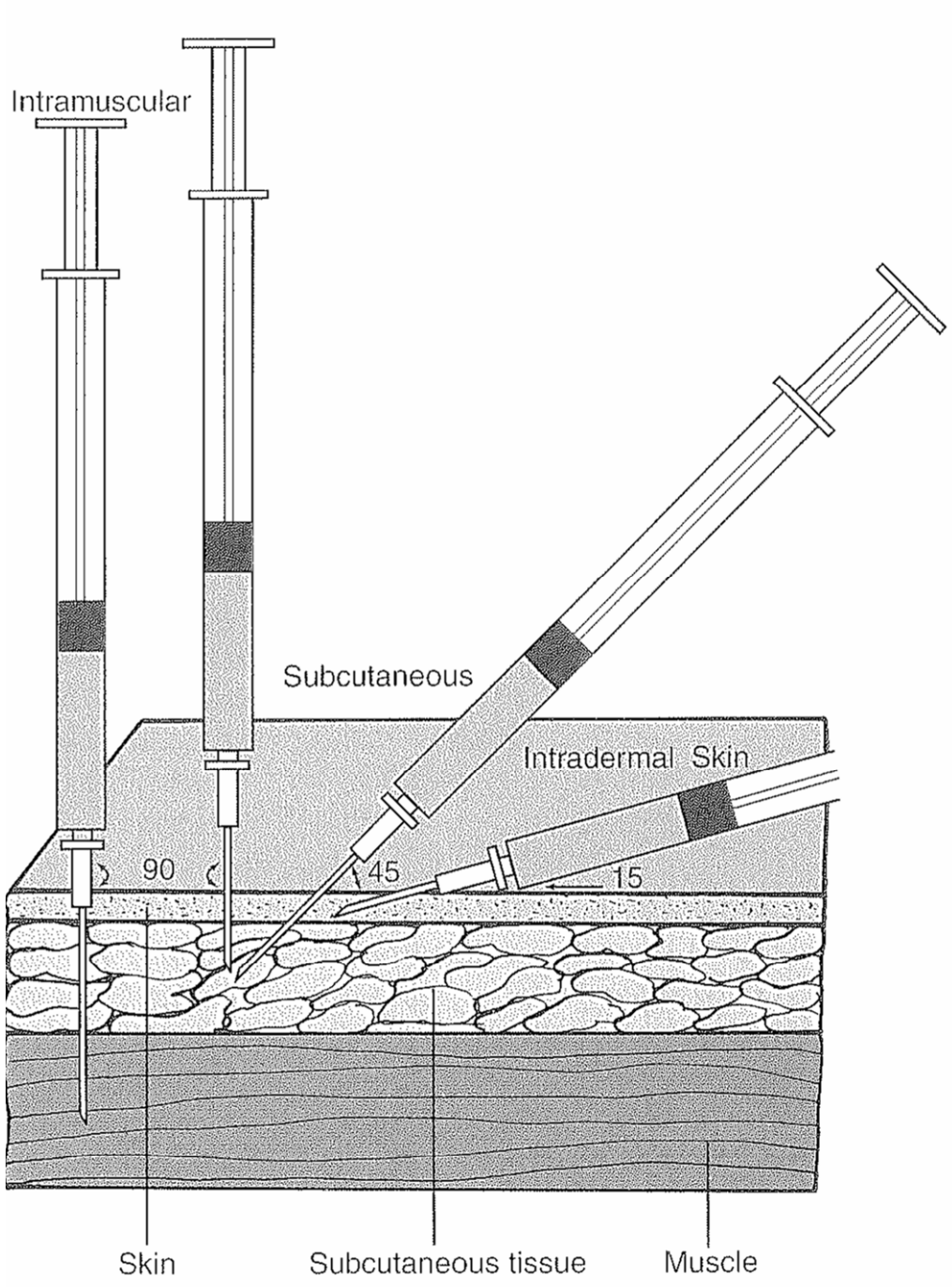
Rita Carey-Nita

Section 3
Parenteral Administration

Parenteral Route

- Parenteral route is liquid medication administered by injection
- Common routes nurses use include:
  - Subcutaneous (SC or SQ)
  - Intramuscular (IM)
  - Intravenous (IV)
  - Intradermal (ID)


Intramuscular
Subcutaneous
Intradermal Skin
90
45
15
Skin
Subcutaneous tissue
Muscle

Parenteral Route

- Key principles with parenteral route:
  - Sterile equipment must be utilized
  - Proper technique with administration
    - Administering medication by the correct route i.e. if subcutaneous be sure angle injection with reach subcutaneous tissue
  - This route has quick rate of absorption
  - Knowledge of medications is imperative

Parenteral Route

- Follow universal precaution—**Wear gloves**
- ***Never Recap a Needle***
- Discard needle into designated sharps container
- Occupational Safety & Health Administration Guidelines (OSHA)
  - Needle sticks expose and can transmit
    - Hepatitis B--Hepatitis C--HIV
    - Others – Tb—syphilis--malaria
  - > 80% preventable
- Each facility should have *Sharps Injury Log & Exposure Control Plan*

Syringes & Needles

- Syringes:
  - Syringes are available in various sizes ranging from 0.5ml to 100ml
  - Syringes consists of three parts:
    - Tip—barrel—plunger
  - There are two types of tips:
    - Leur-lock or plain tip
  - Syringes are disposable

Syringes & Needles

- The plunger is pulled out to create a vacuum & to withdraw medication from vail & pushed to instill medication
- The barrel is clearly marked with calibrated measurements
- Depending on the syringe the measurements can be marked in 10^{th} or 100^{th} per millilters
- Some syringes come with needles attached & some do not

Syringes & Needles

- Needles:
  - Consists of three parts:
    - Hub—shaft—beveled tip
  - Hub attaches to the syringe
  - Shaft is the elongated portion
  - Beveled tip is the slanted tip that contains the bore or hole
  - Needles are usually stainless steel

Syringes & Needles

- Needle size will vary depending on the route & medication
  - Gauge of the needle refers to the diameter of the bore
  - G represents gauge & is first # on needle package
  - The larger the #, the smaller the bore
  - Gauges range from 25-G, 23-G, 20-G, 18-G
  - Thicker medication requires larger gauge needle

Syringes & Needles

- Needles range in length from 3/8 to 2 inches
- The route of parenteral medication will determine the size of the needle utilized
- The patient size, condition & age may also affect the size of the needle utilized
- i.e. IM injection require longer needle to ensure medication is instilled into muscle

Syringes & Needles

- Some syringes are safety syringes that help prevent needle sticks
- There are also needless systems which simply contain a blunt plastic tip that can penetrate a saline or heparin lock already in place

Syringes & Needles

- Needles & syringes are packaged in sterile wrappers
- Maintain sterility
- Check package & needle or syringe for tampering or damage
- Check expiration date

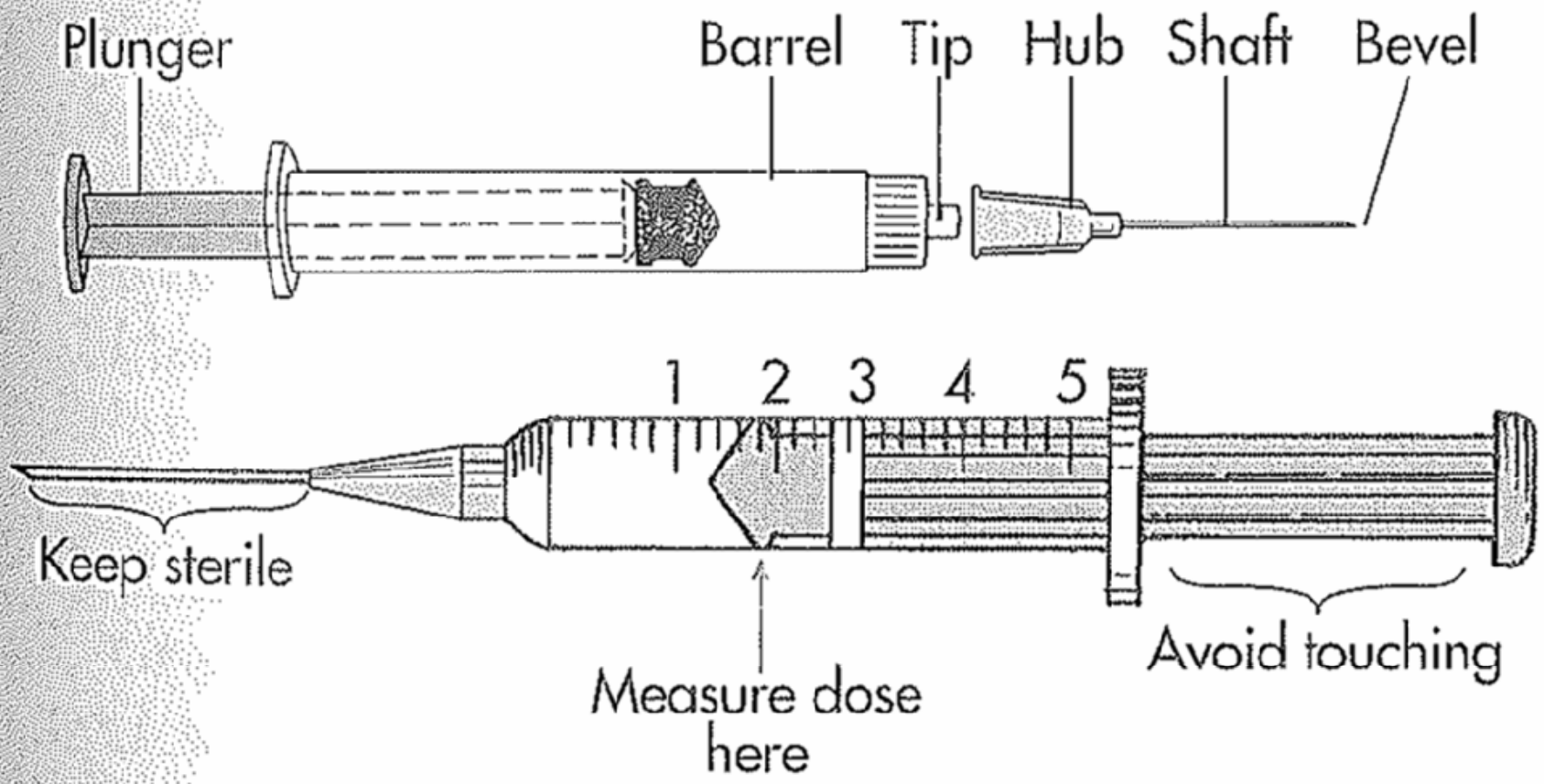


FIGURE 18-1 Parts of a syringe.

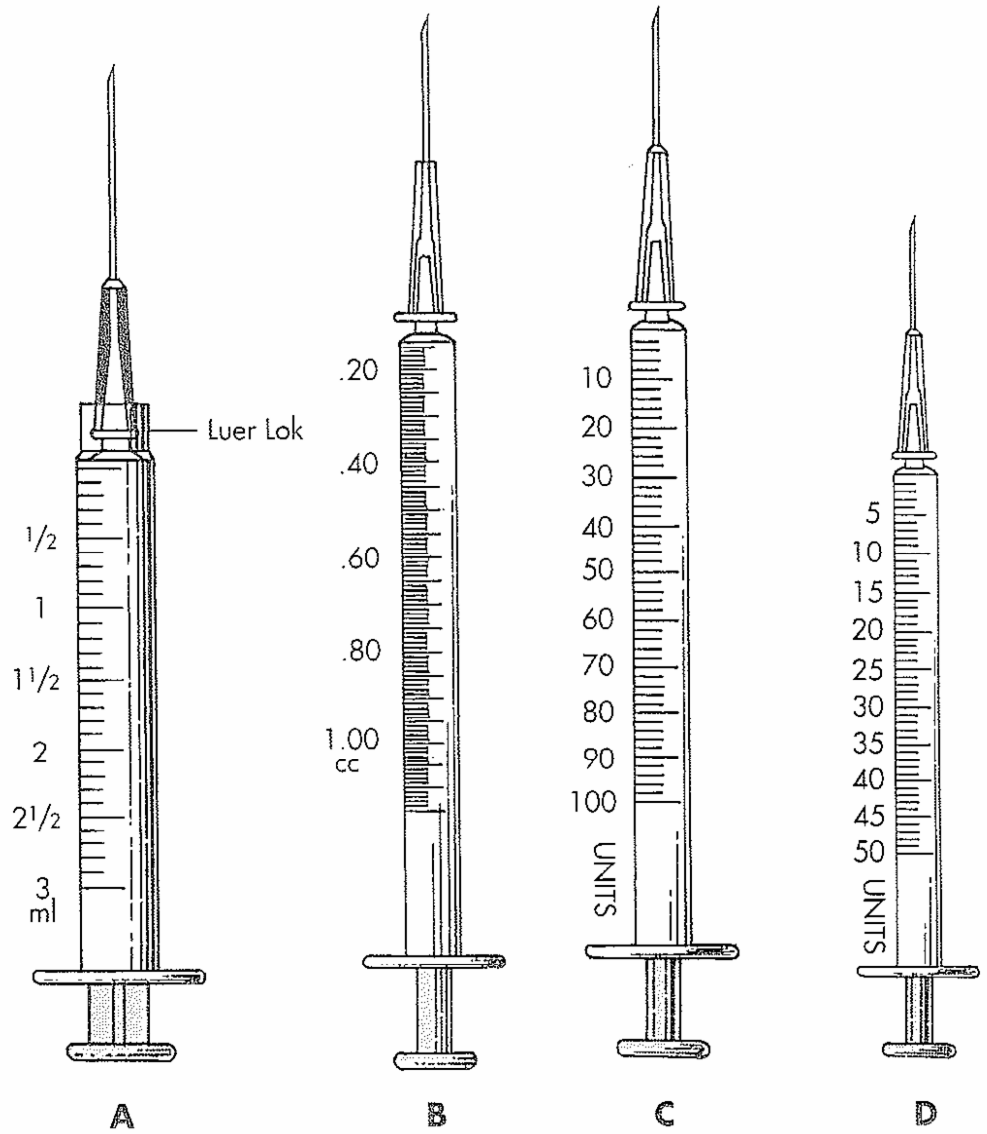
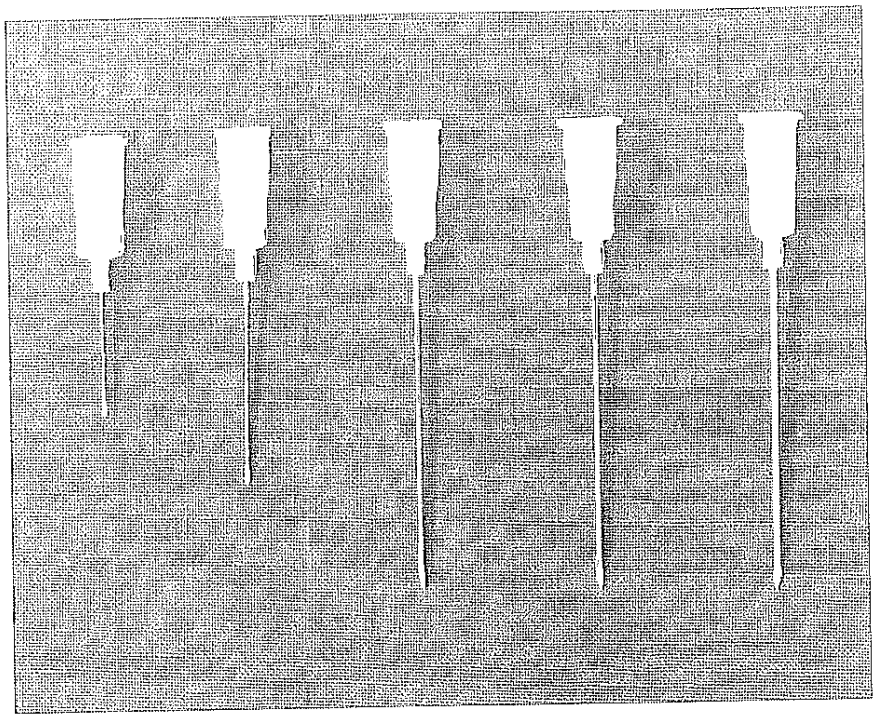


FIGURE 18-2 Types of syringes. A, Syringe with 3-ml capacity is marked in 0.1 (tenths). B, Tuberculin syringe is marked in 0.01 (hundreths) for doses of less than 1 ml. Insulin syringes marked in units in two sizes: C, 100 U; or D, 50 U (low-dose).



Medication

- Parenteral medication can be packaged is packaged in various forms
- Can be single dose or multi-dose
- Can be powder form & require reconstitution or can be liquid
- Forms include:
  - Ampule—cartridges—vials

Ampule

- **Ampule:**
  - Glass flask
  - Contains pre-measured single dose of drug
  - Discard any med not used – cannot prevent contamination after opened
  - Thin neck broken before drug be drawn up – can be inverted or placed on flat surface
  - Care must be taken not to contaminate needle by touching rim of ampule

Ampule

- Technique for opening ampule:
  - Tap the stem of the ampule to move any medication from the stem into the body
  - Wrap with gauze pad around neck or utilize ampule breaker
  - Use a snapping motion to break off the top of the ampule along the scored line at the neck
  - Break away from your body

Ampule

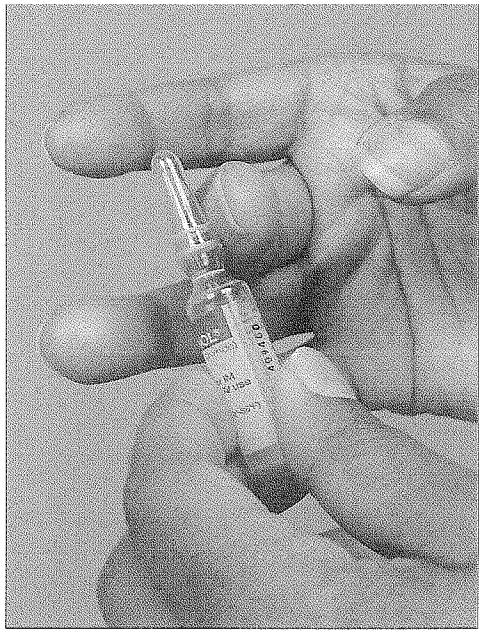
- Technique for removing medication from an ampule:
  - Attach a filtered needle to the syringe to avoid intriducing shards of glass into medication as you withdraw
  - Do Not instill air or medication will run out of ampule
- Two way to withdrawl:
  - Upright or inverted

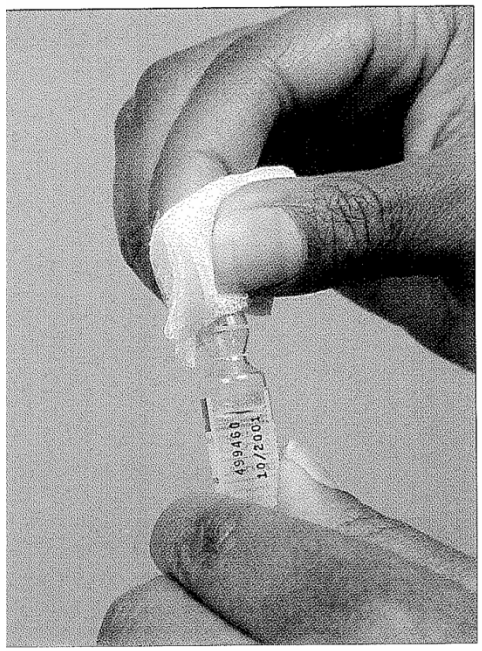
Ampule

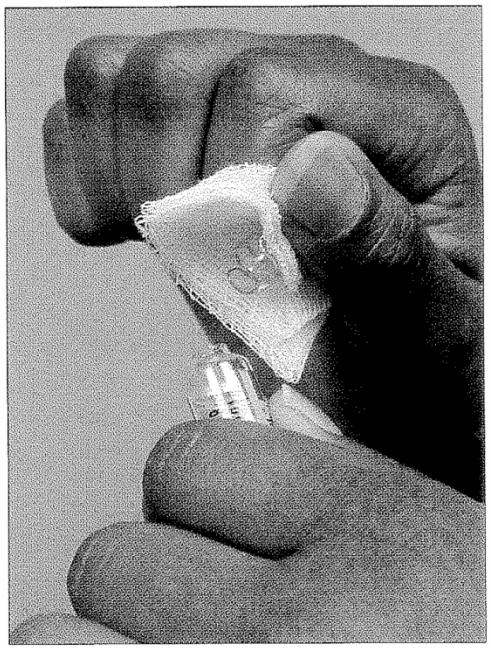
- Withdrawing inverted:
  - Place barrel of syringe against palm of hand while holding ampule between thumb & pointer finger
  - Withdraw medication with dominant hand
  - Be sure not to touch the sides of the ampule with the needle or it is contaminated & must be discarded
  - Withdraw slow & steady

Ampule

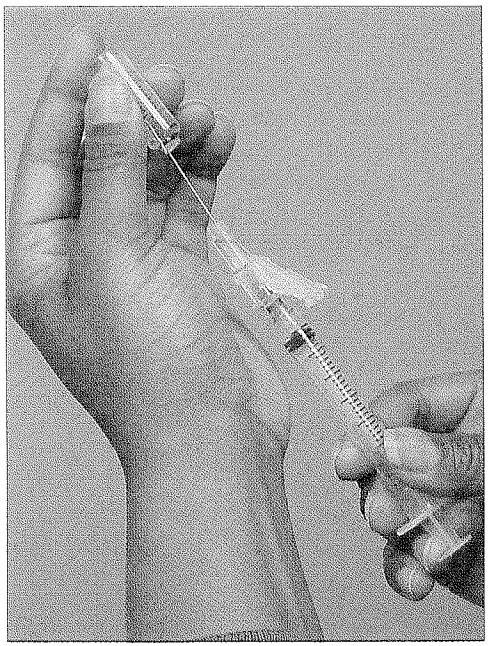
- Withdrawing upright:
  - Place ampule on flat surface
  - Instill needle into liquid inside ampule
  - Withdraw slowly & steadily
  - Do not touch side of ampule
- With both techniques:
  - Only touch the knob end of plunger
  - Do not tap syringe until out of ampule to remove excess air bubbles

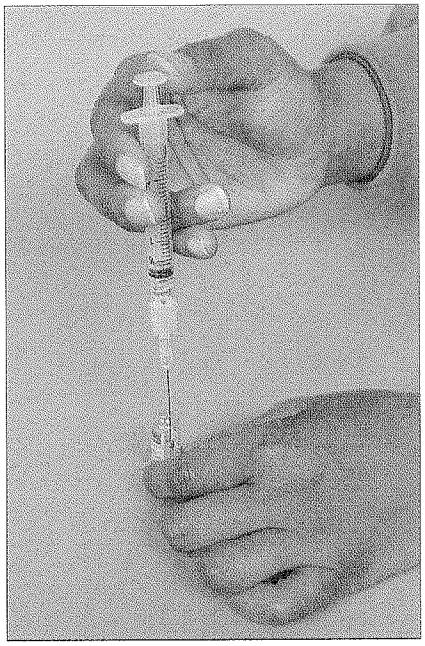






A





B

Vial

- Vial:
  - Glass bottle with a self-sealing stopper through which medication is removed
  - Can be a single dose or multi-dose
  - Usually covered with a soft metal cap that easily removed for transporting and storing
  - Air must be injected first in an amount equal to the drug being removed.
  - Aseptic technique is required to prevent contamination of medication
  - Multi-dose must be dated & timed
  - Be sure of expiration dates

Removing Medication from a Vial

- Technique for removing medication from a vial:
  - Gather equipment
  - Wash hands
  - Remove the metal or plastic cap covering the rubber stopper
  - Swab top of stopper with alcohol prep & allow to dry
  - Remove the cap from the needle
  - Touch only the knob of the plunger

Removing Medication from a Vail

- Draw back an amount of air into the plunger that is equal to the amount of medication to be withdrawn from the vial
- Hold the vial on a flat surface & pierce the rubber stopper in the center with the needle tip & inject the measured air into the space above the solution; ***Do Not inject air into solution***
- Invert the vial & keep the tip of the needle below the fluid level
- Hold the vial with one hand & use other to withdraw medication

Removing Medication from a Vial

- Draw up the prescribed amount of medication while holding the syringe vertically & at eye level
- If any air bubbles accumulate in the syringe, tap the barrel to move the bubble toward hub of syringe to be expelled out of needle
- Pull needle out of fluid portion of & inject the air bubble into air portion of vial

Removing Medication from a Vial

- Return needle tip into solution portion of vial & withdraw the rest of the medication as prescribed
- After medication is withdrawn, remove needle from the vial & carefully replace cap over needle
- Be sure to check the amount of medication in the syringe with the vial & MAR before discarding packaging or surplus

Removing Medication from a Vial

- Some medication are withdrawn with a filter needle which needs replacement or facility policy may require any needle be replaced after medication is drawn
- If a multi-dose medication is used be sure the bottle is dated when opened & timed

Mixing medication from 2 Vials

- Technique for mixing medication from 2 vials:
  - Gather equipment
  - Wash Hands
  - Remove cover on rubber stopper of both vials
  - Swab top of both vials with alcohol & allow to dry
  - Gently agitate medication in vial if required
  - Remove the cap of the needle by pulling straight off

Mixing medication from 2 Vials

- Draw back the plunger touching only the knob an amount of air equal to the amount of medication that will be withdrawn from vial #2
- Vial #2 should be upright on a flat surface
- Peirce the stopper of vial #2 with the needle & instill the air into the air portion of the vial
- Remove the needle from Vial #2

Mixing medication from 2 Vials

- Draw back an amount of air equal to the amount of medication to be withdrawn from Vial #1
- Place Vial #1 upright on a flat surface
- Pierce the rubber stopper of Vial #1 & instill the air into the air portion of the vial

Mixing medication from 2 Vials

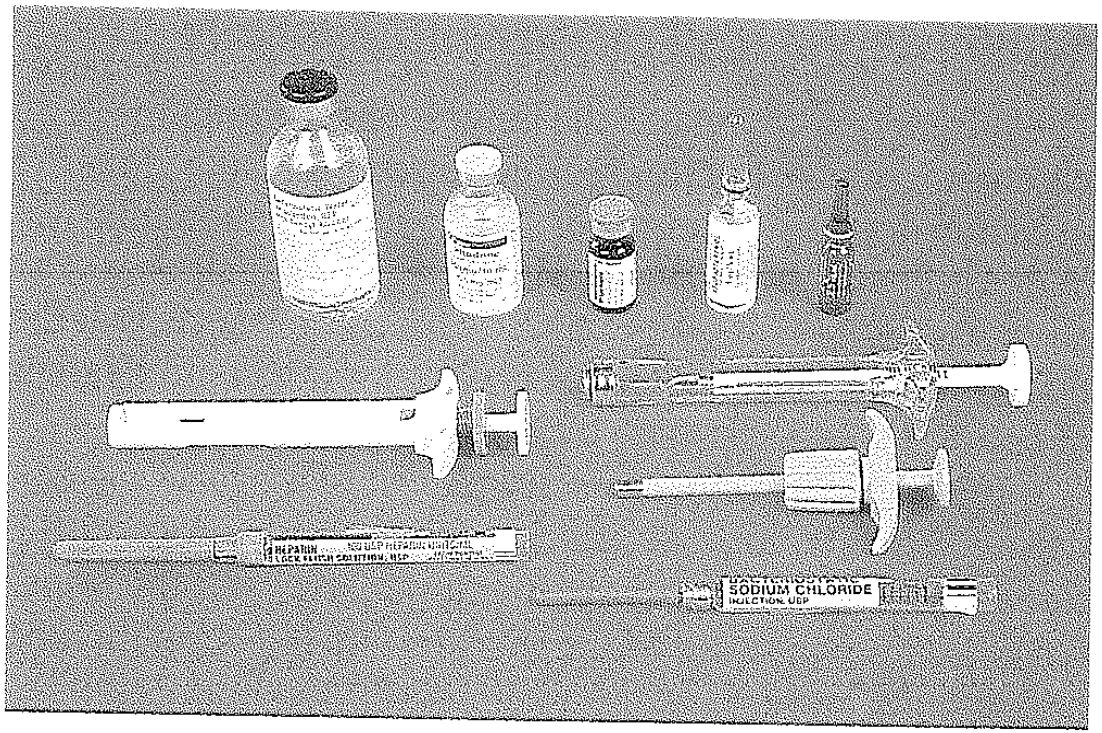
- Invert vial #1 with one hand, place the needle in the liquid portion of vial & withdraw the correct amount of medication while holding the syringe at eye level & vertical
- If no air bubble present, place vial upright & remove needle

Mixing medication from 2 Vials

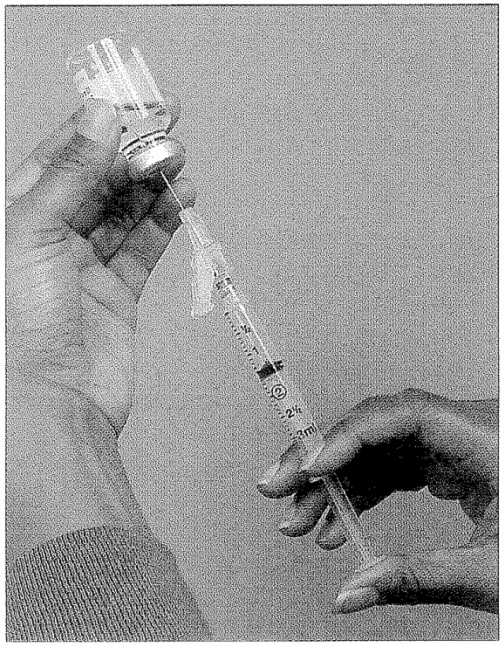
- Next, insert the needle into Vial #2
- Invert Vial #2 & place the needle into the liquid portion of the medication
- At eye level slowly & steadily withdraw the correct amount of medication from Vial #2
- You cannot re-instill any air or medication into Vial #2 because it contains medication from Vial #1 as well

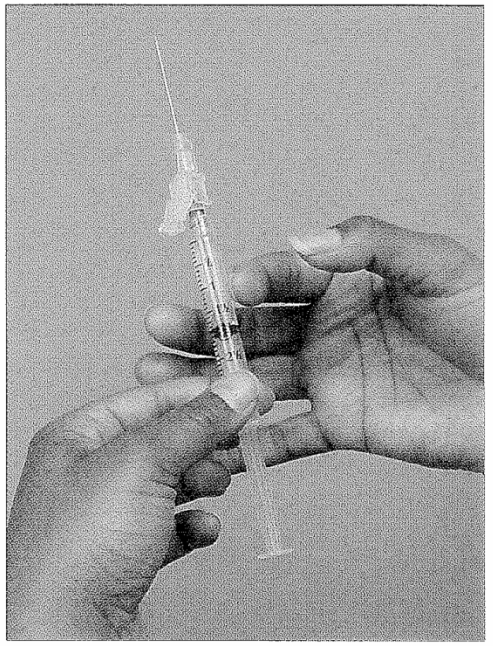
Mixing medication from 2 Vials

- Turn Vial #2 upright & remove needle
- Carefully replace the cap
- Compare the amount of medication in the syringe with the order
- Recheck Vials with the MAR
- Any newly opened vials but be dated & timed


HEPARIN
SODIUM CHLORIDE
INJECTION USP

Preparing Injections from a Vial





Mixing Medications from Vials

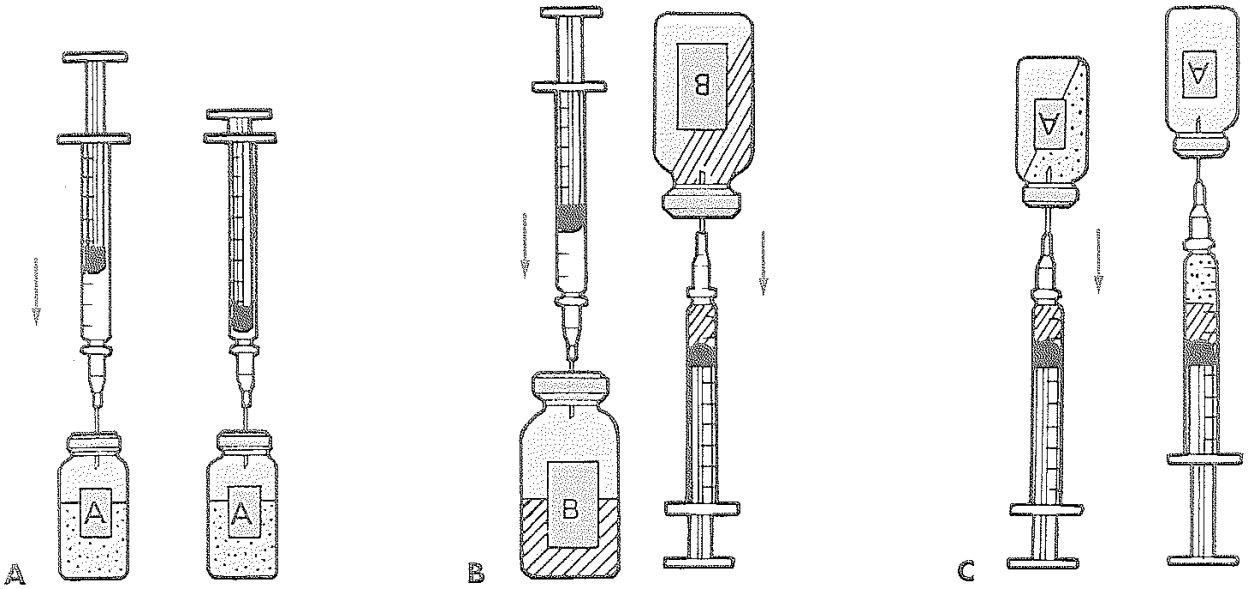


FIGURE 18-9 A, Injecting air into vial A. B, Injecting air into vial B and withdrawing dose. C, Withdrawing medication from vial A; medications are now mixed.

Reconstitution of Vial Medication

- Some medication will be packaged as a powder form
- The medication will have specific instructions for reconstitution
- Most will be reconstituted with either normal saline or sterile water
- Follow instructions carefully

Reconstitution of Vial Medication

- The amount of liquid instilled changes the concentration of the medication
- This will in turn change the dose of medication administered
- Follow Instructions Carefully

Reconstitution of Vial Medication

- Equipment:
  - MAR
  - Medication in vial form
  - Liquid to reconstitute
  - Syringe
  - 2 Needles
  - Alcohol swab

Reconstitution of Vial Medication

- Technique:
  - Be sure of Doctor order
  - Read the medication information for reconstitution
  - Remove cap of both vials & cleanse with alcohol prep
  - Draw up the appropriate amount of liquid into the syringe to be instilled into powered medication vial

Reconstitution of Vial Medication

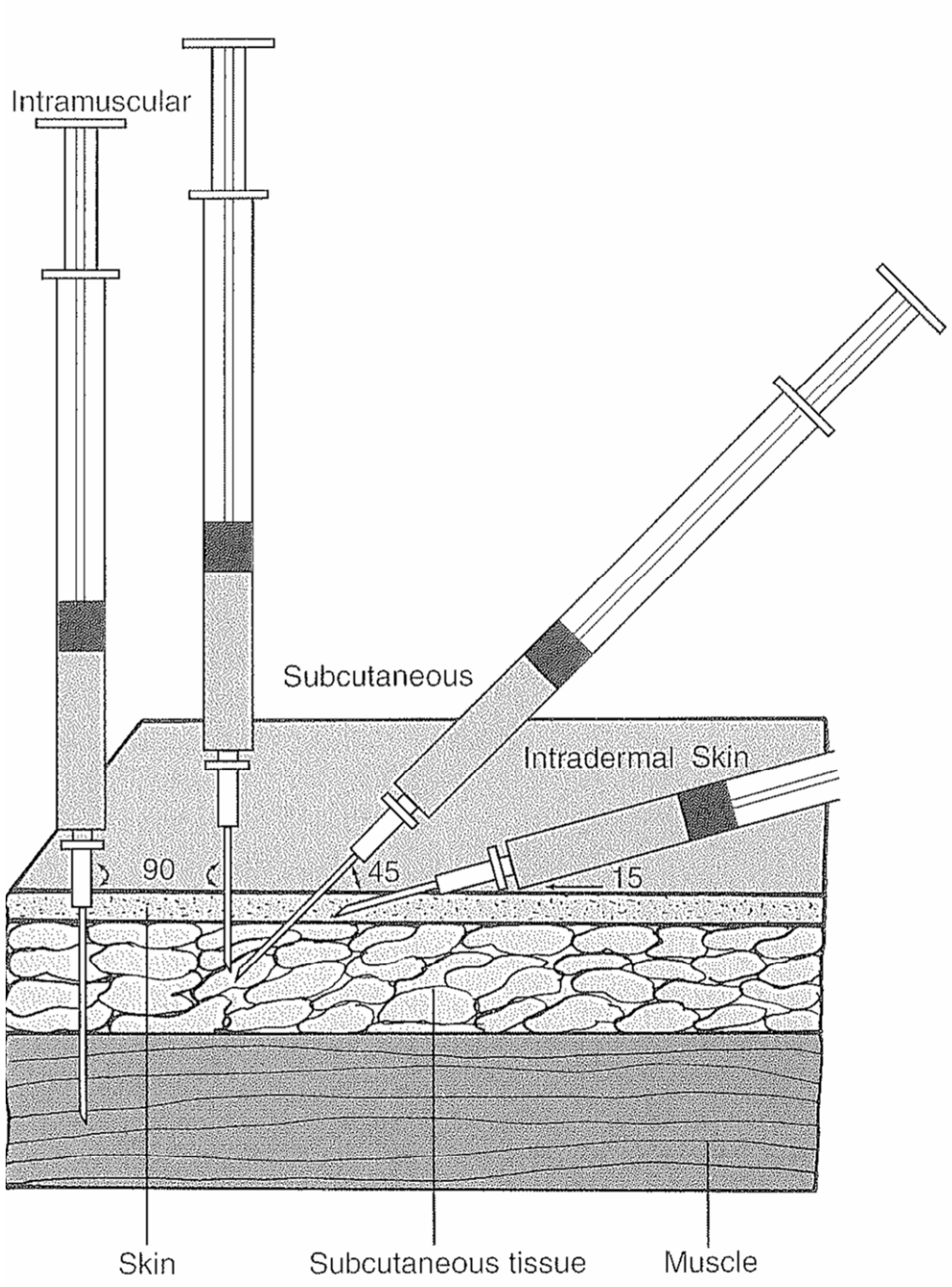
- Insert the needle into the powered vial & slowly instill liquid
- Agitate the medication in the powered vial by rolling back & forth between hands
- Once the medication has been mixed thoroughly you will insert the needle into the vial & remove the ordered amount of medication
- Before the medication is administered change the needle

Prefilled Syringes

- Some medications are packaged as a prefilled syringes or cartridge
- To administer you must utilize a carpuject or tubex
- A needle size appropriate for the medication & route must be placed at end of syringe
- Air must be dispelled before administration

Prefilled Syringes

- Some syringes must be primed prior to use or the medication will not expel
- Some medication may need to be wasted prior to adminstration
- Many narcotics come in prefilled syringes


Intramuscular
Subcutaneous
Intradermal Skin
90
45
15
Skin
Subcutaneous tissue
Muscle

Intradermal Route

- Intradermal injection are administered into the dermis, just below the epidermis
- Longest time for absorption
- Utilized for sensitivity testing
  - Tb--allergy skin testing—local anesthesia

Intradermal Route

- Sites:
  - Inner surface of forearm
  - Upper back
  - Under scapula
  - Assess the area
    - Choose a hairless area
    - Avoid moles
    - Avoid scars
    - Avoid pigmented areas

Intradermal Route

Equipment:

- 1 ml syringe; Tuberculin syringe
- Most accurate syringe for small amounts of agents because measured in 100ths of ml
- Needle
  - 25 to 27 gauge
  - ¼ to ⅝ inch needle
- Small volumes—Usually < 0.1mL
- Alcohol prep & 2x2 gauze

Intradermal Route

- Technique:
  - Wash Hands & Don Gloves
  - Select appropriate site
  - Cleanse in circular motion from inner to outer with alcohol swab & allow to dry
  - Remove cap from needle straight off with non-dominant hand

Intradermal Route

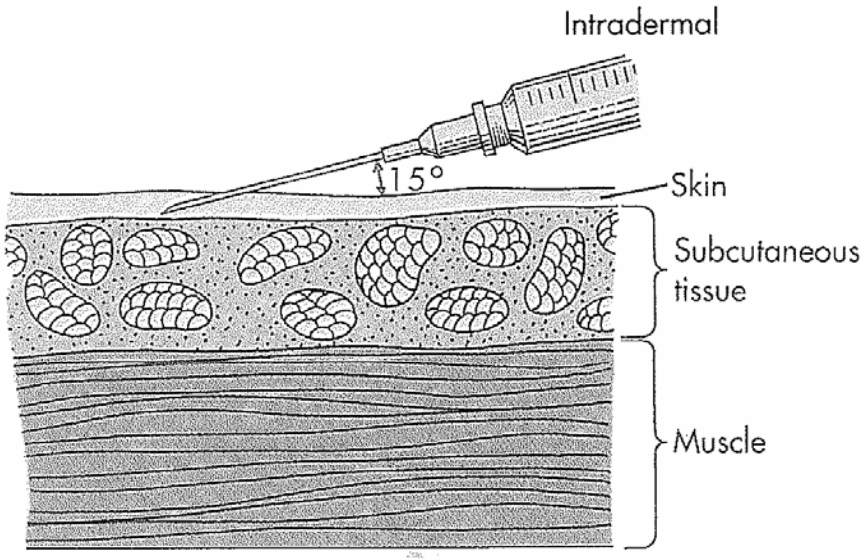
- Use the non-dominant hand to spread skin taut over the injection site
- Hold syringe in dominant hand between the thumb & forefinger with the bevel up
- Hold syringe at a 10°-15° from site
- Insert the syringe only about 1/8”
- You should see the needle through the skin

Intradermal Route

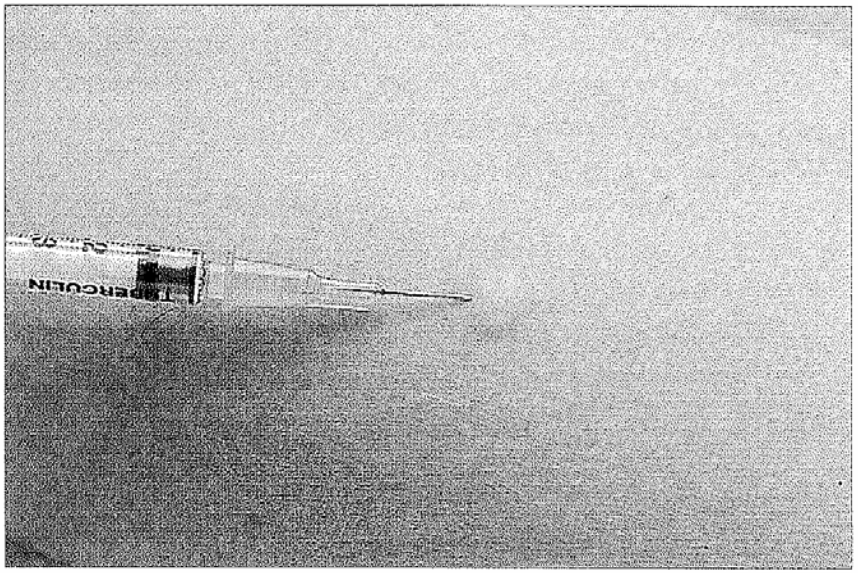
- Once in place slowly inject the medication with the dominant hand while the non-dominant hand secure the syringe
- Injection produces a small raised area called a wheal or bleb
- Withdraw the needle & dispose into sharps container
- **Never Recap**
- Do Not Massage Site or Place Pressure

Intradermal Route

- Remove gloves & wash hands
- Reposition patient
- Documentation
- Included in documentation should be site & if necessary the date to be read



STEP 10 Intradermal needle tip inserted into dermis.



STEP 12 Injection creates small bleb.

Subcutaneous Route

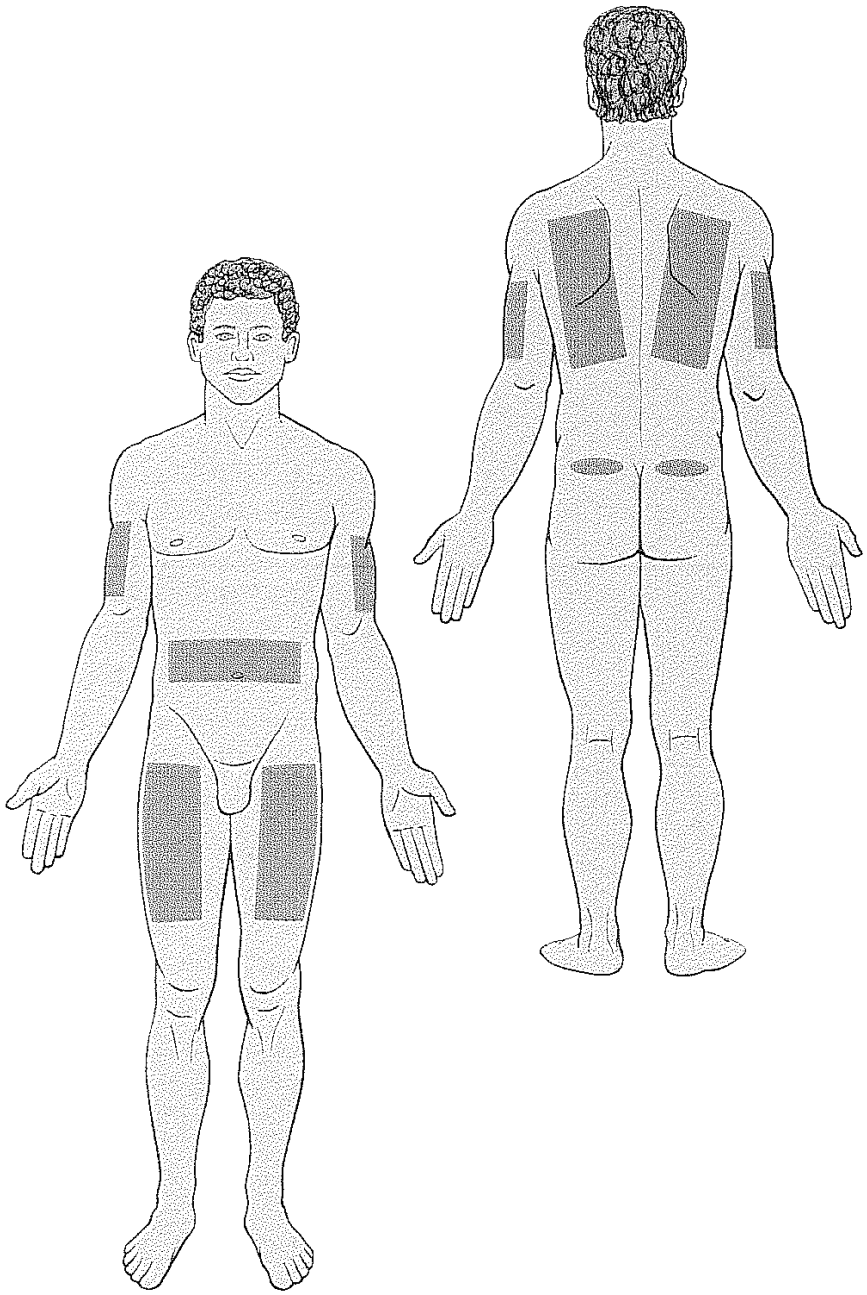
- Drug placed in the adipose tissue between skin & muscle layer
- Slower absorption than IM faster than ID; usually 30 minutes
- Absorbs into the capillary network in tissue
- Heparin & insulin are two common medications administered SQ

Subcutaneous Route

- Equipment:
  - Syringe:
    - 3cc syringe
    - Insulin syringe: 50 unit or 100 unit
  - Gauge range is 23-30
  - Needle length is from 3/8’’ to 1’’ with 5/8 being the most common
- Needle length and angle based on pt’s body weight

Subcutaneous Route

- Sites:
  - Outer aspect of upper arms
  - Abdomen; 1’’ around umbilicus, below costal margins to iliac crest
  - Anterior thighs
  - Upper back
  - Dorsogluteal area



Sites on the body where subcutaneous injections can be given.

Subcutaneous Route

- Technique:
  - Wash hands & don gloves
  - Select appropriate site
  - Assess site being sure it is clear of rashes, lesions or scars
  - Assist patient into position for injection
  - Identify appropriate landmarks
  - Swab area with alcohol swab in circular motion from inner to outer

Subcutaneous Route

- Remove cap of needle with non-dominant hand
- You may enter site at a 45 or 90 degree angle
  - With 45 degree you hold the skin taut
  - With 90 degree you bunch skin at injection site
- Hold the syringe with the thumb & forefinger of the dominant hand
- Inject the needle quickly at the appropriate angle

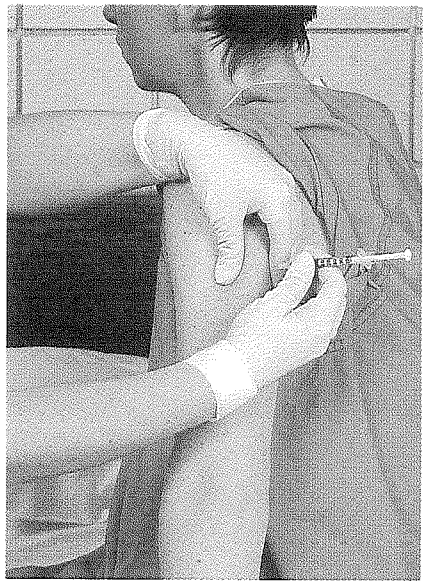
Subcutaneous Route

- Release tissue, maintain site with non-dominant hand & slide dominant hand to plunger
- Some textbooks state to pull back on plunger to ensure you are not in vessel; aspirate others texts recommend you do not with SQ injection
- ***Never Aspirate with Heparin***
- Inject medication slowly
- Withdraw the needle quickly at the same angle it was inserted, keeping non-dominant hand maintaining site

Subcutaneous Route

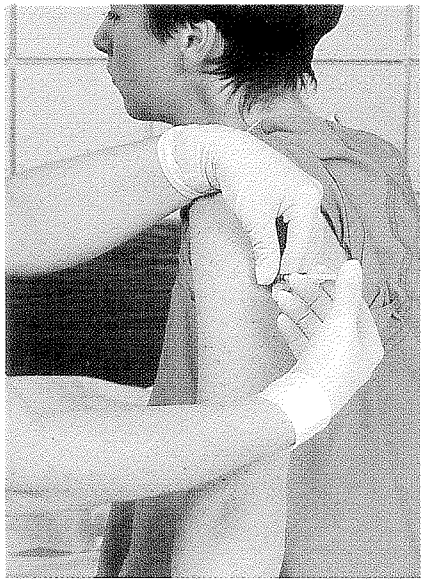
- Apply gentle pressure to site with gauze
- **Do Not Massage Site; especially with Heparin**
- **Never Recap**
- **Dispose of in sharps container**
- Assist patient into comfortable position
- Remove gloves & wash hands
- Document site & evaluate for response

Action 8: Cleaning injection site.



Action 10: Bunching tissue around injection site.

Action 11: Inserting needle.



Action 14: Injecting medication.

Action 15: Withdrawing needle. (PHOTOS ©: B. PROUD.)

Intramuscular Route

- Drug administered into the muscle
- Absorbed more rapidly than SQ due to rich blood supply; 10-30 minutes
- Larger volume given at one site
- Volume amount varies by site & age
- Imperative to have knowledge of anatomic landmarks for injection sites as well as knowledge of major nerves & blood vessels
- Knowledge of medication also important due to rate of absorption

Intramuscular Route

- Sites:
  - Deltoid (children & adults)
  - Ventrogluteal (only adults)
  - Vastus lateralis (only infants & babies under 7 months)
- Anatomic Landmarks:
  - Depends on site
  - Knowledge of site important to avoid injury to patient

Intramuscular Route

- Deltoid landmarks:
  - Client should be standing or sitting
  - Have them relax arm
  - Palpate the lower base of the acromion process
  - Triangular shaped muscle with base of triangle along acromion process
  - Place 4 fingers across the deltoid muscle with top finger across acromion process
  - Medication can be placed within the 3 finger widths below or 1-2inches below process

Deltoid

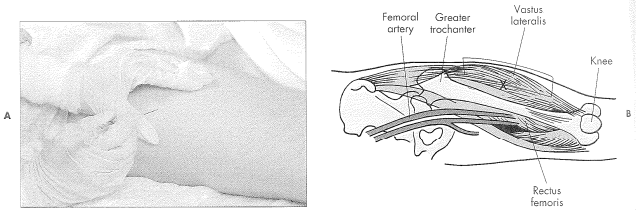


FIGURE 18-13 **A,** Giving IM injection in vastus lateralis site. **B,** Landmarks for vastus lateralis site.

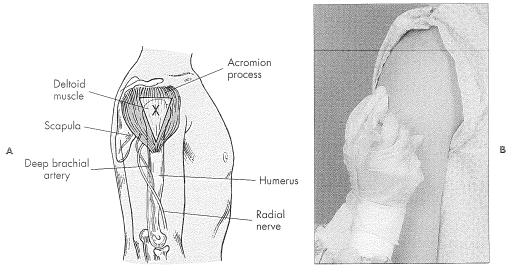


FIGURE 18-14 **A,** Landmarks for deltoid site. **B,** Giving IM injection in deltoid site.

[redacted]

Intramuscular Route

- Ventrogluteal landmarks:
  - Position patient onto either side with knees bent & upper leg slightly in front of the bottom leg
  - Palpate the greater trochanter at the head of the femur & the anterior superior iliac spine
  - Use right hand if client on right side & left hand when client on left side to ensure proper location

Intramuscular Route

- Ventrogluteal landmarks:
  - Place the palm of the hand over the greater trochanter & the index finger on the anterior superior iliac spine while the thumb is pointing toward the patient's groin
  - Spread the middle finger back along the iliac crest toward the buttock as far as possible; making a V
  - The injection site is between the index & middle finger

Ventrogluteal

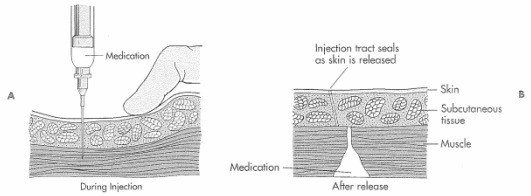


FIGURE 18-11 **A,** Pull on overlying skin before needle insertion and during IM injection moves tissues to prevent later tracking. **B,** The Z-track left after injection prevents the deposit of medication through sensitive tissue.

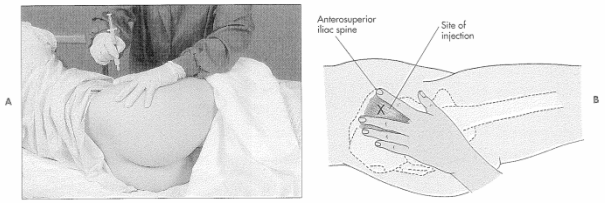


FIGURE 18-12 **A,** Injection site for ventrogluteal muscle avoids major nerves and blood vessels. **B,** Anatomical view of ventrogluteal muscle injection site.

Vastus Lateralis Muscle

The vastus lateralis muscle is another injection site used in the adult client and is the preferred site for infants under 7 months of age (Beyea and Nicoll, 1995; Wong and others, 1999). The muscle is thick and well developed. It is located on the anterior lateral aspect of the thigh; in an adult it extends from a handbreadth above the knee to a handbreadth below the greater trochanter of the femur (Figure 18-13). The middle third of the muscle is the suggested site for injection. The width of the muscle usually extends from the midline of the thigh to the midline of the thigh's outer side.

Deltoid Muscle

Although the deltoid site is easily accessible, the muscle is not well developed in many adults. The radial and ulnar nerves and the brachial artery lie within the upper arm along the humerus (Figure 18-14, *A*). The nurse should use this site only for small medication volumes (0.5 to 1.0 ml) and when other sites are inaccessible because of dressings or casts.

To locate the deltoid muscle the nurse fully exposes the client's upper arm and shoulder. A tight-fitting sleeve should not be rolled up. The nurse instructs the client to relax the arm at the side and flex the elbow by placing the hand on the hip or relaxing the lower arm across the abdomen or lap. The client may sit, stand, or lie down (Figure 18-14, *B*). The nurse palpates the lower edge of the acromion process, which forms the base of a triangle in line with the midpoint of the lateral aspect of the upper arm. The injection site is in the center of the triangle, about 2.5 to 5 cm (1 to 2 inches) below the acromion process (see Figure 18-14, *A*). The nurse may also locate the site by placing four fingers across the deltoid muscle, with the top finger along the acromion process. The injection site is then three finger widths below the acromion process.

Intramuscular Route

- Vastus lateralis:
  - Place patient in supine position
  - Place one hand above the knee & one hand below the greater trochanter of the femur
  - Locate the midline of the anterior thigh & lateral thigh
  - The injection site is located within the rectangle formed by these boundaries

Vastus lateralis

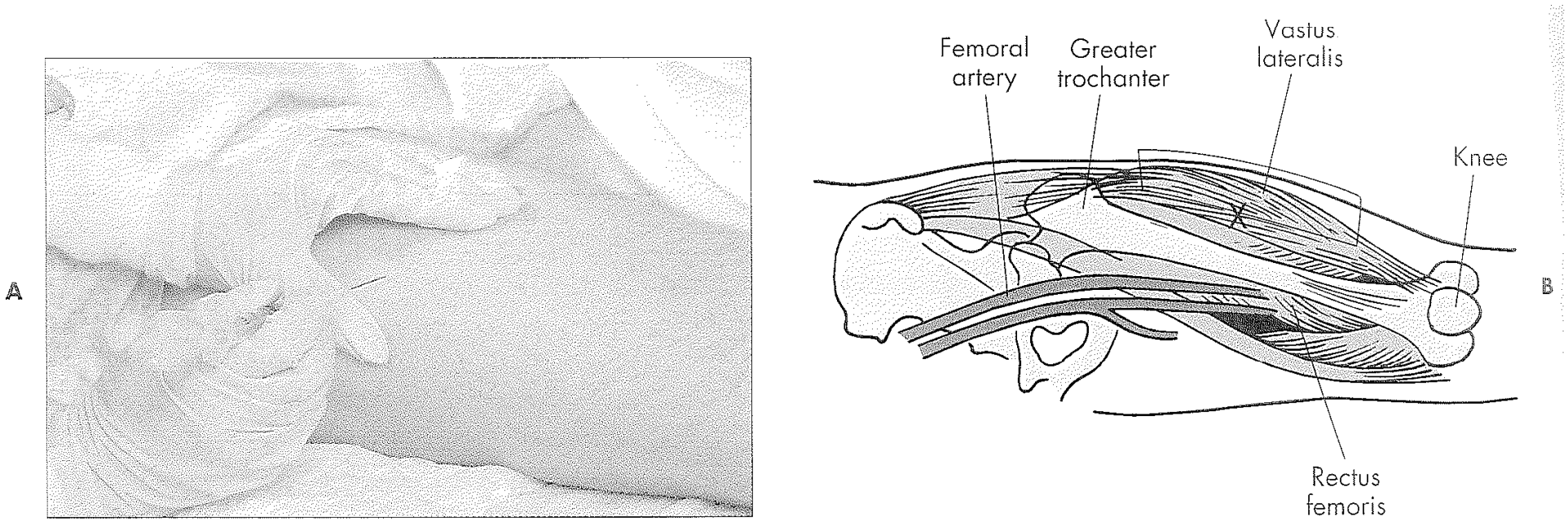


FIGURE 18-13 **A,** Giving IM injection in vastus lateralis site. **B,** Landmarks for vastus lateralis site.

Intramuscular Route

- Equipment:
  - Syringe is usually a 3cc syringe
  - Well developed adult may receive up to 4ml of a solution so a 5 cc syringe may be necessary
  - Needle length can vary between 1” to 3” & is dependent on the age & size of patient
  - Gauge is dependent upon medication & varies between 18-25G

Intramuscular Route

- Usually only 1 ml is administered into deltoid of any patient
- Children should receive no more than 1 ml of medication in a given site
- Less developed patients, elderly should receive no more than 1-2ml in a given site

Intramuscular Route

- Technique:
  - Gather equipment
  - Wash hands & don gloves
  - Choose appropriate site for administration of IM injection
  - Position patient & ***identify landmarks for site chosen***
  - Cleanse the area around the injection site in a circular motion from inner to outward & allow to dry

Intramuscular Route

- Remove the cap from the needle & hold the syringe in the dominant hand between the thumb & index finger
- Non-dominant hand should be placed at landmarks but also pulling skin down or to the side about 1’’ & skin taut
- Quickly dart the medication into the tissue at a 90 degree angle

Intramuscular Route

- Once the needle is in place use the thumb & index finger of the non-dominant hand to hold syringe in place
- Slide dominant hand to the plunger & aspirate slowly by pulling back on the plunger for 5 seconds to determine if the needle has entered a vessel
- Watch for a flash of red or pink in syringe
- ***If a flash appears; remove syringe***
- ***Do not instill medication***

Intramuscular Route

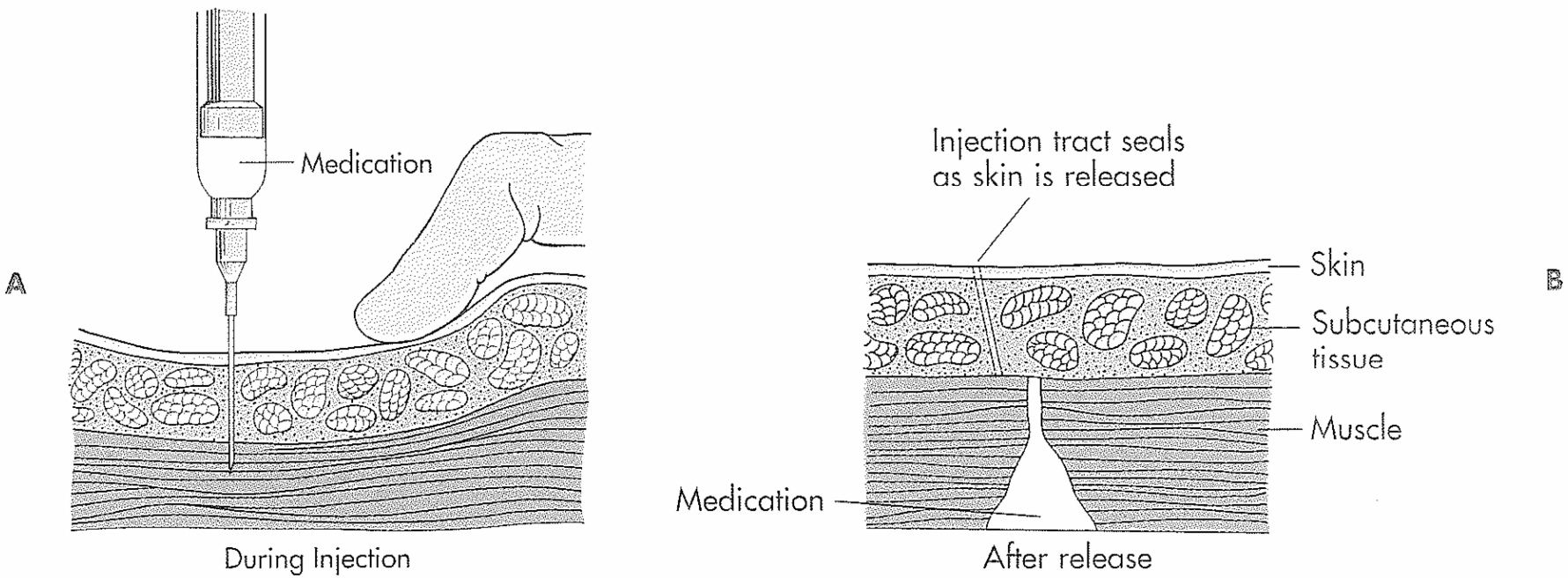
- If no blood is aspirated, inject the medication slowly; about 10 seconds/ml
- Wait another 10 seconds before withdrawing the syringe
- Release displaced skin & withdraw the needle slow & steady & at the angle it was injected
- Apply gentle pressure to site with 2x2 gauze

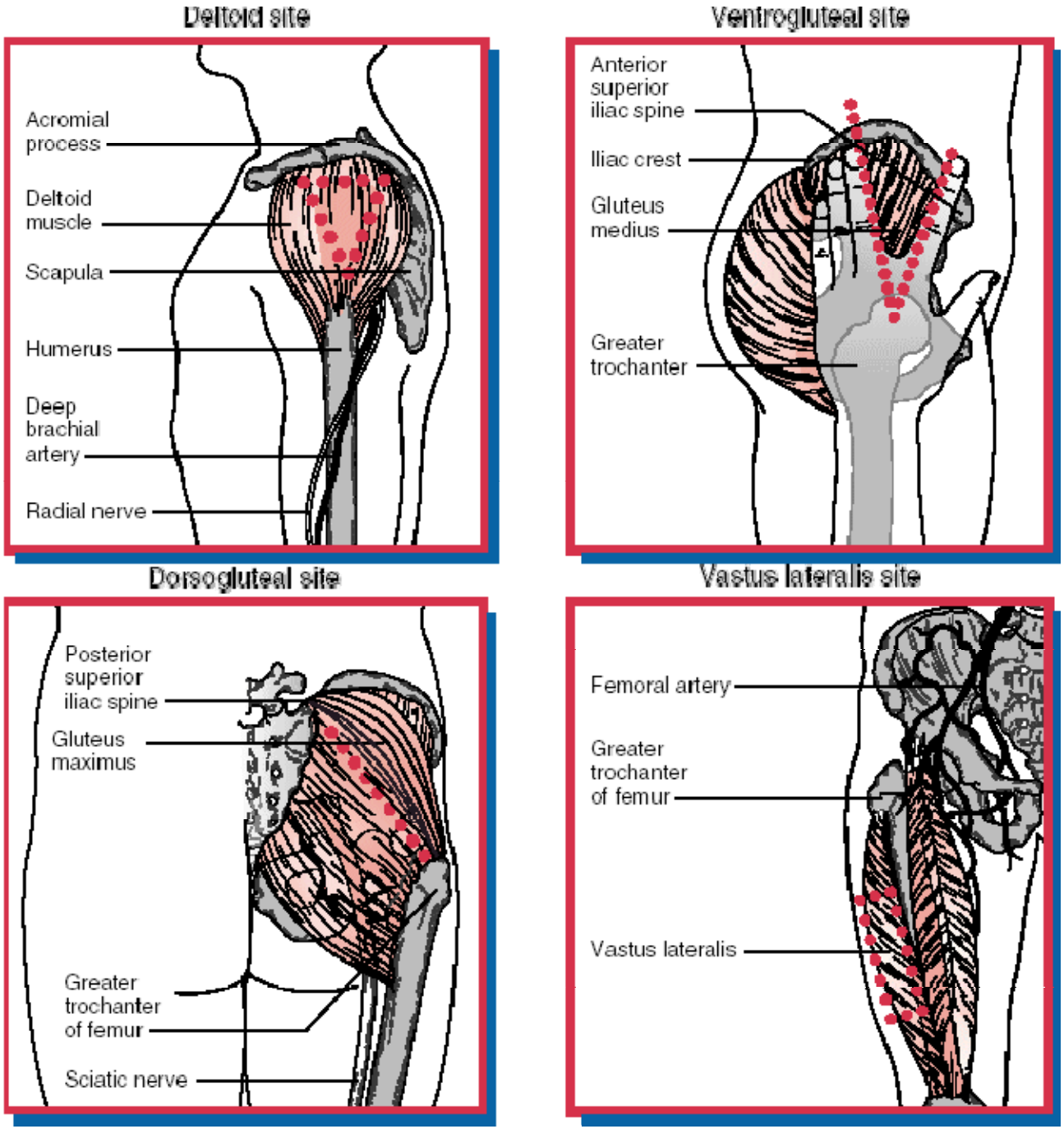
Intramuscular Route

- ***Never Recap Needle***
- Discard of syringe in sharps
- You may place bandage to site is bleeding occurs
- Reposition patient for comfort
- Document site & toleration
- Evaluated response to medication

Intramuscular Route
Z-Track Technique

- Utilize this method when:
  - Drug irritating to SQ tissue
  - Drugs that can permanently stain skin
- Procedure:
  - Draw medication in syringe
  - Change needle
  - Draw ~ 0.1 to 0.2 mL air into syringe
  - Position pt appropriately
  - Cleanse skin
  - Pull skin laterally
  - Insert needle and inject drug, wait 10 seconds
  - Release skin and withdraw needle


A
Medication
During Injection
Injection tract seals
as skin is released
Skin
Subcutaneous
tissue
Muscle
Medication
After release
B


Deltoid site
Acromial process
Deltoid muscle
Scapula
Humerus
Deep brachial artery
Radial nerve
Ventrogluteal site
Anterior superior iliac spine
Iliac crest
Gluteus medius
Greater trochanter
Dorsogluteal site
Posterior superior iliac spine
Gluteus maximus
Greater trochanter of femur
Sciatic nerve
Vastus lateralis site
Femoral artery
Greater trochanter of femur
Vastus lateralis

Nursing Responsibilities with Drug Administration

- Always document immediately after medication administration
- Note any issues with administration process
- Evaluate & record patient response to medication
- Observing for adverse reactions

Nursing Process & Medication Administration

- The nursing process is unique to nursing
- As nurses, we continually
  - Assess our patient
  - Diagnosis (uses nursing diagnoses not medical)
  - Plan care according to the diagnosis
  - Implement our plan of action
  - Evaluate the effect of our action

The Nursing Process in Drug Administration

- Assessment
  - Initial
    - Collect subjective and objective data
    - Assess knowledge of disease process, drug and drug regimen
  - Ongoing
    - Collect data related to effectiveness of the drug
    - Monitor for adverse effects

The Nursing Process in Drug Administration

- Nursing Diagnoses
  - Ineffective therapeutic regimen management
  - Deficient Knowledge
  - Noncompliance
  - Anxiety
  - Impaired Knowledge
  - Risk for Injury
  - Risk for Infection
  - Risk for allergic response

The Nursing Process in Drug Administration (cont.)

- Planning
  - Set expected outcomes
  - Develop a teaching plan to correct deficient knowledge or reason for non compliance
  - Examples
    - The patient will effectively manage the therapeutic regimen
    - The patient will state the drug regimen
    - The patient will comply with the drug regimen

The Nursing Process in Drug Administration (cont.)

- Implementation
  - Perform any nursing assessment before administration of a drug
    - Vital signs
    - Review subjective/objective data
  - Administer drug according to the “Six Rights” & 3 Checks
  - Manage adverse reactions
  - Teach patient/family about drug, disease process, treatment regimen

The Nursing Process in Drug Administration (cont.)

- Evaluation
  - Evaluate the effectiveness of nursing interventions to meet patient outcomes
  - Evaluate effectiveness of the drug regimen
  - Evaluate patient/family's understanding of the drug regimen