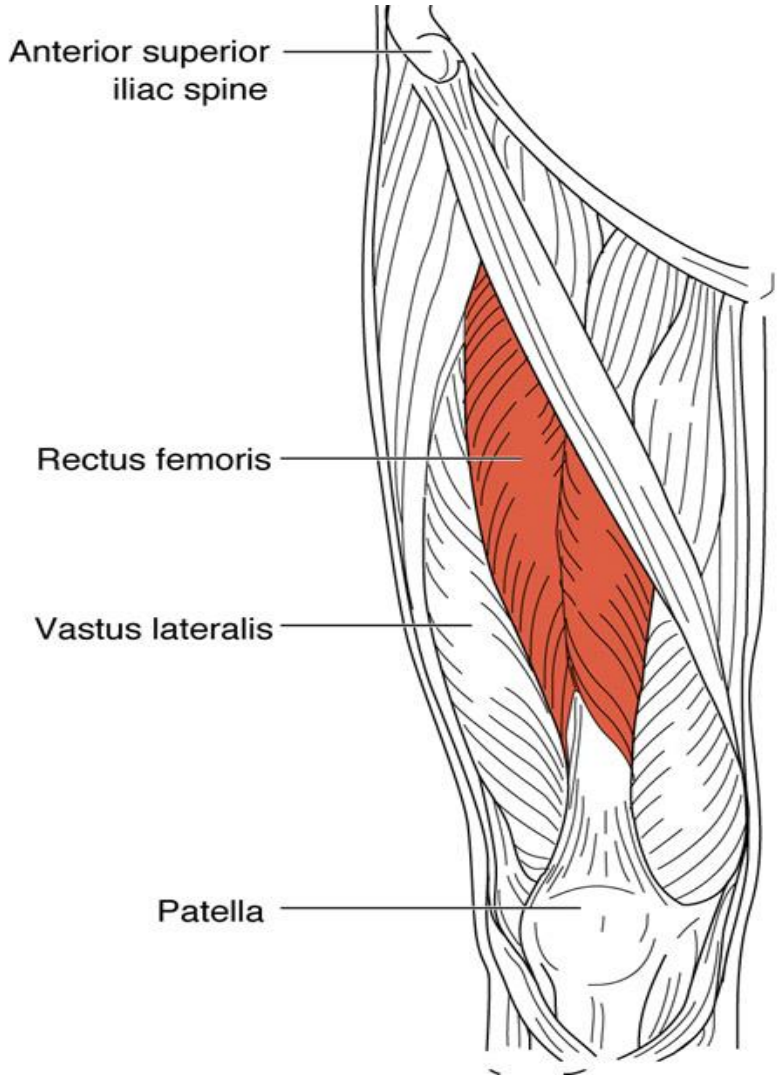


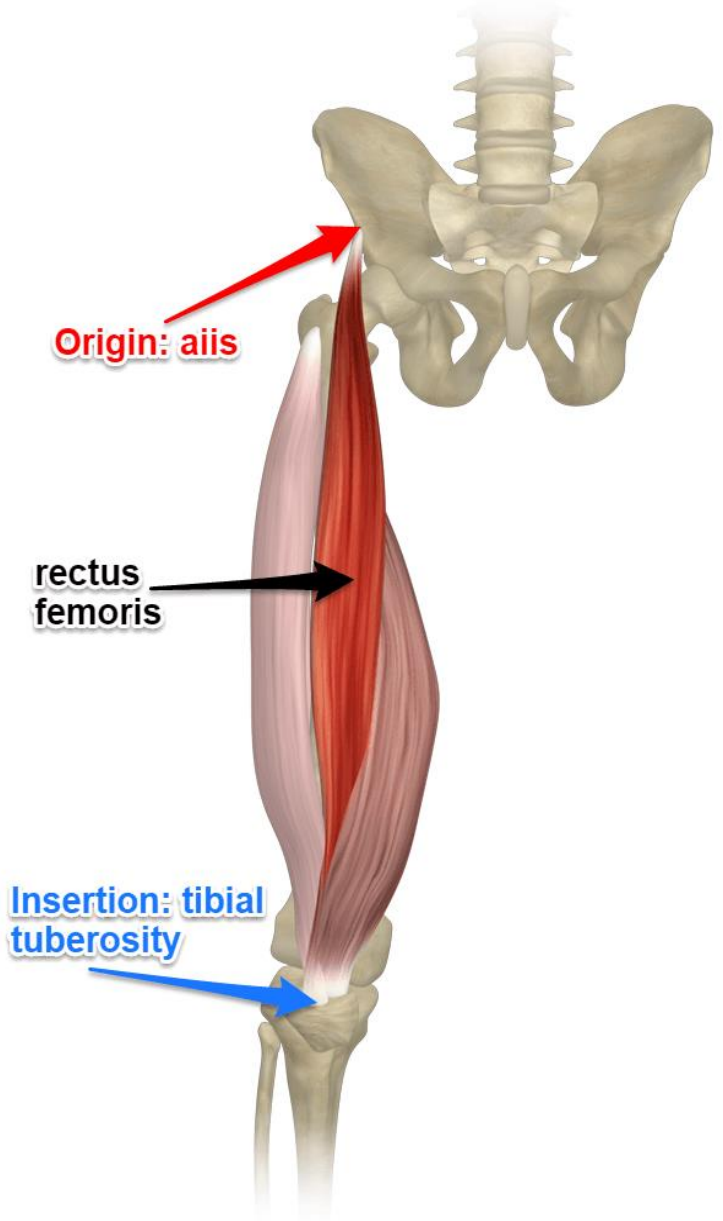


D-Deltoid Site.

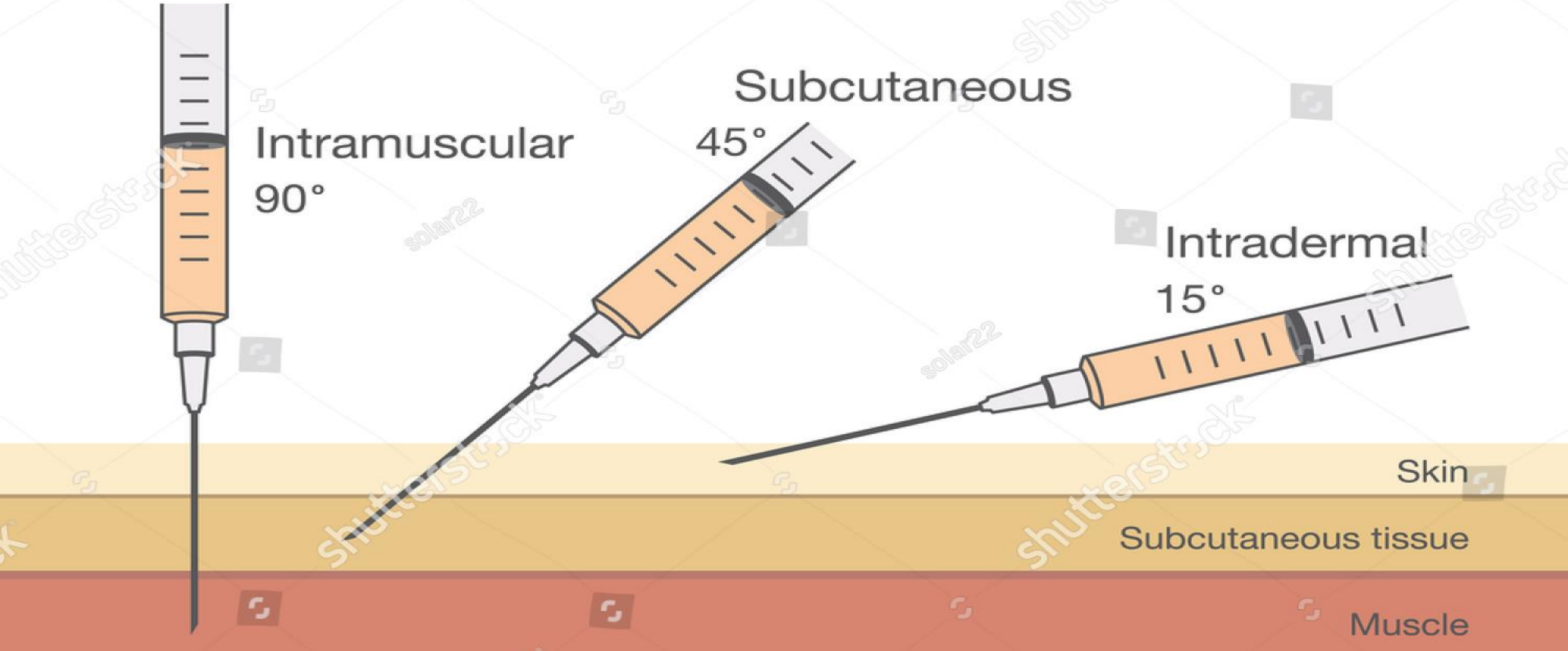


E-Rectus Femoris site.





Comparison of angles of injection.



4- Intravenous (IV)

- It enters client's blood stream directly by a vein, they are appropriate when a rapid effect is required.

Methods of Medications by administered I.V :

1-Large volume infusion of I.V fluids

2-Intermittent intravenous infusion

3-Volume controlled infusion (used for children)

4-Intravenous push or bolus (I.V.P)

5-Intermittent injection ports (device)

4- Intravenous (IV)

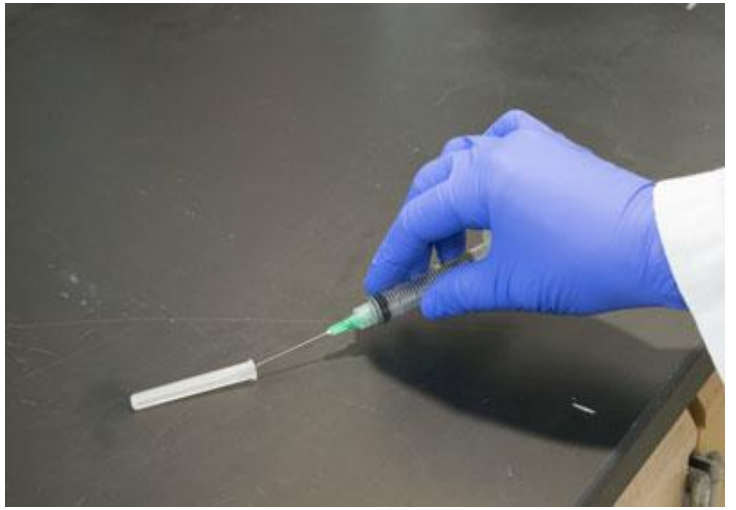
Before adding any medications to any existing intravenous infusion, the nurse must:

a) Inspect and palpate intravenous insertion site for signs of infection, infiltration, or a dislocated catheter.

b) Inspect surrounding skin for redness, pallor, swelling.

c) Palpate surrounding tissues for coldness and presence of edema, which could indicate leakage of the I.V fluid into the tissues.

IMPORTANT



NEVER, EVER RECAP A USED NEEDLE !!!!

Route	Advantages	Disadvantages
Oral	-Most common route -Most convenient -Safe method, -Doesn't break skin barrier -Doesn't cause stress -Least expensive	-Inappropriate /contraindicated for clients: ✓ with nausea or vomiting, ✓ unconscious ✓ unable to swallow, ✓ gastric or intestinal suction. ✓ has reduced motility - May have unpleasant taste or odor. -Can't be used before certain diagnostic tests or surgical procedures. -May discolor teeth, harm tooth -May irritate gastric mucosa -Can be aspirated by seriously ill clients

Sublingual	-Convenient, safe -Administered for local effect -More potent than oral because drug directly enters the blood and bypass the liver	-If swallowed, drug may be inactivated by gastric juice. -Drug must remain under tongue until dissolved and absorbed.
Buccal	Same as for sublingual	Same as for sublingual
Rectal	-Drug released at slow, steady rate	-Dose absorbed is unpredictable.
Topical	-Provides local effect. -Few side effects	-May be messy and may soil clothes. -Drug can rapidly enter body through abrasions and cause systemic effect.

Subcutaneous	-Onset of drug action faster than oral	-Must involve sterile technique because breaks skin barrier -More expensive than oral -Can administer only small volume. -Slower than intramuscular administration -Some drugs can irritate tissues and causing pain. -Can be anxiety-producing.
Intramuscular	-Can administer larger volume than subcutaneous -Drug is rapidly absorbed	-Breaks skin barrier -Can be anxiety-producing
Intradermal	-Absorption is slow	-Amount of drug administered must be small. -Breaks skin barrier

Intravenous	-Rapid effect	-Limited to highly soluble drugs -Rapid distribution inhibited by poor circulation.
Inhalation	-Introduces drug throughout the respiratory tract. -Rapid localized relief. -Drug can be administered with unconscious client.	-Drug intended for localized effect can have systemic effect. -Of use only for respiratory system.