MEDAVIE HealthEd ÉduSanté

Drug Administration

Advanced Care Paramedicine

Module: 03

Section: 04

For All Medication Administration

- Apply the following to all routes:
  - Appropriate BSI
  - Confirm indication, medication, dose, route, and expiration
  - Review 7 rights of medication administration
    - Consider informed consent
      - Did you give the patient all the information on the efficacy and safety prior to administering this medication to make an appropriate decision, being mindful of what is most imporant to convey in emergency situations
  - Confirm medication indications and patient allergies
  - Assemble and prepare needed equipment.
  - Draw up medication as appropriate.

Medication Administration & Documentation

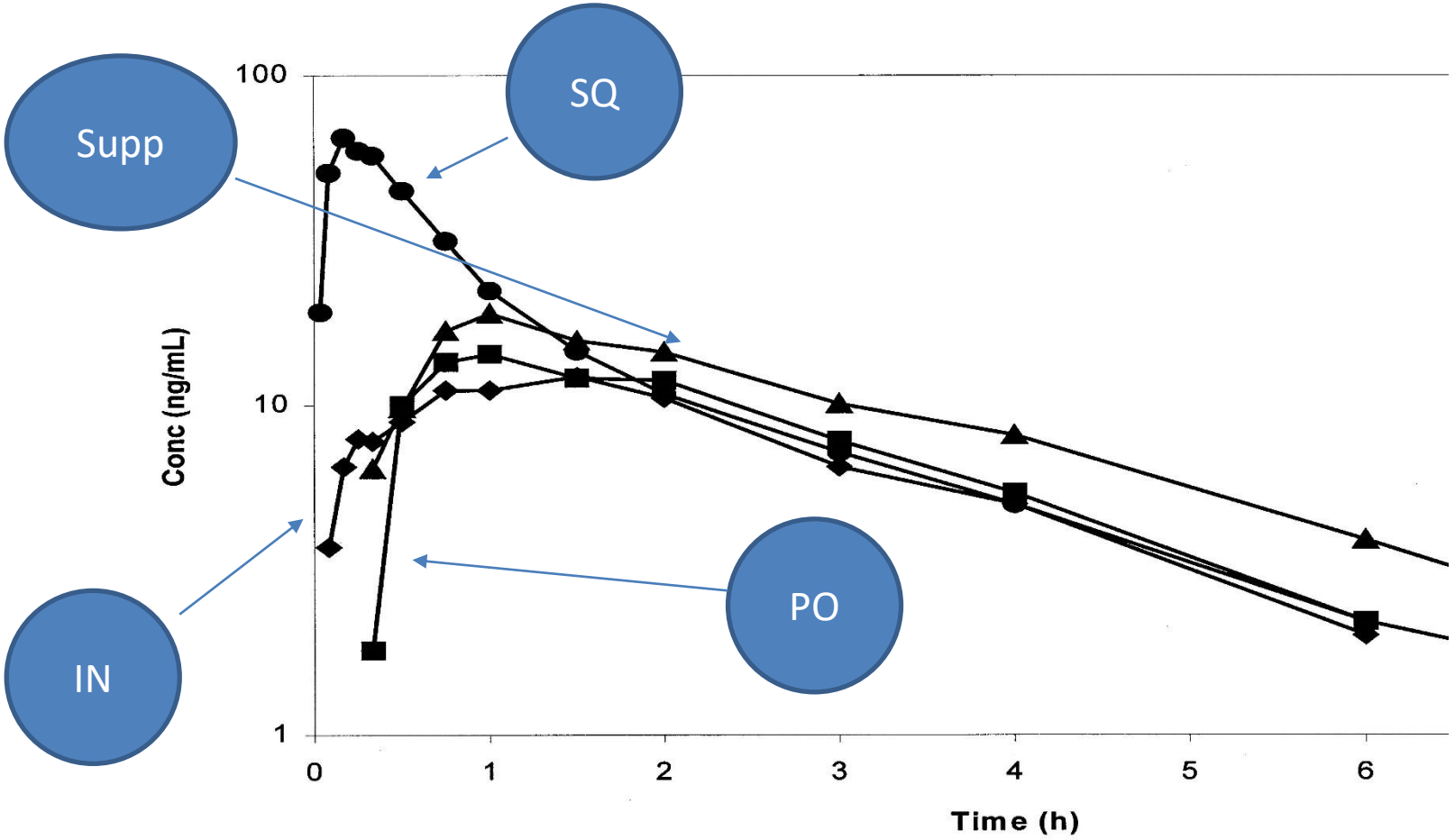
- Record all information concerning the patient and medication including:
  - Indication for drug administration.
  - Dosage and route delivered.
  - Patient response to the medication—both positive and negative.

Enteral vs Parenteral

- Enteral are medications absorbed via the gastrointestinal tract
  - Does not mean they all go through first pass metabolism
- Parenteral are medications entering via all other routes

Enteral	• Per Os (PO) - is Latin for by mouth • Sublingual (SL) • Rectal (PR) • Orogastric (OG)/Nasogastric (NG) • Buccal
Parenteral	• Intravenous • Intramuscular • Subcutaneous • Intraosseous • Umbilical
Parenteral (topical)	• Percutaneous • Ocular • Nasal • Respiratory

Contrasting Route of Administration



Duquensnoy et al., 1998. Eur J Pharm Sci. 6:99-104

- Percutaneous drug administration are drugs applied to and absorbed through the skin or mucous membranes.

Transdermal

- Absorbed through the skin at a slow, steady rate.
- Method:
  - BSI
  - Clean administration site
  - Apply medication
  - Leave medication in place for required time
  - Monitor the patient for desirable or adverse effects

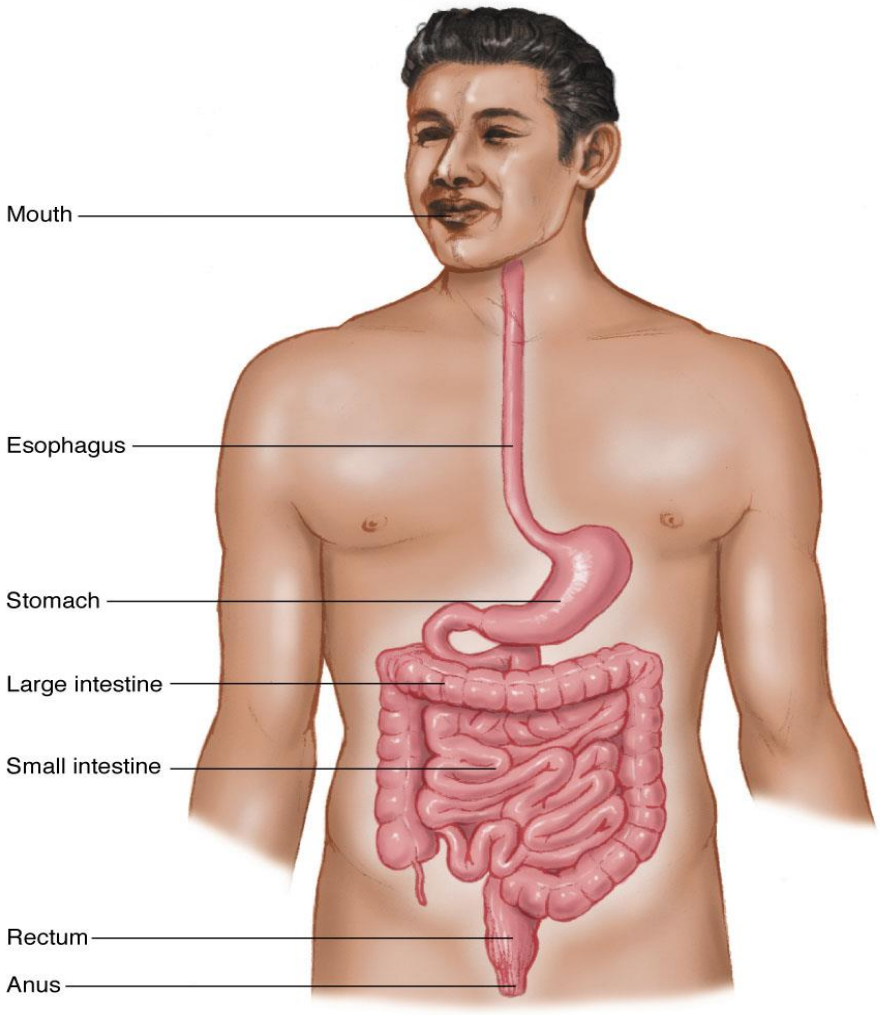
Mucous Membranes

- Absorbed through the mucous membranes at a moderate to rapid rate.
- Medication sites:
  - Tongue
  - Cheek
  - Eye
  - Nose
  - Ear

Enteral Administration

- The delivery of any medication that is absorbed through the gastrointestinal tract
- Routes:
  - Oral
  - Sublingual
  - Buccal
  - Gastric tube
  - Rectal

Gastrointestinal tract



Sublingual

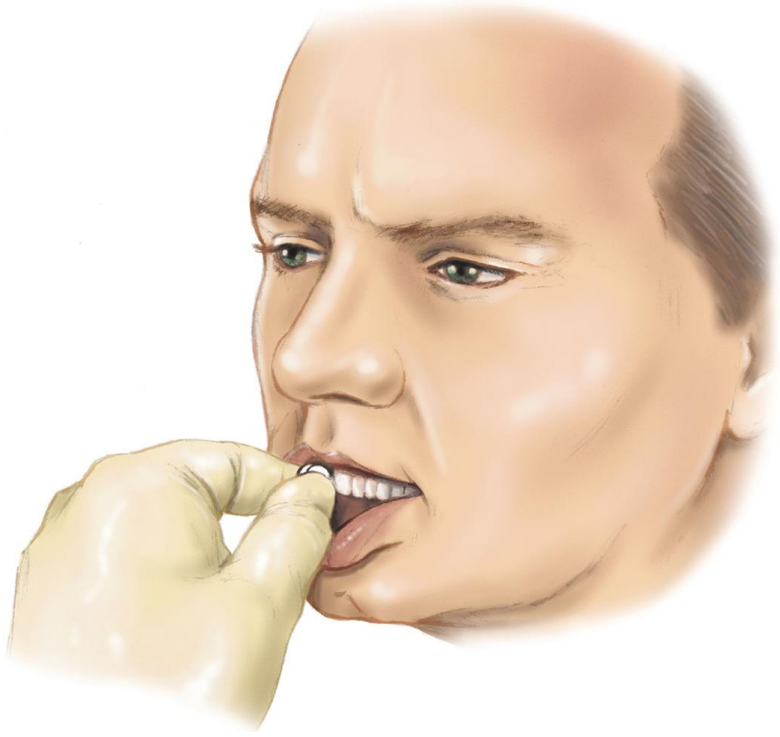
- Have your patient lift his tongue towards the top and back of his oral cavity
- Place the pill or direct spray between the underside of the tongue and floor of the oral cavity
- Monitor the patient for desirable or undesirable effects

Sublingual Medication Administration

- Place the pill or direct spray between the underside of the tongue and the floor of the oral cavity.

Buccal Medication Administration

- Place the medication between the patient's cheek and gum.



Oral Drug Administration

- Any medication taken by mouth and swallowed into the GI tract.
- Be sure the patient has an adequate level of consciousness to prevent aspiration.

Oral Drug Forms

- Capsules
- Tablets
- Pills
- Enteric coated/ time release capsules and tablets
- Elixirs
- Emulsions
- Lozenges
- Suspensions
- Syrups

Equipment for Oral Administration

- Soufflé cup
- Medicine cup
- Medicine dropper
- Teaspoon
- Oral syringe
- Nipple

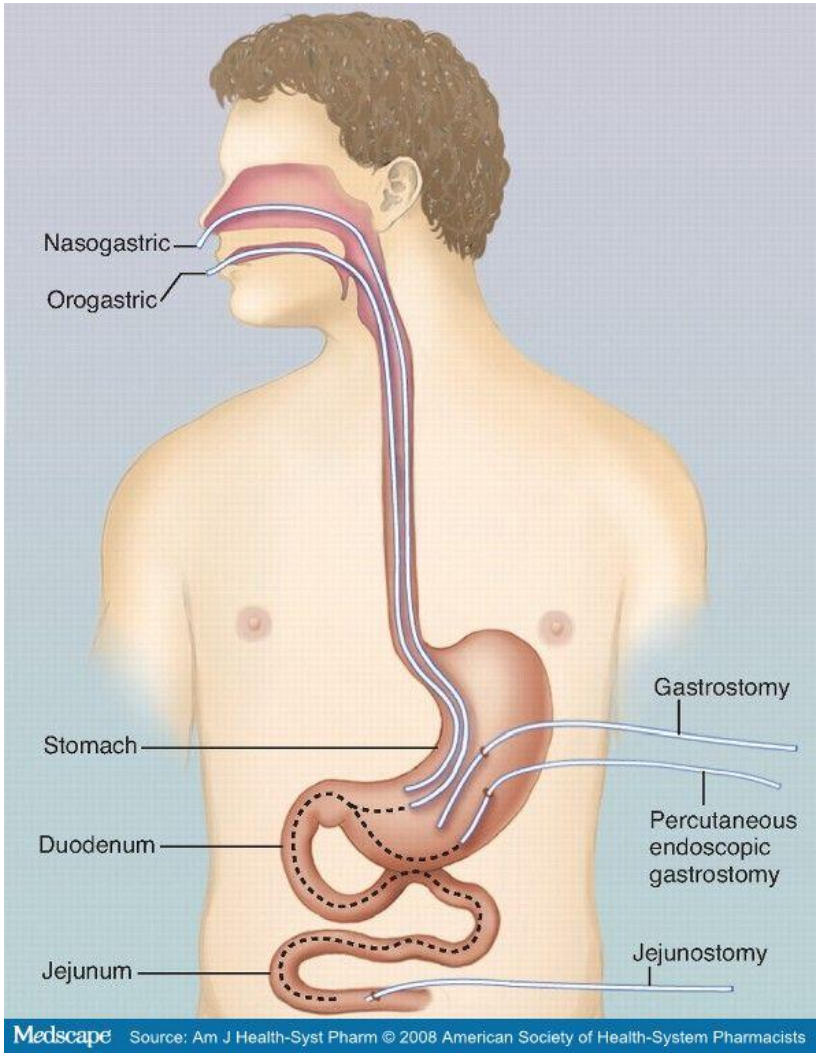
General Principles of Oral Administration

- Note whether to administer medication with food or on empty stomach.
- Gather any necessary equipment.
- Have patient sit upright when not contraindicated.
- Place the medication into your patient's mouth. Allow self-administration; assist when needed.
- Follow administration with 4-8 ounces of water and ensure that patient has swallowed the medication.

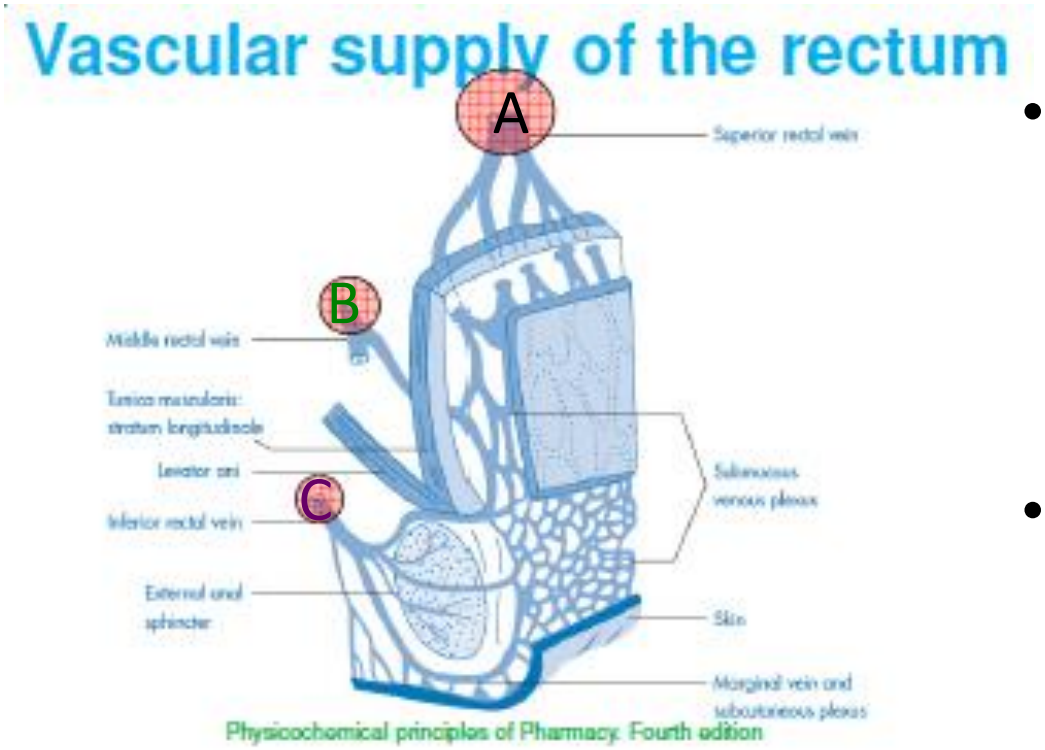
Gastric Tube Administration

- Gastric tubes provide access directly to the GI system
  - Orogastric
  - Nasogastric

Gastric Tubes



Rectal drug absorption



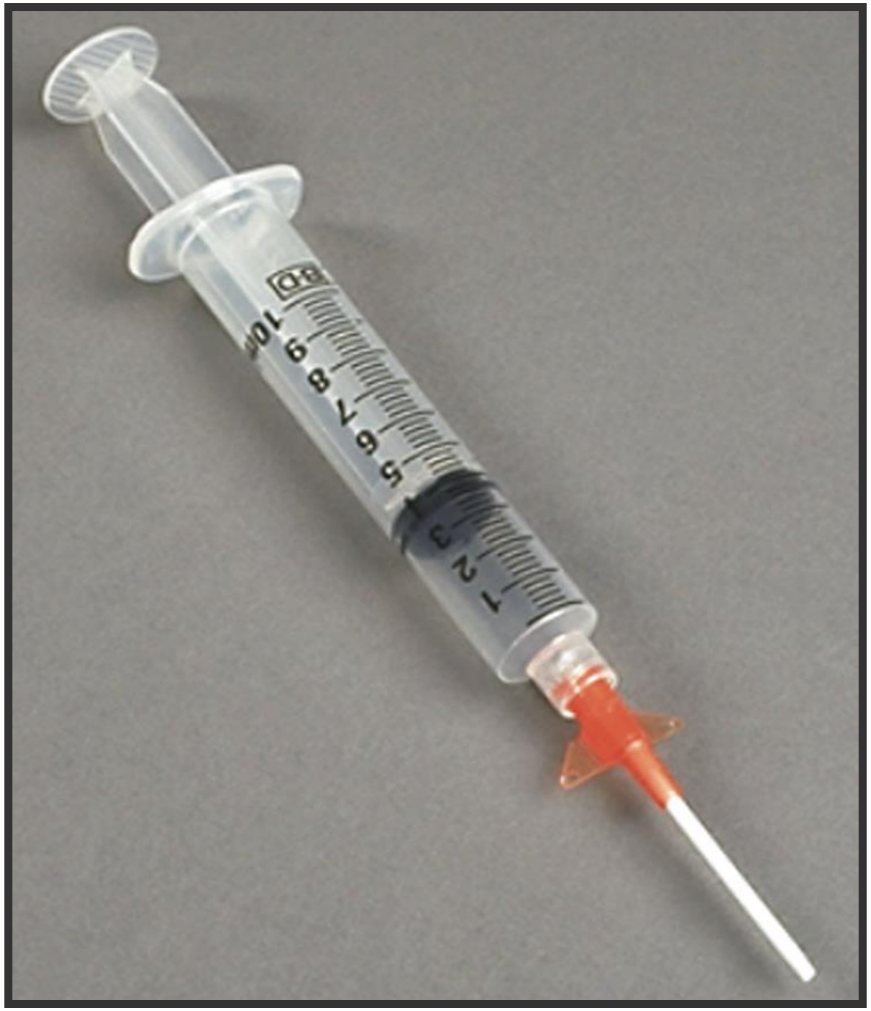
- Example of the contrast between circumventing and entering portal circulation
  - Hence, rectal absorption can be erratic
- Drugs can be utilized via this route to treat local (hemorrhoids) or systemic (diazepam for seizures) conditions

A. Superior rectal vein drains into the mesenteric vein which drains into portal vein

B. Middle rectal vein drains into vena cava

C. Inferior rectal vein drains into vena cava

Catheter placement on needleless syringe



Syringe attached to endotracheal tube

Prepackaged enema container

Parenteral Administration

- Drug administration outside of the gastrointestinal tract
- Usually involves a needle

Eye Drop Administration

- Use a medication dropper to place the prescribed dosage on the conjunctival sac.

Eye drop administration

- Have patient tilt head back or lay down
- Avoid touching the eyelid or lashes
- Have patient look up
- Pull down on the lower eyelid to form a pouch
- Place drop into pouch
- Have the patient look down and then slowly release the lower lid
- Instruct patient to gently close eyes and try to keep them closed for at least 30 seconds, preferred up to 5 minutes
- Advisable to press down on the corner of the eye with thumb and index finger to close nasolacrimal duct
  - this promotes retention of medication and prevent swallowing of medications
- Try not to blink or rub the eye
- Note:
  - Eye drops with certain preservatives can bind to contact lenses
  - Ophthalmic suspensions should be shaken prior to instilling

Nasal Medication Administration

- Have patient blow nose
- Shake the bottle
- Have patient sit up (head not titled backwards), you or patient close on nostril
- Point bottle away from the septum, but up and back towards nasal cavity
- Have patient breathe through mouth
- Repeat to other side if needed
- Avoid blowing nose for 3-5 minutes
- Rinse tip of bottle with hot water

Pulmonary Drug Administration

- Parenteral drug administration route
- Medications are administered into the pulmonary system via inhalation or injection
- Mechanisms:
  - Small-volume Nebulizer
  - Pressurized Metered-dose
    - Spacers and holding chambers
  - Dry-powder Inhaler
  - Endotracheal tube

Dry-powder Inhaler

Figure 22. Currently available dry-powder aerosol formulations in the United States categorized by design features (see text description of design features)

Small-volume Nebulizer

Large Volume Nebulizer

Metered Dose Inhaler

Metered Dose Inhaler

Figure 20. Currently available pMDI dose counters on the market

Close Mouth Technique

1. Warm the pMDI canister to hand or body temperature.
2. Remove the mouthpiece cover and shake the inhaler thoroughly.
3. Prime the pMDI into the air if it is new or has not been used for several days.
4. Sit up straight or stand up.
5. Breathe all the way out
6. Place the pMDI between their teeth; make sure that their tongue is flat under the mouthpiece and does not block the pMDI.
7. Seal their lips.
8. Actuate the pMDI as she/he begins to breathe in slowly.
9. Hold his/her breath for 10 seconds. If she/he cannot hold their breath for 10 seconds, then for as long as possible

Open Mouth Technique

- Warm the pMDI canister to hand or body temperature (if possible)
- Remove the mouthpiece cover and shake the pMDI thoroughly.
- Prime the pMDI into the air if it is new or has not been used for several days.
- Sit up straight or stand up
- Breathe all the way out.
- Place the pMDI two finger widths away from their lips.
- With mouth open and tongue flat (tip of tongue touching inside of their lower front teeth), tilt outlet of the pMDI so that it is pointed toward the upper back of the mouth.
- Actuate the pMDI as she/he begins to breathe in slowly
- Breathe slowly and deeply through the mouth and hold their breath for 10 seconds. If she/he cannot hold their breath for 10 seconds, then for as long as possible.

- * If using a corticosteroid, important to rinse out mouth after use to prevent oral thrush

Shaking and Priming

Generic Name	Brand Name	Time to Prime	No. of Sprays
Short-acting Bronchodilators			
Albuterol Sulfate HFA	ProAir HFA®	New and when not used for 2 weeks	3
	Proventil® HFA	New and when not used for 2 weeks	4
	Ventolin® HFA	New and when not used for 14 days	4

Spacer/valve holding devices

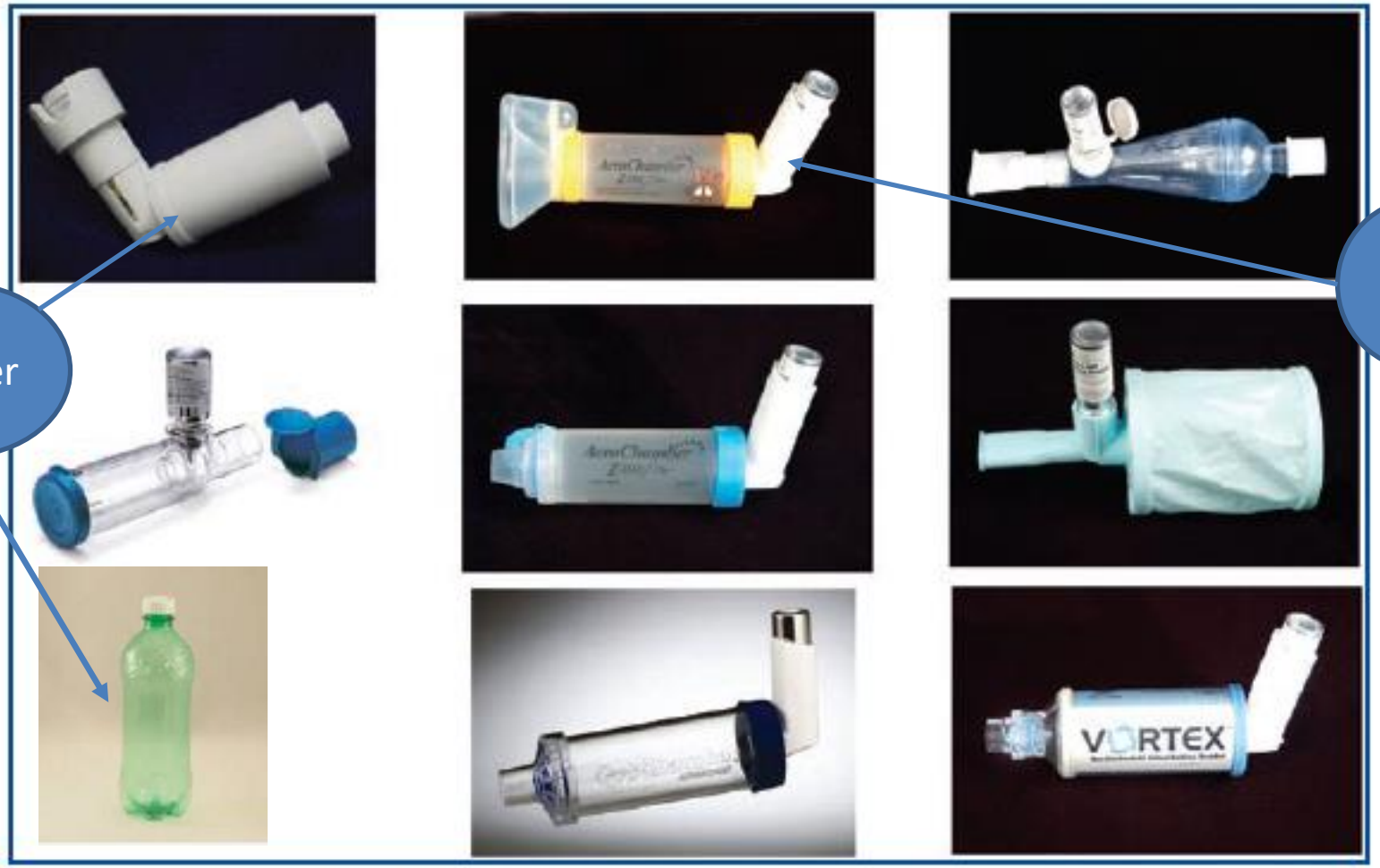


Figure 21. Examples of VHCs and spacers

Spacer

Commercial versus home-made spacers in delivering bronchodilator therapy for acute therapy in children

Carlos E Rodriguez-Martinez[1,*], Monica Sossa[2], Juan Manuel Lozano[3]

Database Title — The Cochrane Library

Editorial Group: Cochrane Airways Group

Published Online: 23 APR 2008

Assessed as up-to-date: 17 AUG 2010

DOI: 10.1002/14651858.CD005536.pub2

Authors' conclusions

Care should be taken in the interpretation and applicability of our results because of the small number of RCTs along with few events available meeting the criteria for inclusion in the review, absence of the primary outcome of interest and other clinically important outcomes in the majority of included studies. The possible need for a face-mask in younger children using home-made spacers should also be considered in practice

"No significant differences were demonstrated between the two delivery methods in terms of the need for hospital admission"

Discussion

Advantages and disadvantages of each aerosol device

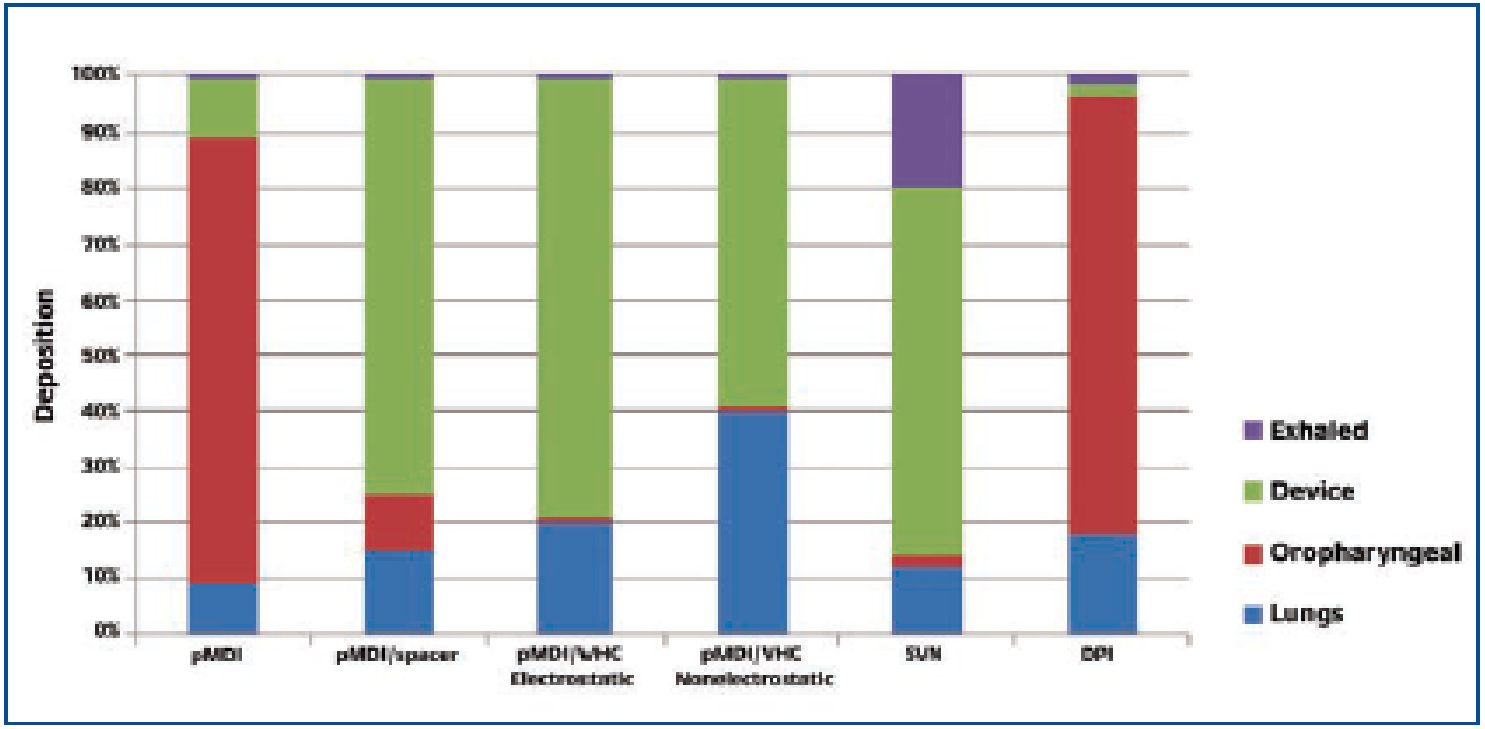


Figure 2. Drug deposition with common aerosol inhaler devices. Shown by color are the varying percentages of drug lung deposition and drug loss in the oropharynx, device, and exhaled breath.
pMDI = pressurized metered-dose inhaler; VHC = valved holding chamber; SVN = small-volume nebulizer; DPI = dry-powder inhaler
(Modified, with permission, from Reference 1 and Reference 7)

Pop quiz

- Of the three devices we just reviewed, which one is the best at delivering medication to the lungs?
  - pMDI, DPI, or SVN?

Endotracheal Tube

- Several medications can be administered through an endotracheal tube:
  - Lidocaine
  - Epinephrine
  - Atropine
  - Naloxone

Endotracheal Tube

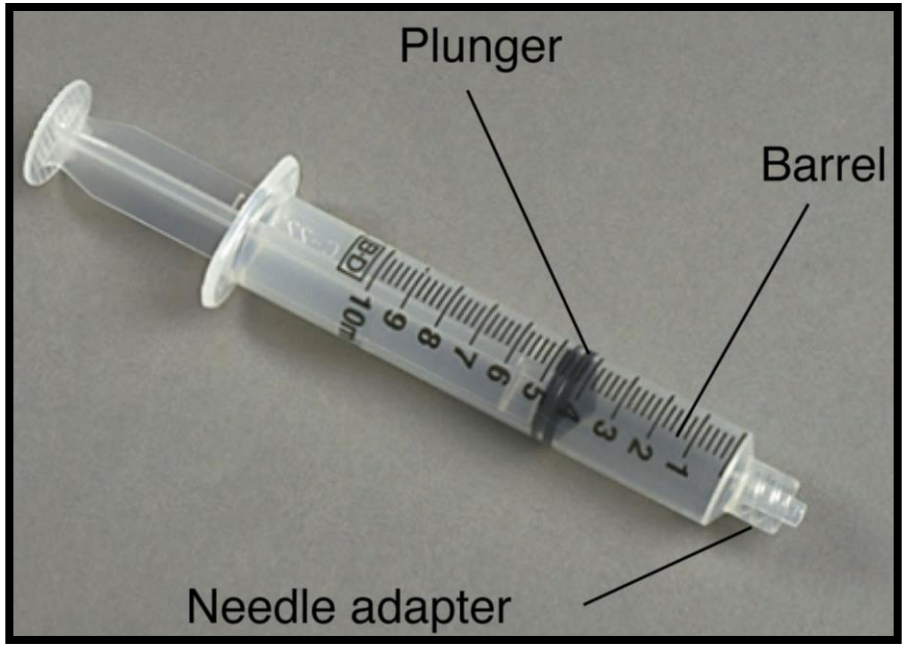
- "Compared with patients who received ACLS IV drug administration following out-of-hospital cardiac arrest, patients with intravenous access & drug administration had higher rates of short-term survival with no statistically significant improvement in survival to hospital discharge, quality of CPR, or long-term survival".
  - **Intravenous drug administration during out-of-hospital cardiac arrest: a randomized trial.** Olasveengen TM[1], Sunde K, Brunborg C, Thowsen J, Steen PA, Wik L. JAMA. 2009 Nov 25;302(20):2222-9. doi: 10.1001/jama.2009.1729

Endotracheal Tube

- "For our out-of-hospital advanced rescuer system, ET drugs at recommended doses (twice the IV dose) injected into an ET tube during cardiac arrest and CPR were of no benefit."
  - **Endotracheal drug administration during out-of-hospital resuscitation: where are the survivors?** Niemann JT, Stratton SJ, Cruz B, Lewis RJ. Resuscitation. 2002 May;53(2):153

Syringes and Needles

Syringe.



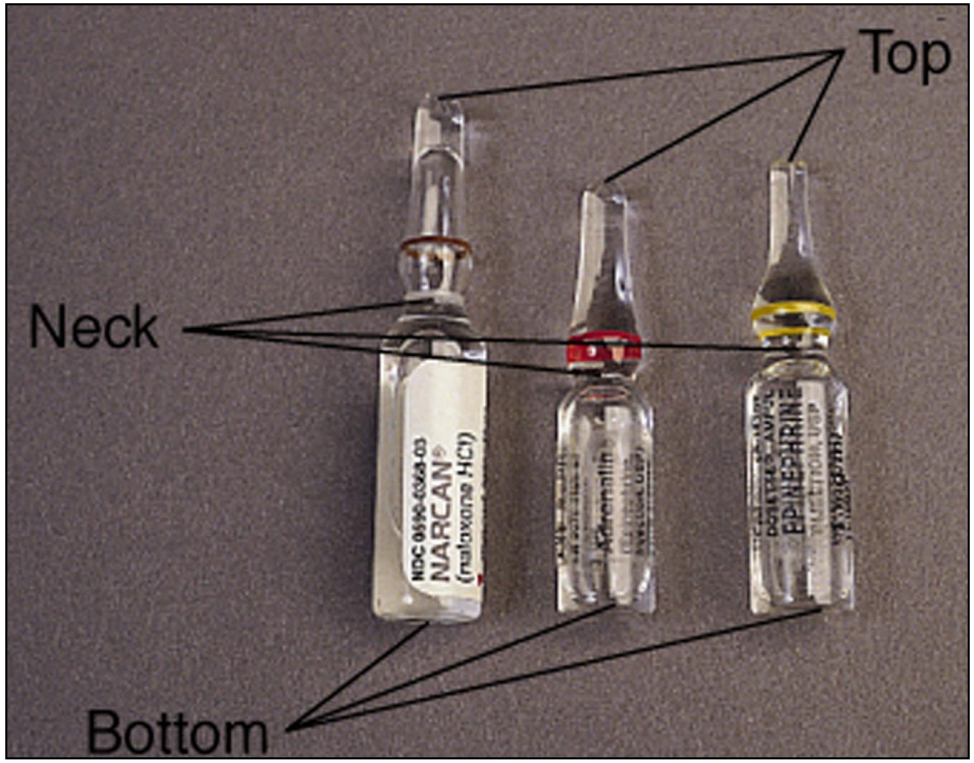
Hypodermic needle.

Parenteral Drug Containers

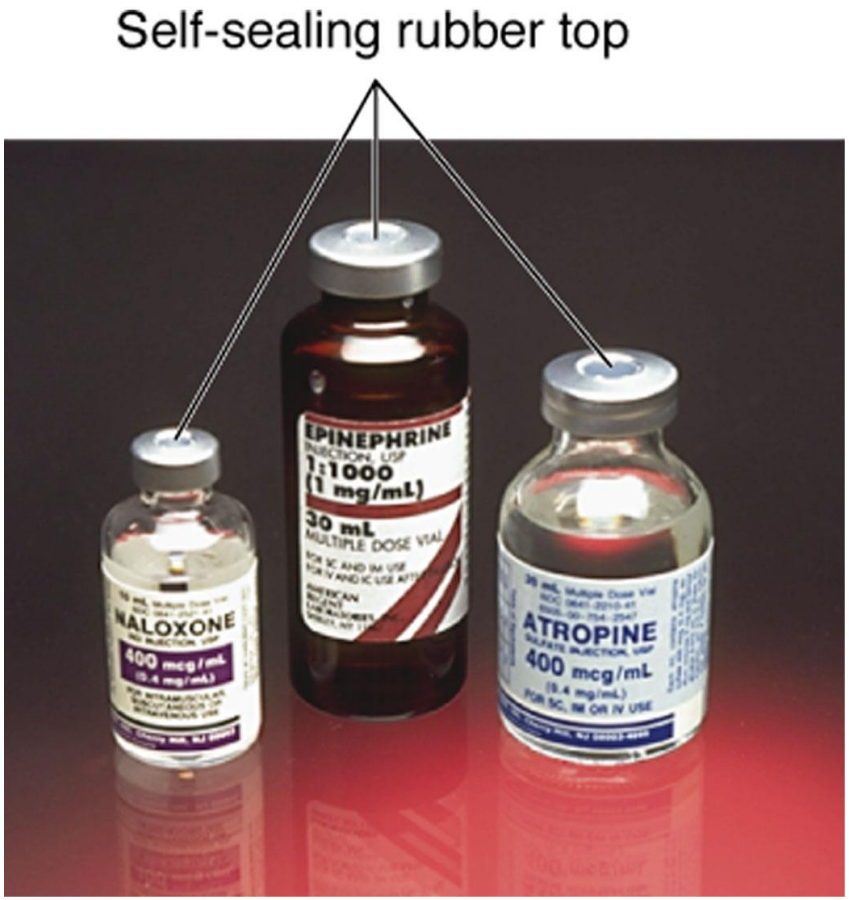
- Glass ampules
- Single and multidose vials
- Nonconstituted syringes
- Prefilled syringes
- Intravenous medication fluids

Ampules and Vials

Ampules.



Vials.



Information On Drug Labels

- Name of medication
- Expiration date
- Total dose and concentration

Obtaining Medication from a Glass Ampule

- Hold the ampule upright and tap its top to dislodge any trapped solution.

Obtaining Medication from a Glass Ampule

- Place gauze around the thin neck

Obtaining Medication from a Glass Ampule

- Snap it off with your thumb.

Draw Up the Medication

Obtaining Medication from a Vial

- Confirm the vial label.

Obtaining Medication from a Vial

- Prepare the syringe and hypodermic needle.

Obtaining Medication from a Vial

- Cleanse the Vial's Rubber Top

Obtaining Medication from a Vial

- Insert the hypodermic needle into the rubber top and inject the air from the syringe into the vial.

- Obtaining Medication from a Non-constituted Drug Vial

Glucagon Kit

Obtaining Medication from a Non-constituted Drug Vial

- The non-constituted drug vial actually consists of two vials, one containing a powdered medication and one containing a liquid mixing solution.

Obtaining Medication from a Non-constituted Drug Vial

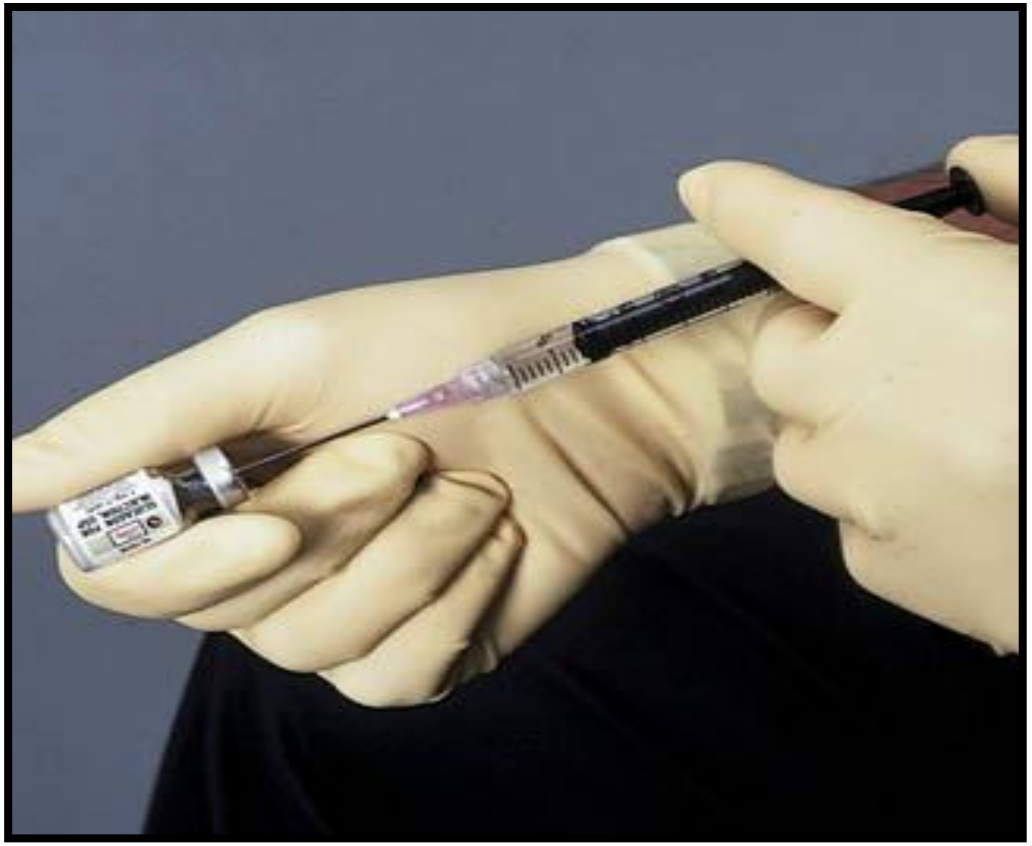
- Non-constituted drugs come in separate vials. Confirm the labels.

Obtaining Medication from a Non-constituted Drug Vial

- Remove all solution from the vial containing the mixing solution.

Obtaining Medication from a Non-constituted Drug Vial

- Cleanse the top of the vial containing the powdered drug and inject the solution.



Obtaining Medication from a Non-constituted Drug Vial

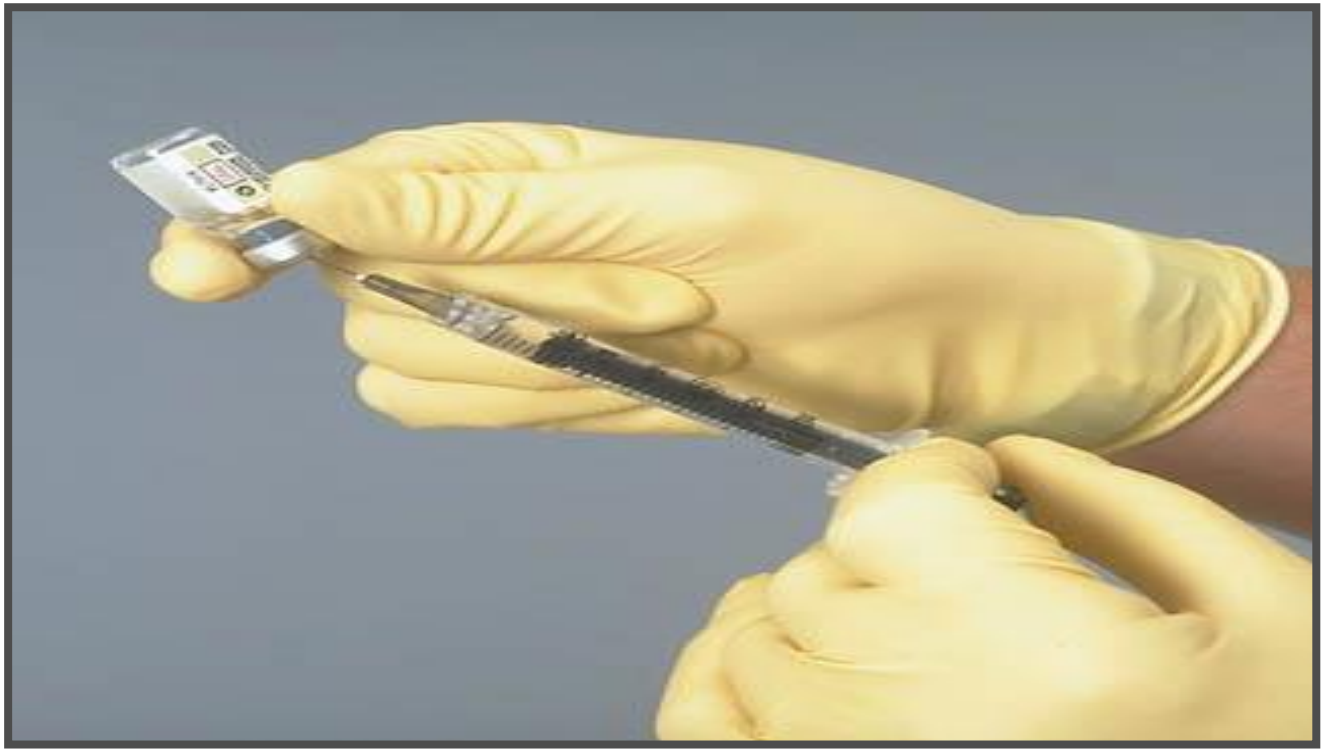
- Agitate (do not shake) the vial to ensure complete mixture.

Obtaining Medication from a Non-constituted Drug Vial

- Prepare a new syringe and hypodermic needle.

Obtaining Medication from a Non-constituted Drug Vial

- Withdraw the appropriate volume of medication.



Obtaining Medication from a Non-constituted Drug Vial

- In the Mix-O-Vial system, the vials are joined at the neck. Confirm the labels.

Obtaining Medication from a Non-constituted Drug Vial

- Squeeze the vials together to break the seal. Agitate or shake to mix completely.

Obtaining Medication from a Non-constituted Drug Vial

- Withdraw the appropriate volume of medication.

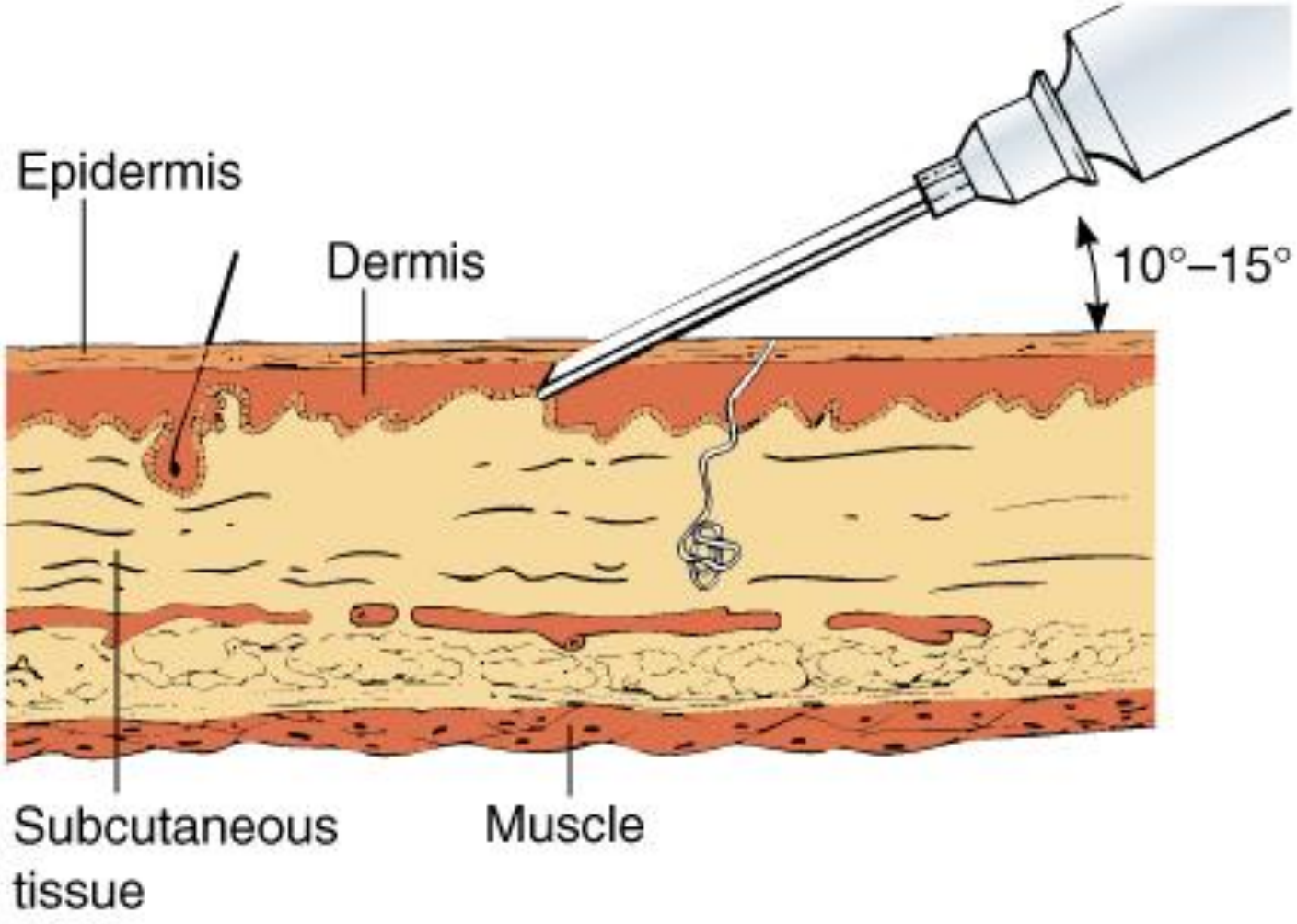
Prefilled or Preloaded Syringes

- Assemble the prefilled syringe. Remove the pop-off caps and screw together
- Reconfirm indication, drug, dose, and route of administration
- Administer appropriately via the indicated route
- Properly dispose of the needle and syringe

Parenteral Routes

- Intradermal injection
- Subcutaneous injection
- Intramuscular injection
- Intravenous access
- Intraosseous infusion

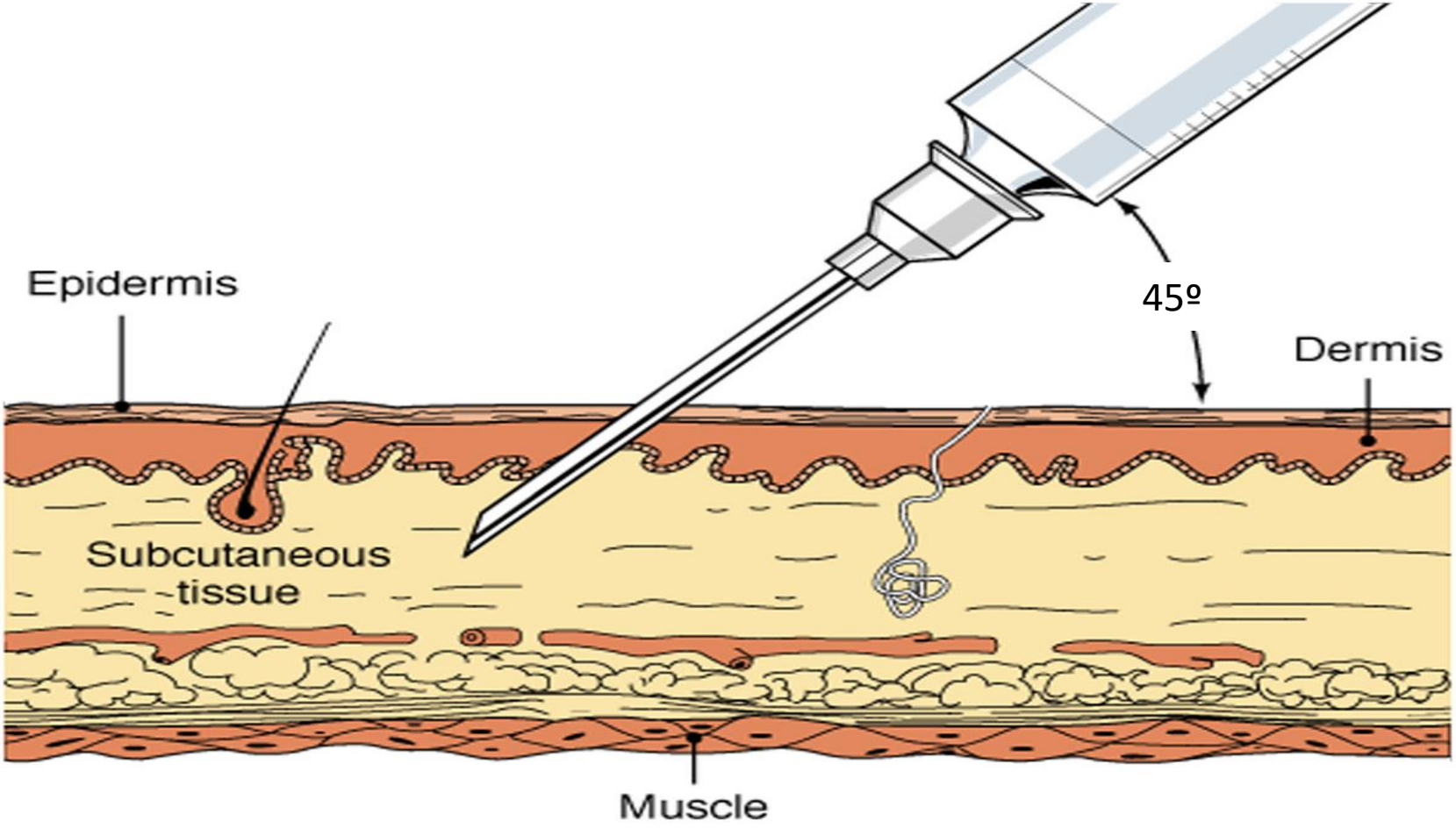
Intradermal Injection



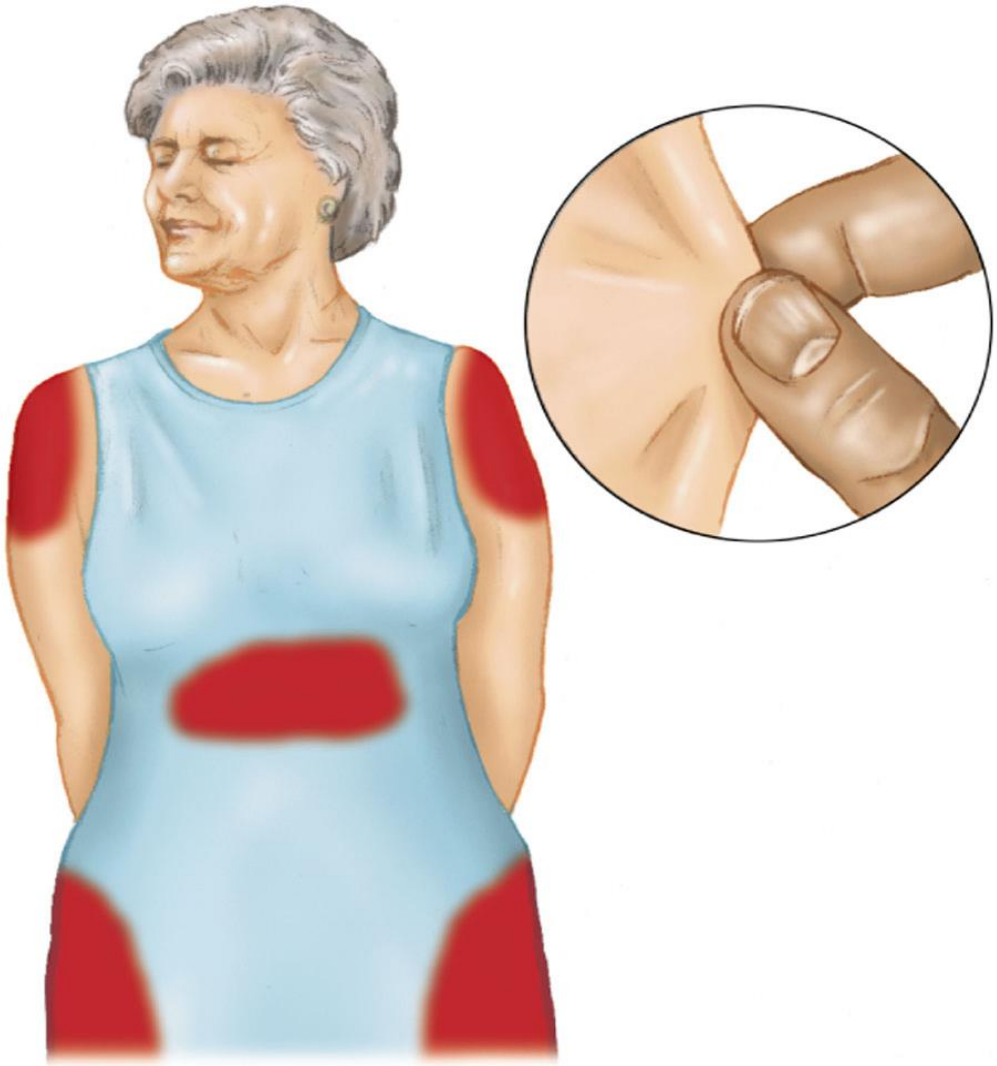
Intradermal Injection Procedure

- Prepare the site with alcohol or betadine.
- Pull the patient's skin taut with your nondominant hand.
- Insert the needle, bevel up, just under the skin, at a 10-15 degree angle.
- Slowly inject the medication, look for a small bump, or wheal to form as medication is deposited and collects in the intradermal tissue.
- Remove the needle and dispose of it in the sharps container.
- Place the adhesive bandage over the site; use the gauze for hemorrhage control if needed.

Subcutaneous Injection

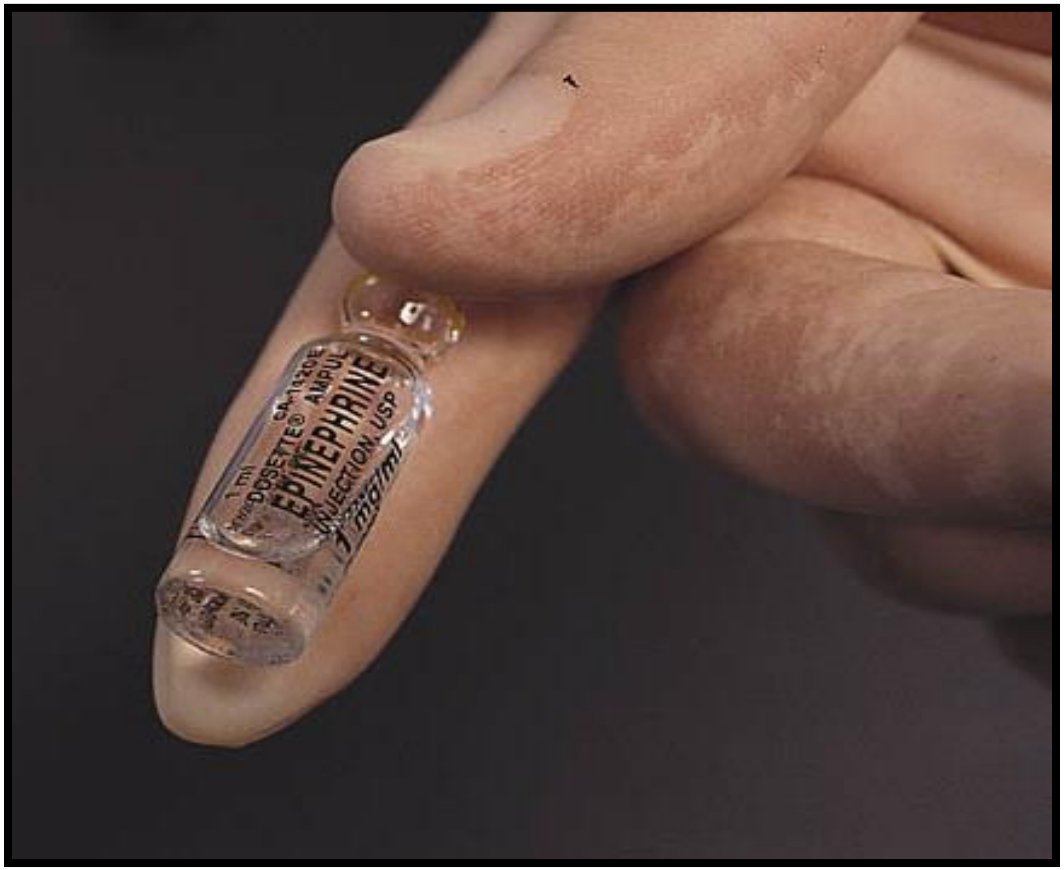


Subcutaneous Injection Sites

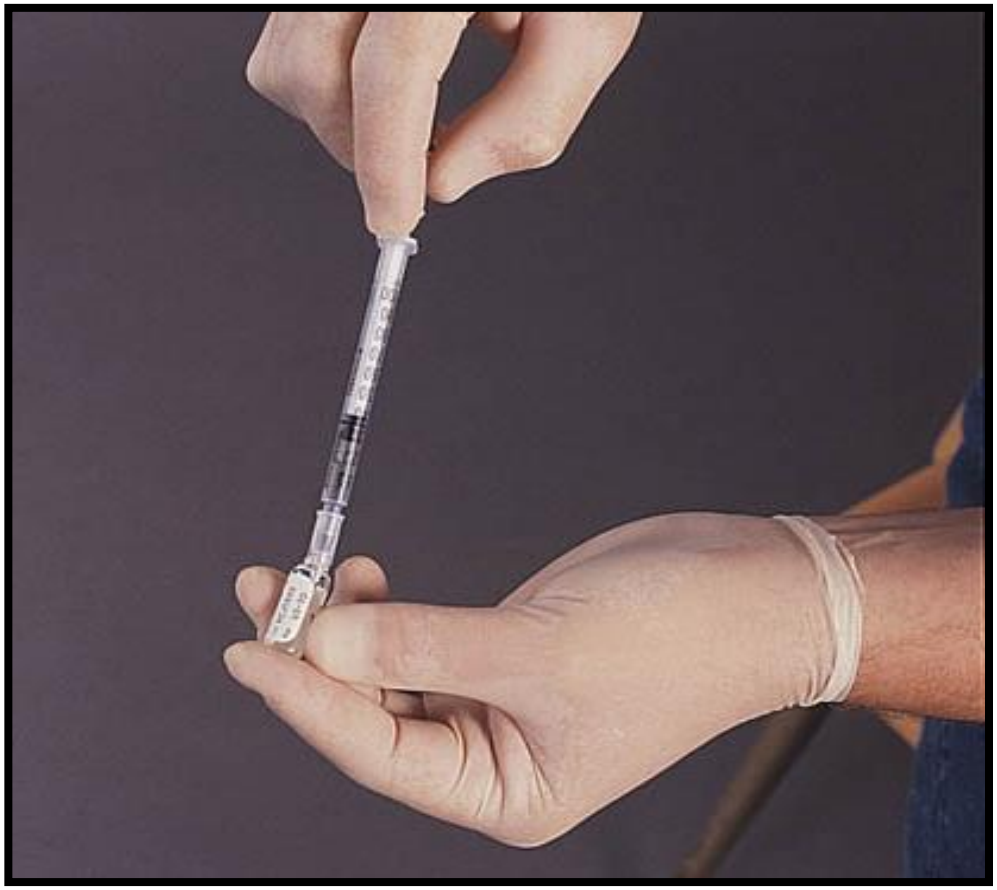


Prepare the equipment.

Check the medication.

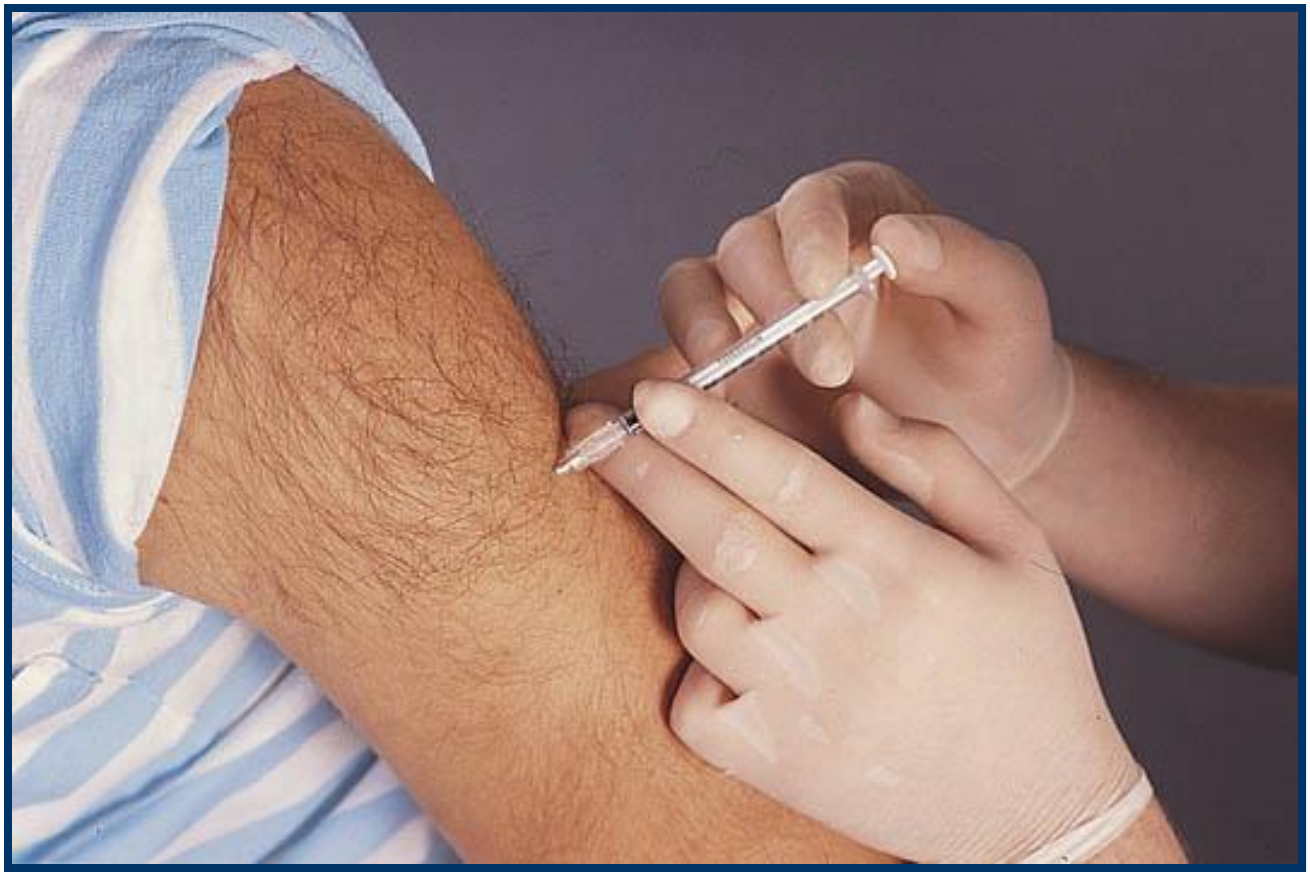


Draw up the medication.



Prep the site.

Insert the needle at a 45° angle.



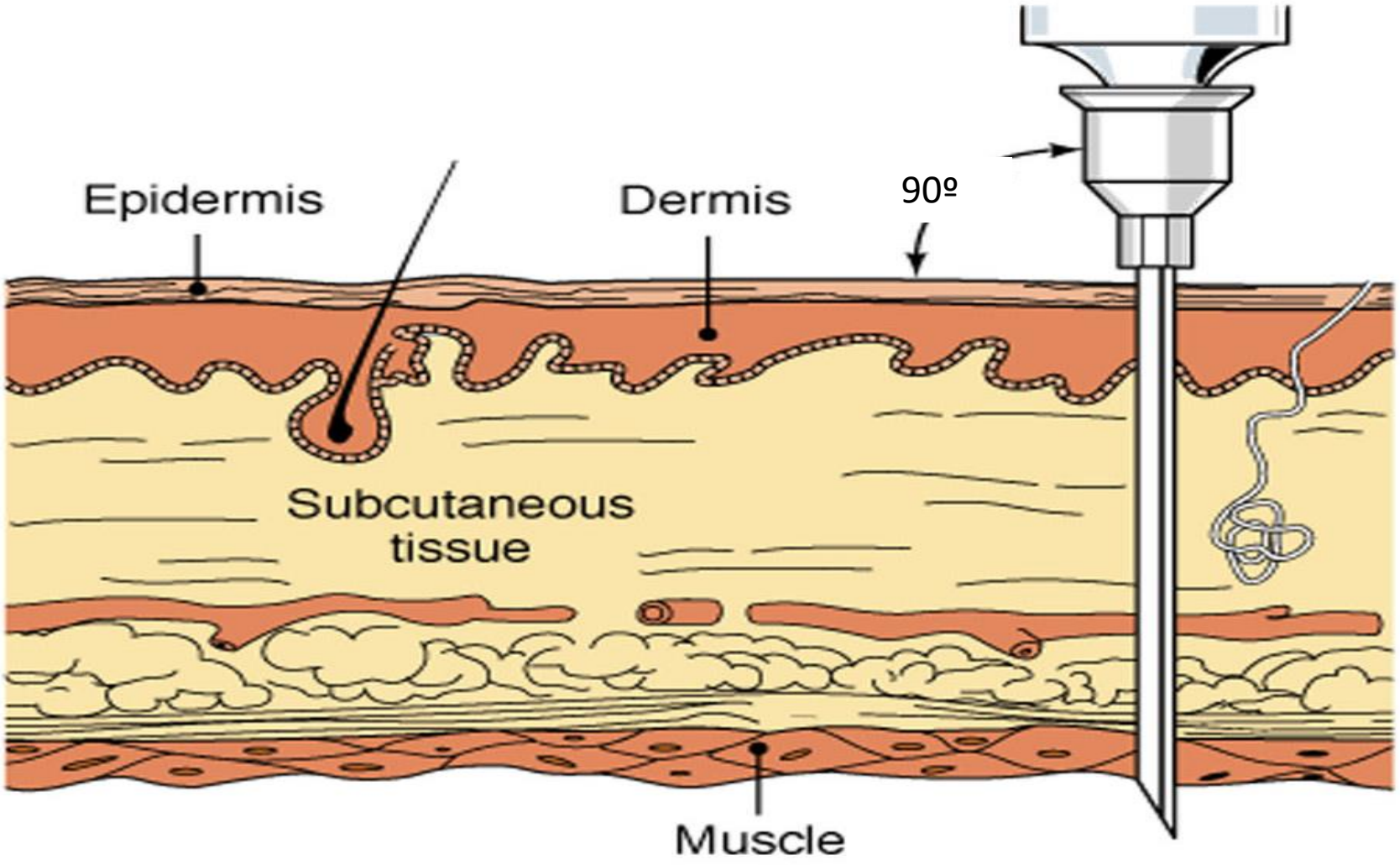
- Remove the needle and cover the puncture site.

Monitor the patient.

Intramuscular Injection Sites

- Deltoid
- Dorsal gluteal
- Vastus lateralis
- Rectus femoris

Intramuscular Injection



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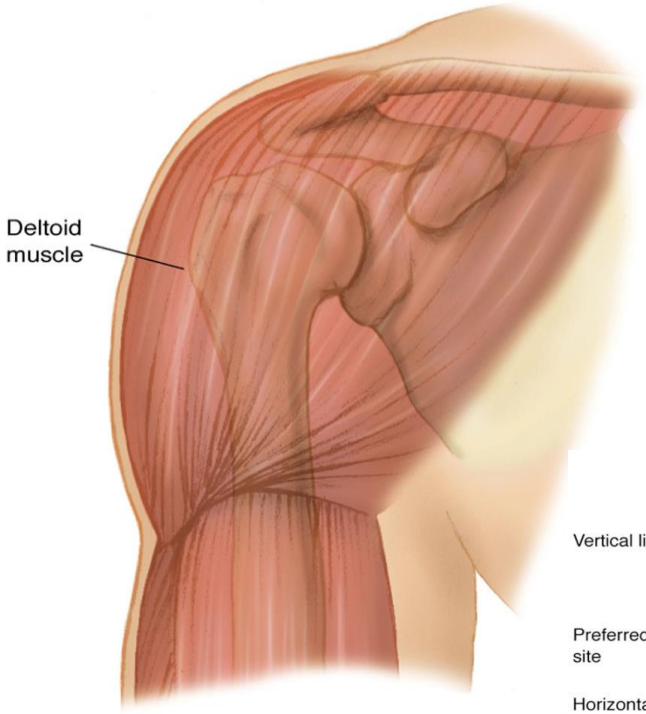
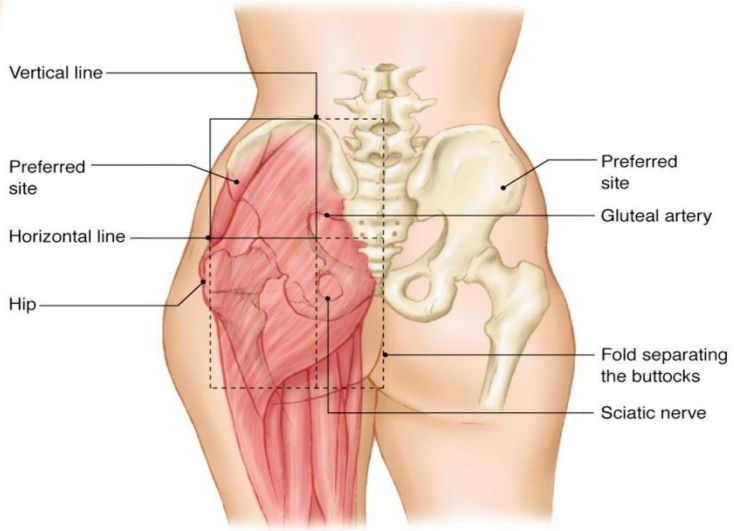
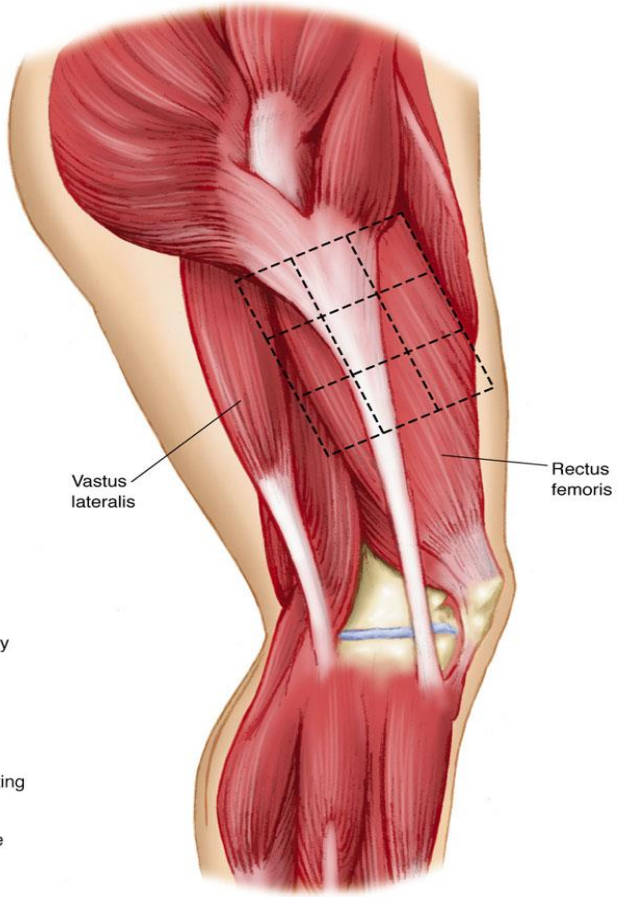
Intramuscular Injection Sites





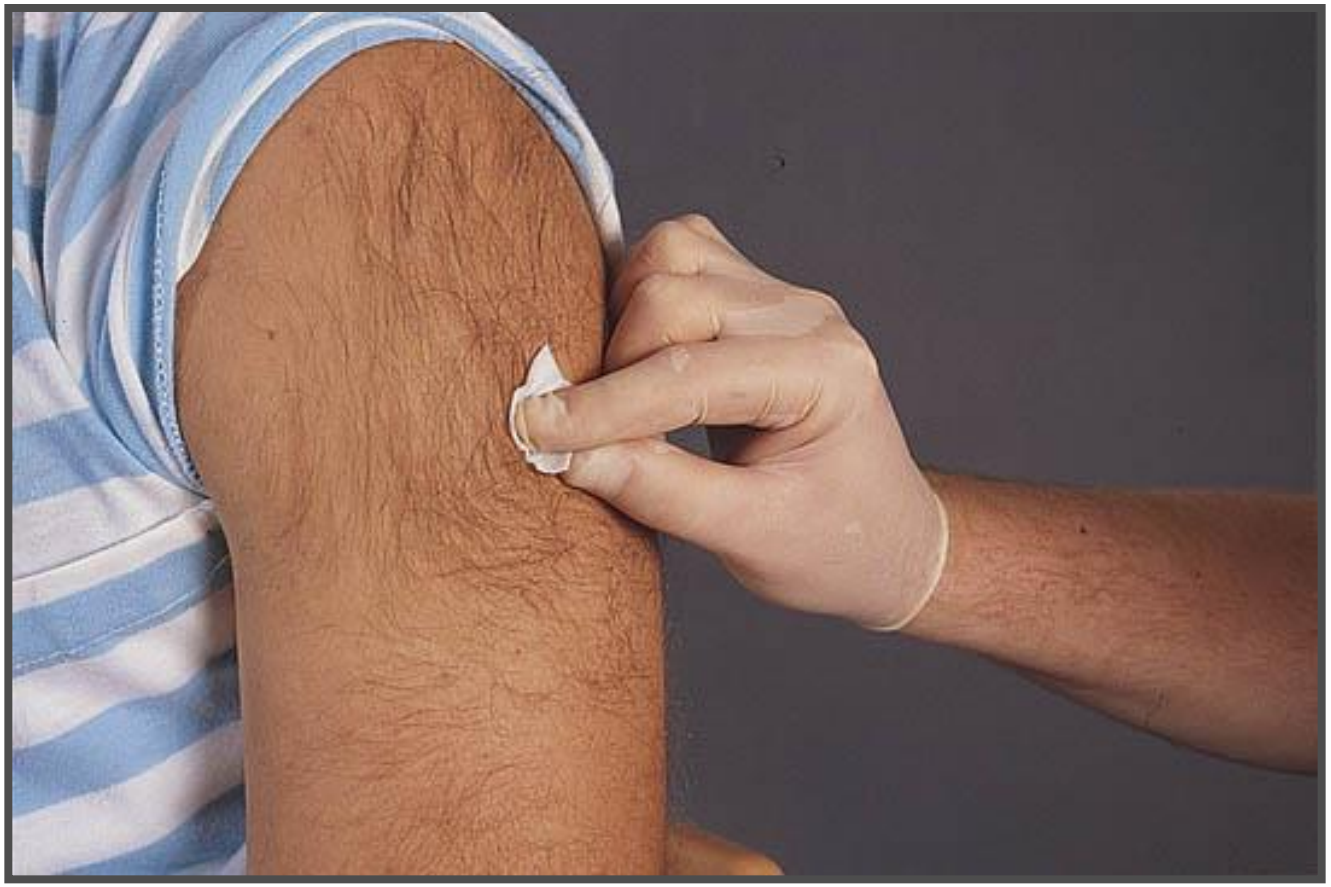


Prepare the equipment.

Check the medication.

Draw up the medication.

Prepare the site.



Insert the needle at a 90° angle.

- Remove the needle and cover the puncture site.

Monitor the patient.