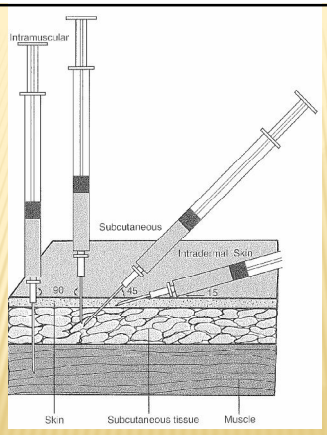
RITA CAREY-NITA

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)



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 of injection will 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 vial & 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

INSULIN SYRINGES

- Insulin medication is ***only*** administered with an insulin syringe.
- It is calibrated in units because insulin is ordered by units which is a more exact measurement
  - 2 types: 50 unit or 100 unit
- It is a subcutaneous size needle that is directly attached to the syringe
- As with all, they are disposable after use

SYRINGES & NEEDLES

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

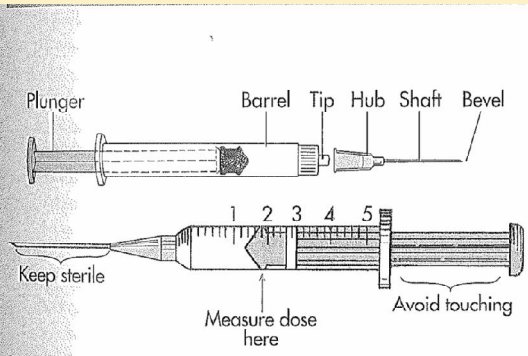


FIGURE 18-1 Parts of a syringe.

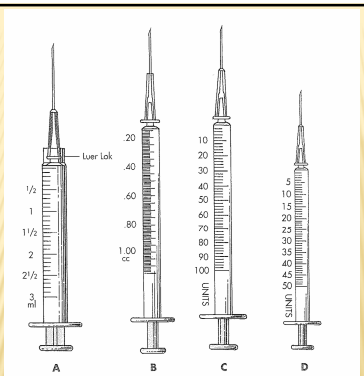
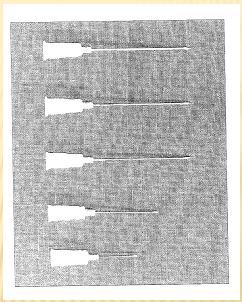


FIGURE 18-2 Types of syringes. A, Syringe with 3-ml capacity is marked in 0.1 (tenths). B, Tuberculin syringe is marked in 0.01 (hundredths) for doses of less than 1 ml. Insulin syringes marked in units in two sizes: C, 100 U; or D, 50 U (low-dose).



MEDICATION

- Parenteral medication can be packaged 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 is 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

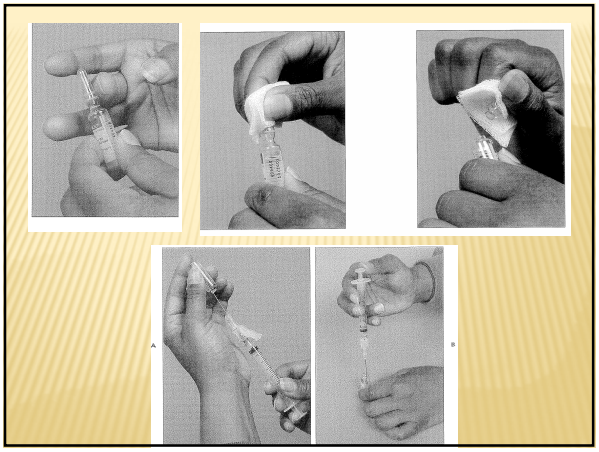
- Technique for removing medication from an ampule:
  - Attach a filtered needle to the syringe to avoid introducing shards of glass into medication as you withdraw
  - Do Not instill air or medication will run out of ampule
- Two way to withdraw:
  - Upright or inverted

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



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 barrel 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 storing multi-dose

REMOVING MEDICATION FROM A VIAL

- Some medication are withdrawn with a filter needle which needs replacement
  - Facility policy may require any needle be replaced after medication is withdrawn
- 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

MIXING INSULIN

- Insulin is the main medication that is at times mixed
- Before mixing any insulin be sure of compatabilty
- Always remember the rule:

Clear to cloudy

- Draw up the unmodified insulin first which is clear
  - Regular: Humulin R–Novolog R–Humalog
- Then the modified which is cloudy
  - NPH–Novolin70/30–Humulin 70/30

Mixing Medications from Vials

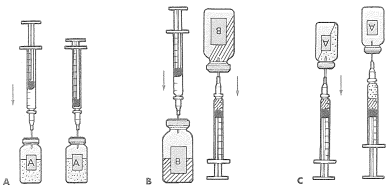


FIGURE 18-9 A, Injecting air into vial A. B, Injecting air into vial B and withdrawing dose. C, Withdrawing medication from vial A; medications are now mixed.

RECONSTITUTION OF VIAL MEDICATION

- Some medication will be packaged in 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

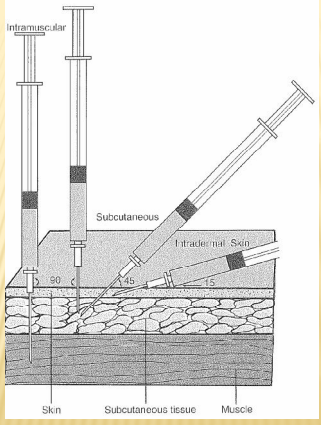
- Insert the needle into the powered vial & slowly instill liquid
- Agitate the medication in the powered vial by rolling back & forth between hands
- Once the medication has been mixed thoroughly you will insert the needle into the vial & remove the ordered amount of medication
- Before the medication 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 administration
- Many narcotics come in prefilled syringes



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

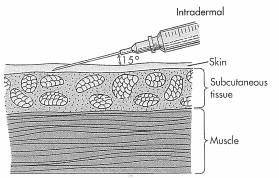
- Use the non-dominant hand to spread skin taut over the injection site
- Hold syringe in dominant hand between the thumb & forefinger with the bevel up
- Hold syringe at a 10°-15° from site
- Insert the syringe only about 1/8”
- You should see the needle through the skin

INTRADERMAL ROUTE

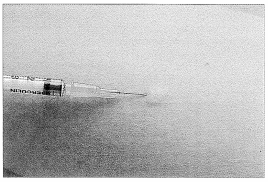
- Once in place slowly inject the medication with the dominant hand while the non-dominant hand secure the syringe
- Injection produces a small raised area called a wheal or bleb
- Withdraw the needle & dispose into sharps container
- **Never Recap**
- Do Not Massage Site or Place Pressure

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

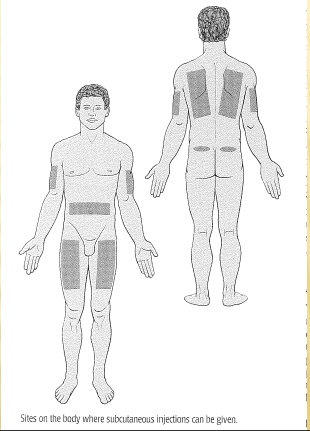
- Drug placed in the adipose tissue between skin & muscle layer
- Slower absorption than IM faster than ID; usually 30 minutes
- Absorbs into the capillary network in tissue
- Heparin & insulin are two common medications administered SQ

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

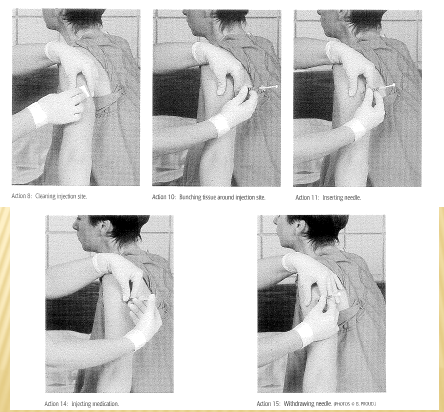
- Remove cap of needle with non-dominant hand
- You may enter site at a 45 or 90 degree angle
  - With 45 degree you hold the skin taut
  - With 90 degree you bunch skin at injection site
- Hold the syringe with the thumb & forefinger of the dominant hand
- Inject the needle quickly at the appropriate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



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

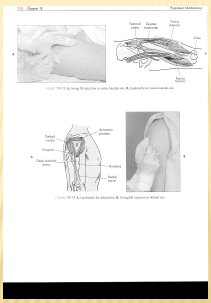
INTRAMUSCULAR ROUTE

- Sites:
  - Deltoid
  - Ventrogluteal
  - Vastus lateralis
- 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



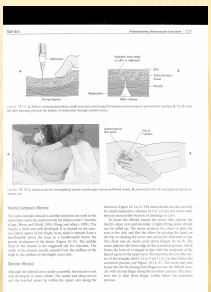
INTRAMUSCULAR ROUTE

- 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



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

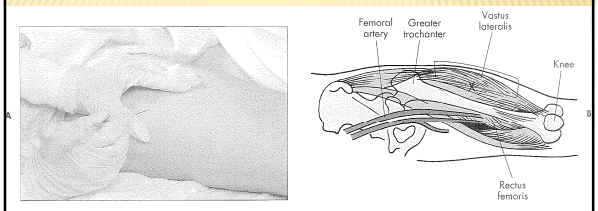


FIGURE 18-13 A, Giving IM injection in vastus lateralis site. B, Landmarks for vastus lateralis site.

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

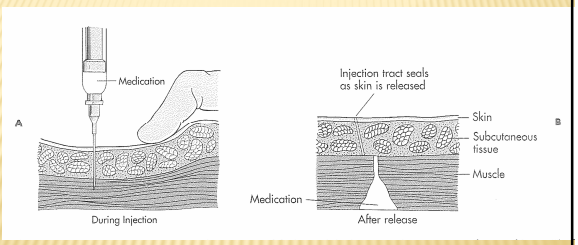
- If no blood is aspirated, inject the medication slowly; about 10 seconds/ml
- Wait another 10 seconds before withdrawing the syringe
- Release displaced skin & withdraw the needle slow & steady & at the angle it was injected
- Apply gentle pressure to site with 2x2 gauze

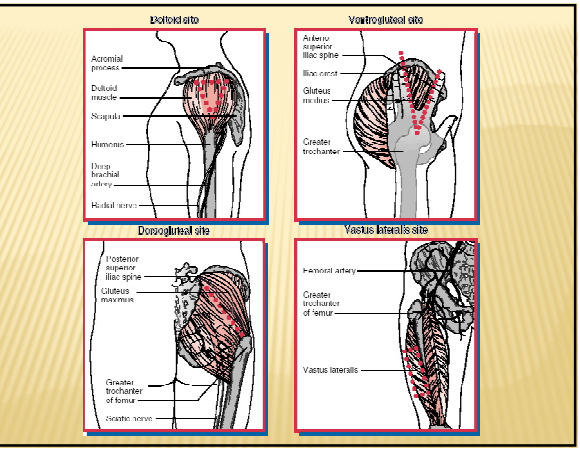
INTRAMUSCULAR ROUTE

- ***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 as you withdraw needle





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
  - 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