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Intravenous Access, Blood Sampling and Intraosseous Infusions

DND Primary Care Paramedicine

Module: 02

Section: 06

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Lecture Outline

- Types of intravenous access
- Equipment for intravenous access
- IV drug administration
- Venous blood sampling
- Intraosseous infusion

Intravenous (IV) Access

- Indications
  - Fluid and blood replacement
  - Drug administration
  - Obtaining venous blood specimens for lab analysis
- Types
  - Peripheral venous access
  - Central venous access

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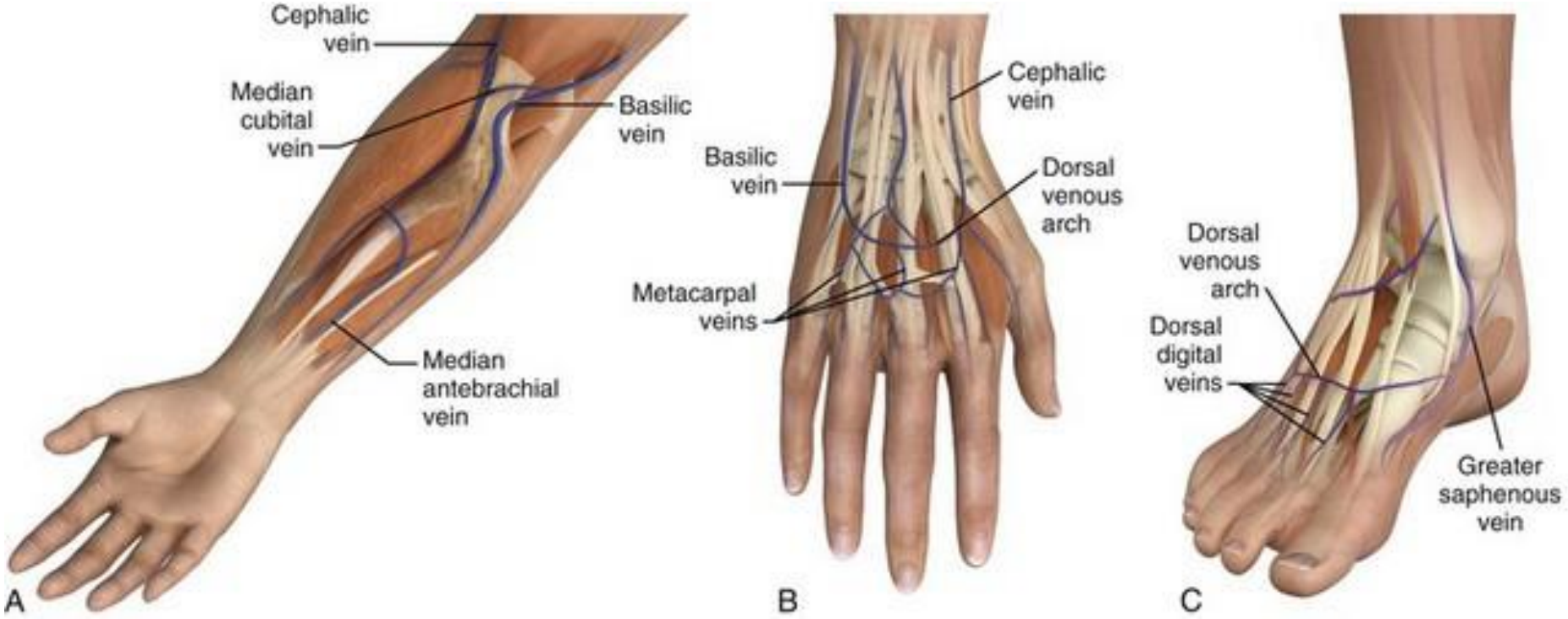
Peripheral IV Access Sites



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IV, IO, Blood Sample

INTRAVENOUS FLUIDS

Colloids

- Colloids remain in the circulatory system for a long time.
  - Plasma protein fraction (plasmanate)
  - Salt poor albumin
  - Dextran
  - Hetastarch (hespan)

Crystalloids

- Primary out of hospital solutions
  - Isotonic solutions
  - Hypertonic solutions
  - Hypotonic solutions
- Prehospital Solutions
  - Lactated Ringer's
  - Normal saline solution
  - 5% dextrose in water

Packaging of IV Fluids

- Most packaged in soft plastic or vinyl bags.
- Container provides important information:
  - Label lists fluid type and expiration date.
  - Medication administration port.
  - Administration set port.

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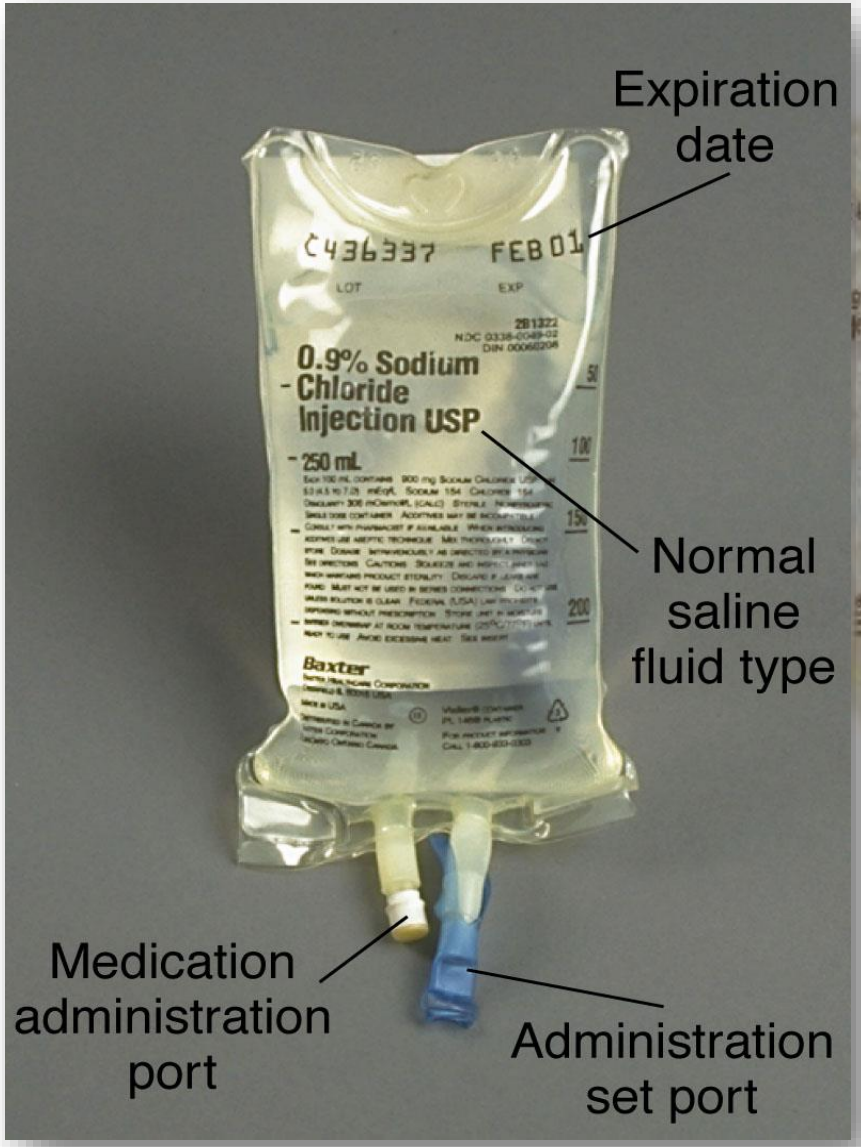
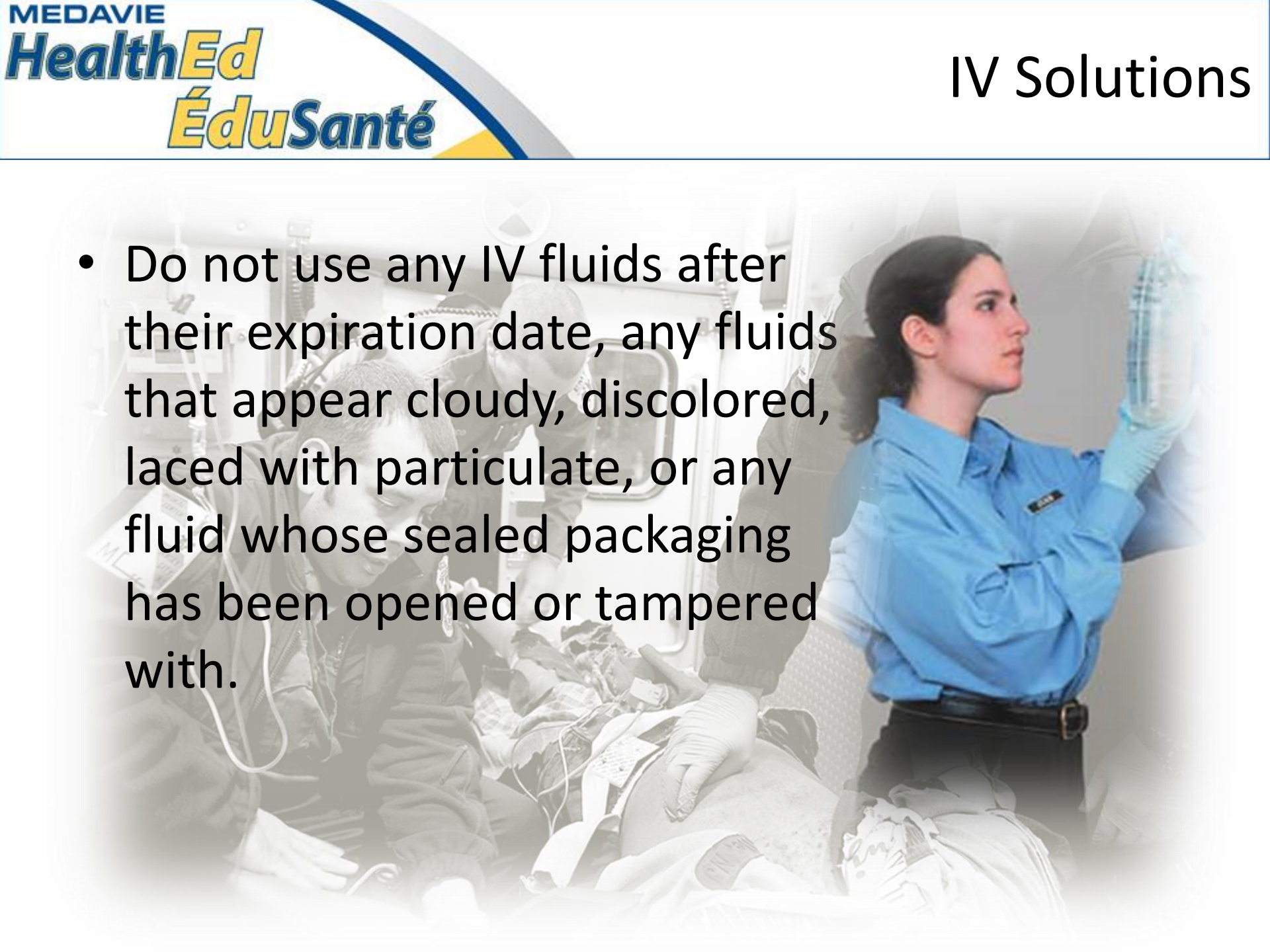
IV Solution Containers



IV Solutions

- Do not use any IV fluids after their expiration date, any fluids that appear cloudy, discolored, laced with particulate, or any fluid whose sealed packaging has been opened or tampered with.



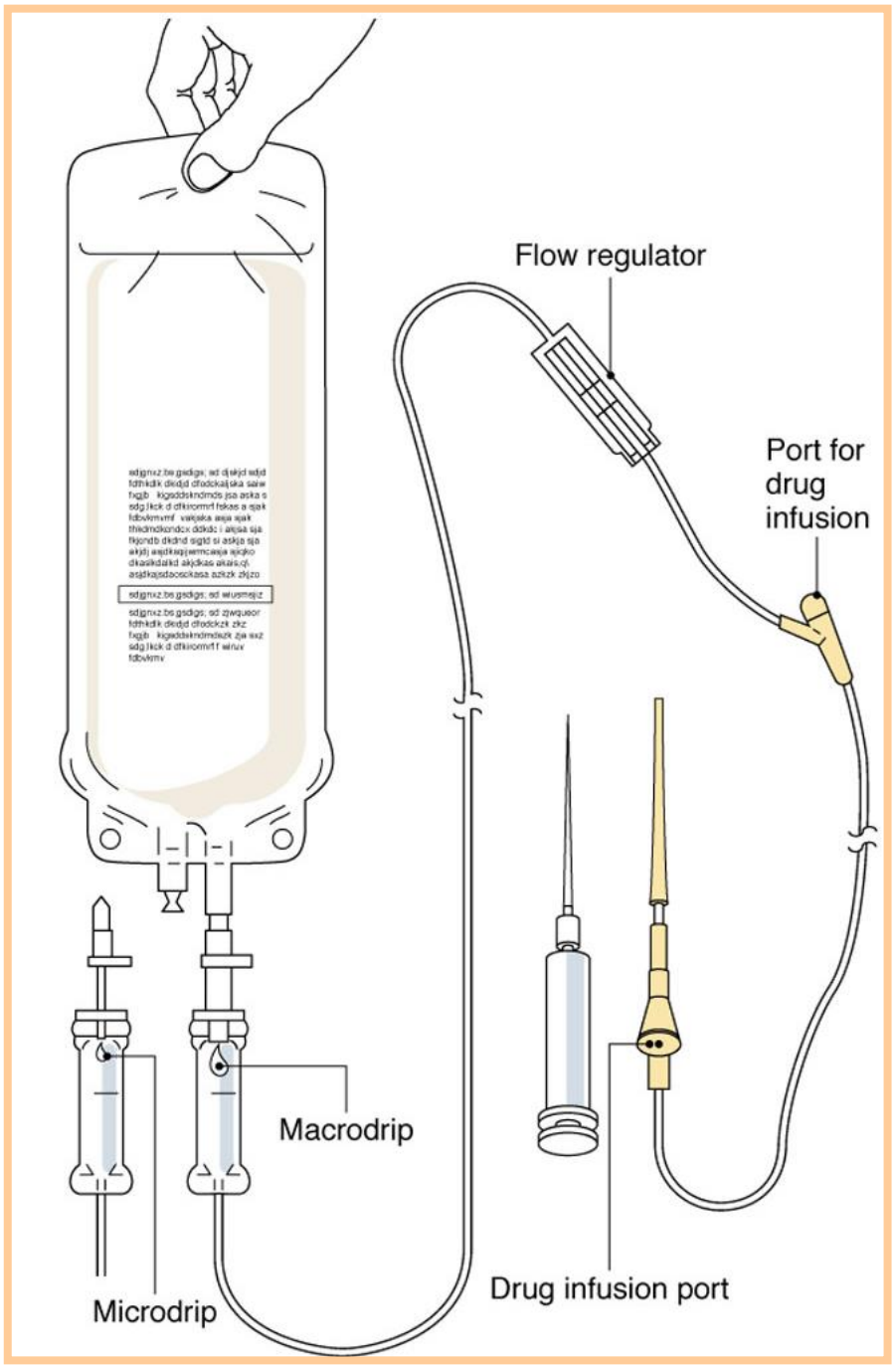
IV Administration Sets

- Macrodrip
  - 10 to 20 gtts = 1 ml, for giving large amounts of fluid.
- Microdrip
  - 60 gtts = 1 ml, for restricting amounts of fluid.
- Blood tubing
  - Has a filter to prevent clots from blood products from entering the body.
- Measured volume
  - Delivers specific volumes of fluids.

IV Administration Sets

- IV extension tubing
  - Extends original tubing.
- Electromechanical pump tubing
  - Specific for each pump.
- Miscellaneous
  - Some sets have a dial that can set the flow rates.

Macrodrip and Microdrip Administration Sets



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Measured Volume Administration Set

Intravenous Cannulas

- Over the needle catheter
- Hollow needle catheter
- Plastic catheter inserted through a hollow needle

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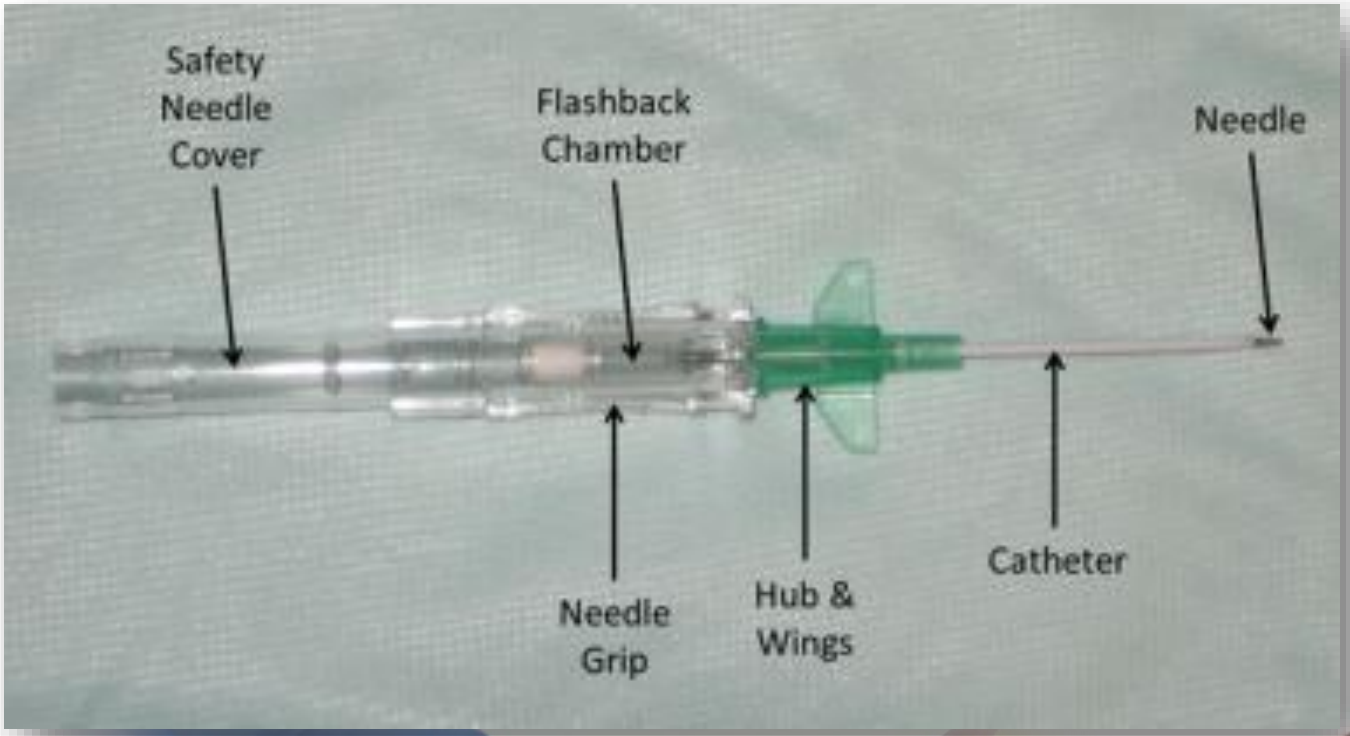
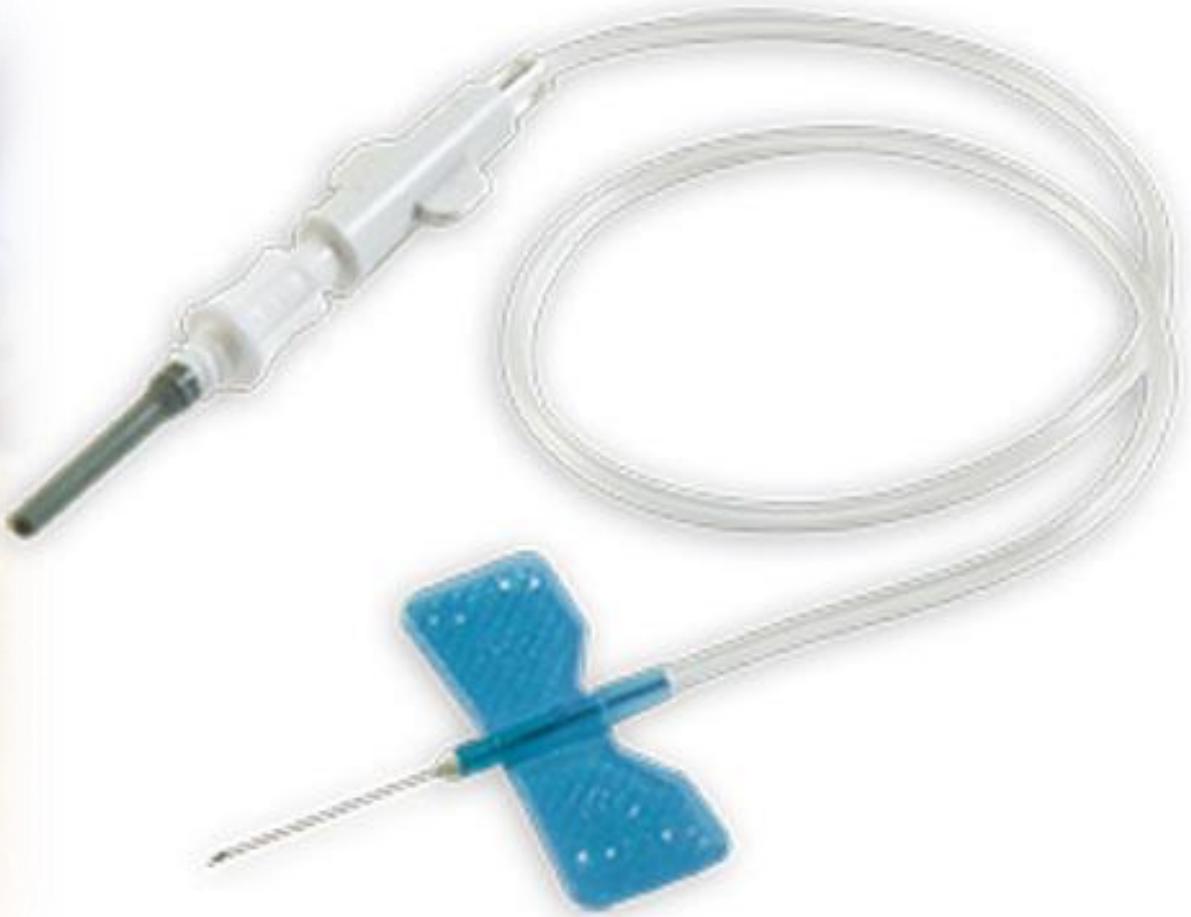
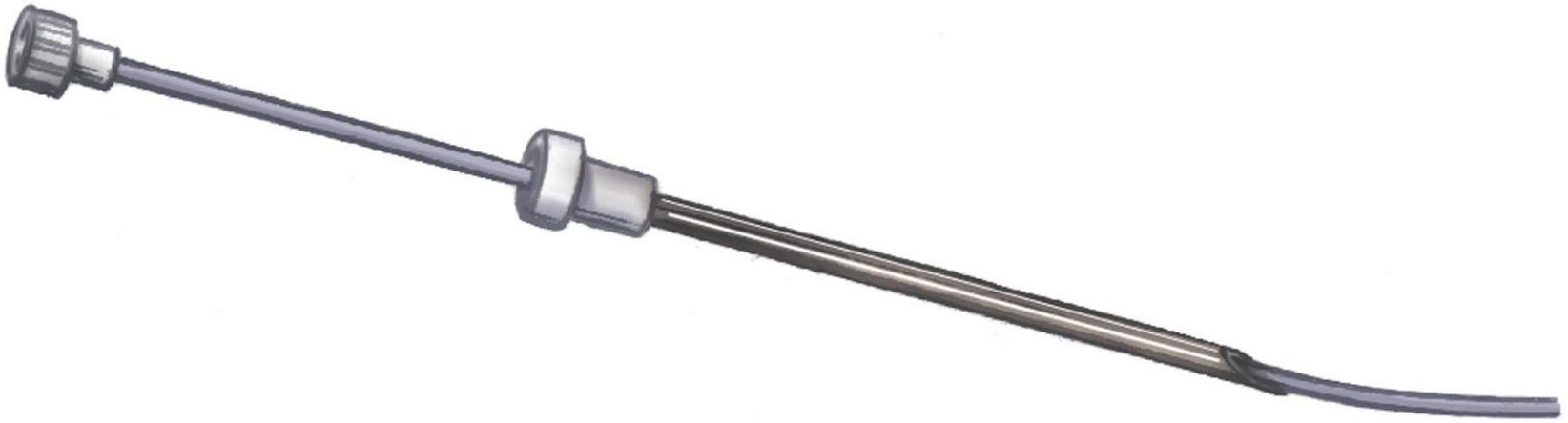
Over the Needle Catheter



Hollow Needle Catheter



Catheter Inserted Through the Needle



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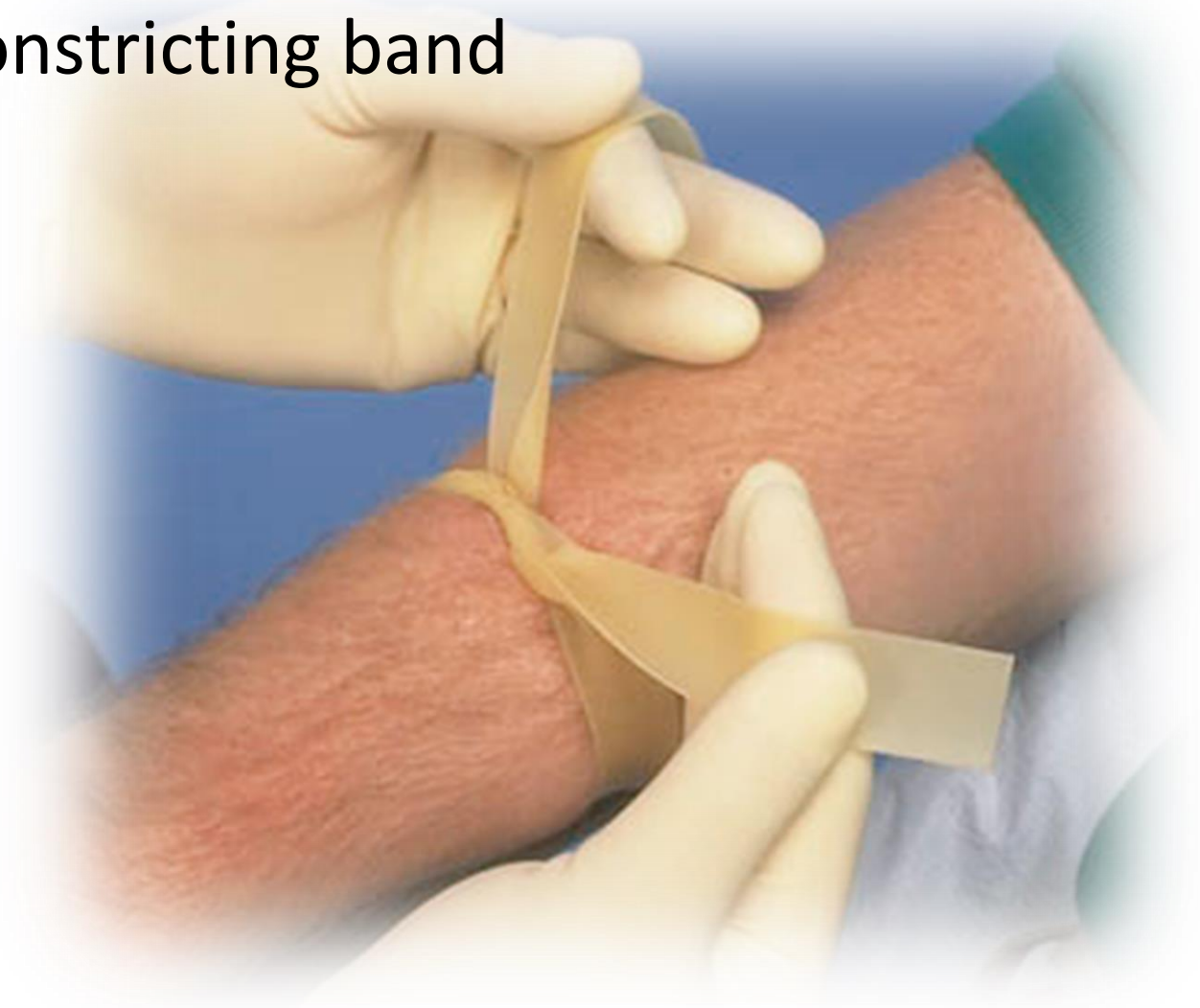
PERIPHERAL IV ACCESS

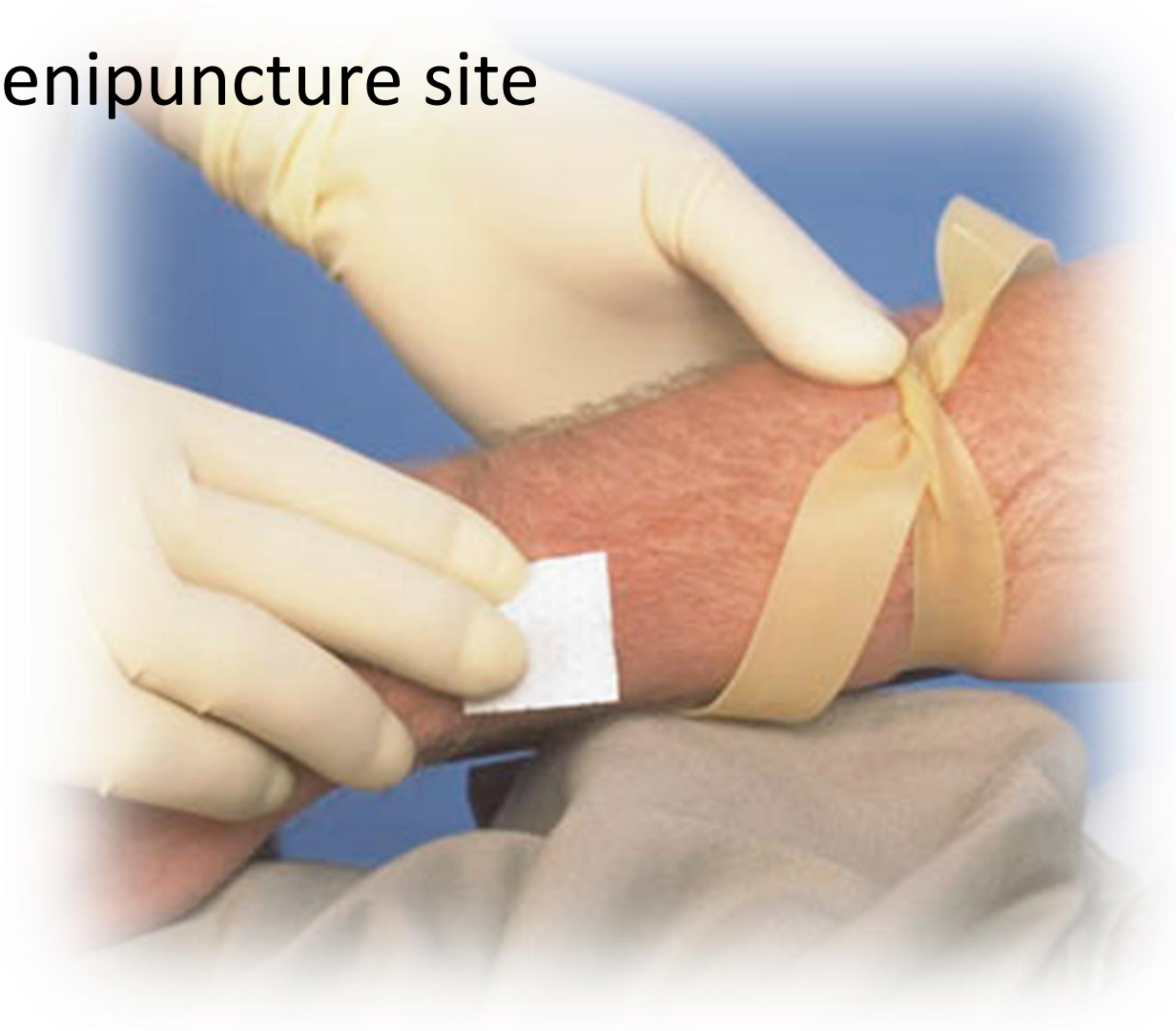
Peripheral IV Access

- Place the constricting band



Peripheral IV Access

- Cleanse the venipuncture site



Peripheral IV Access

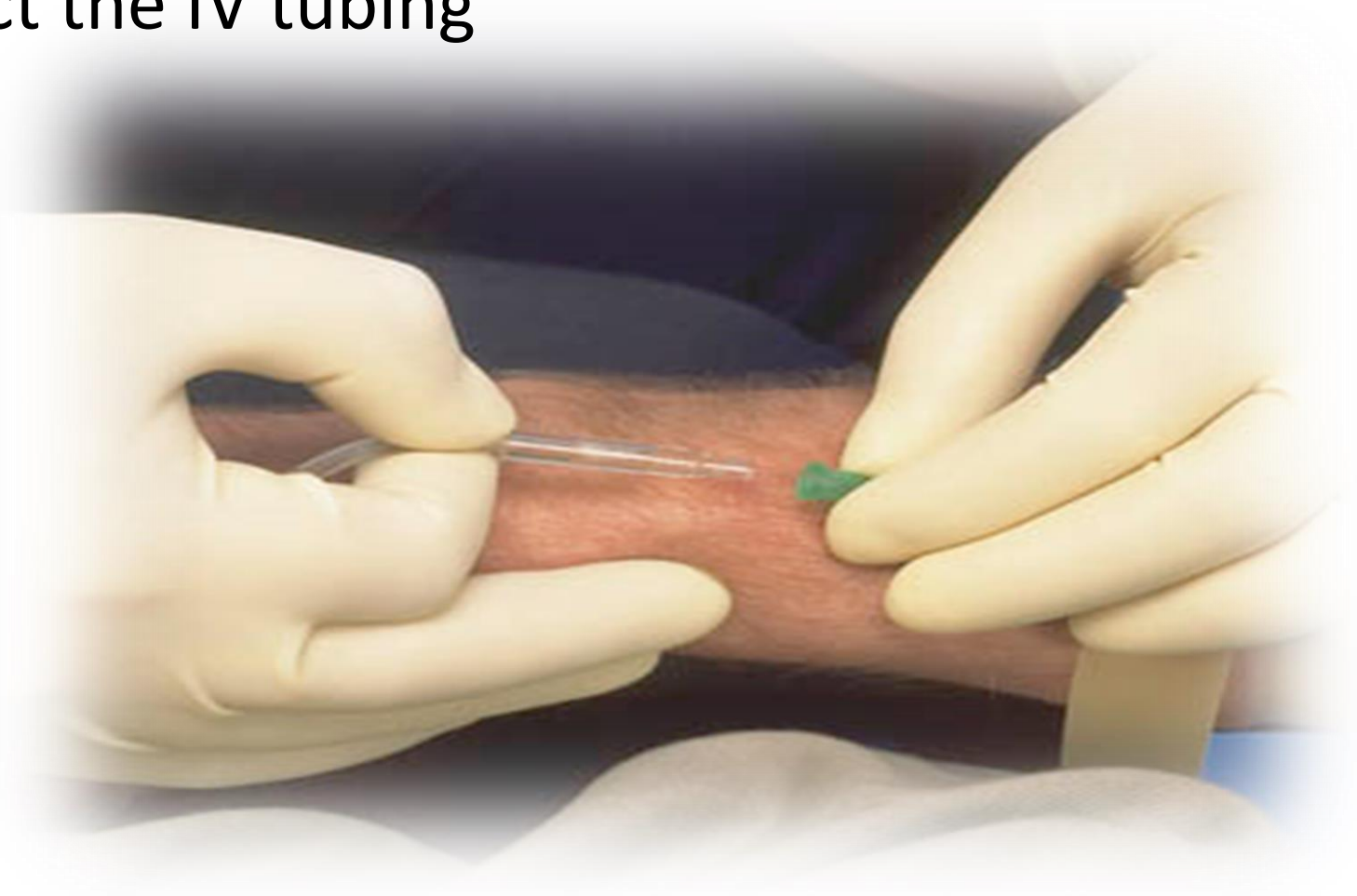
- Insert the intravenous cannula into the vein

Peripheral IV Access

- Withdraw any blood samples needed

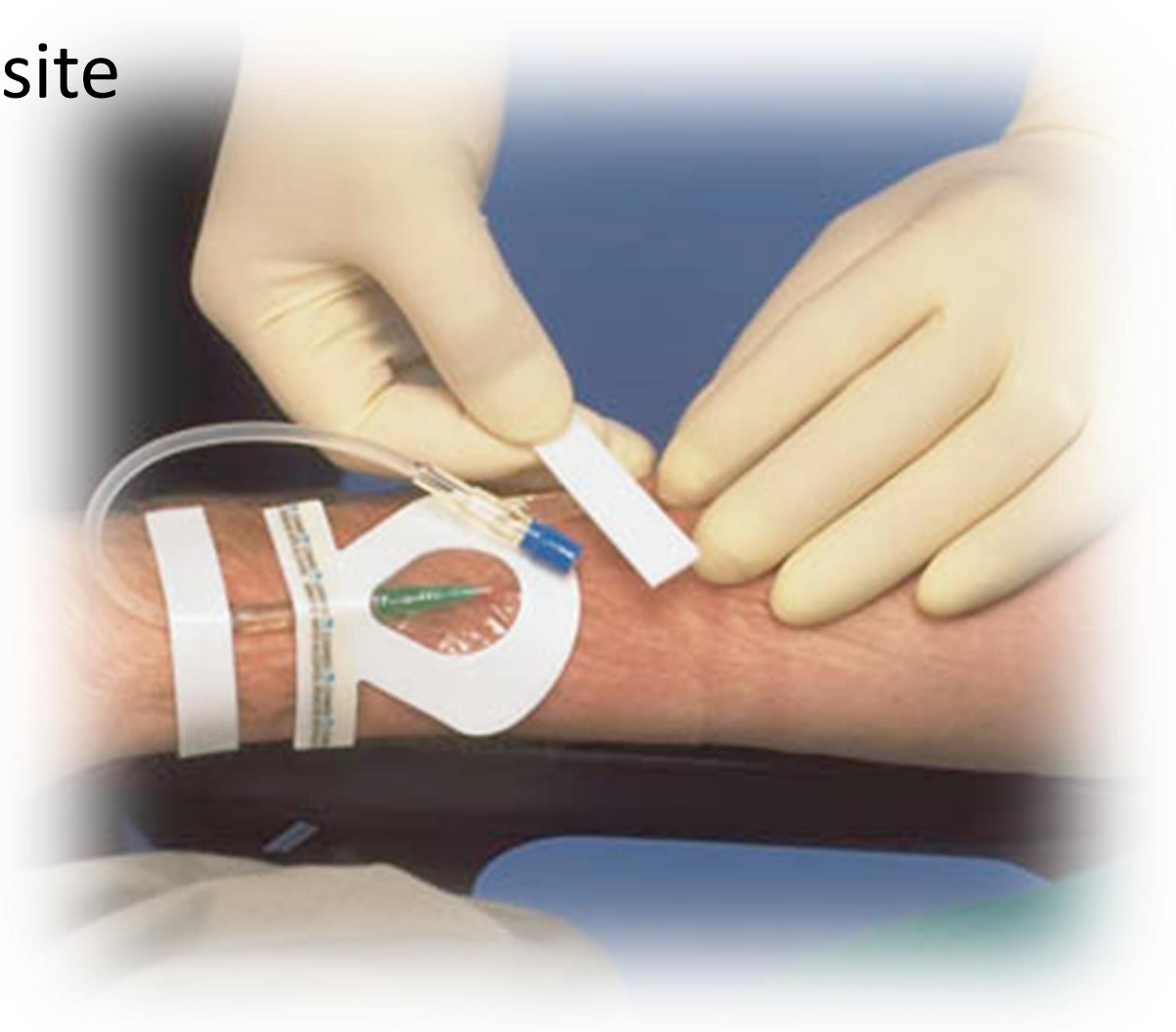
Peripheral IV Access

- Connect the IV tubing



Peripheral IV Access

- Secure the site



Peripheral IV Access

- Label the IV solution bag

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PERIPHERAL INTRAVENOUS ACCESS IN AN EXTERNAL JUGULAR VEIN

External Jugular

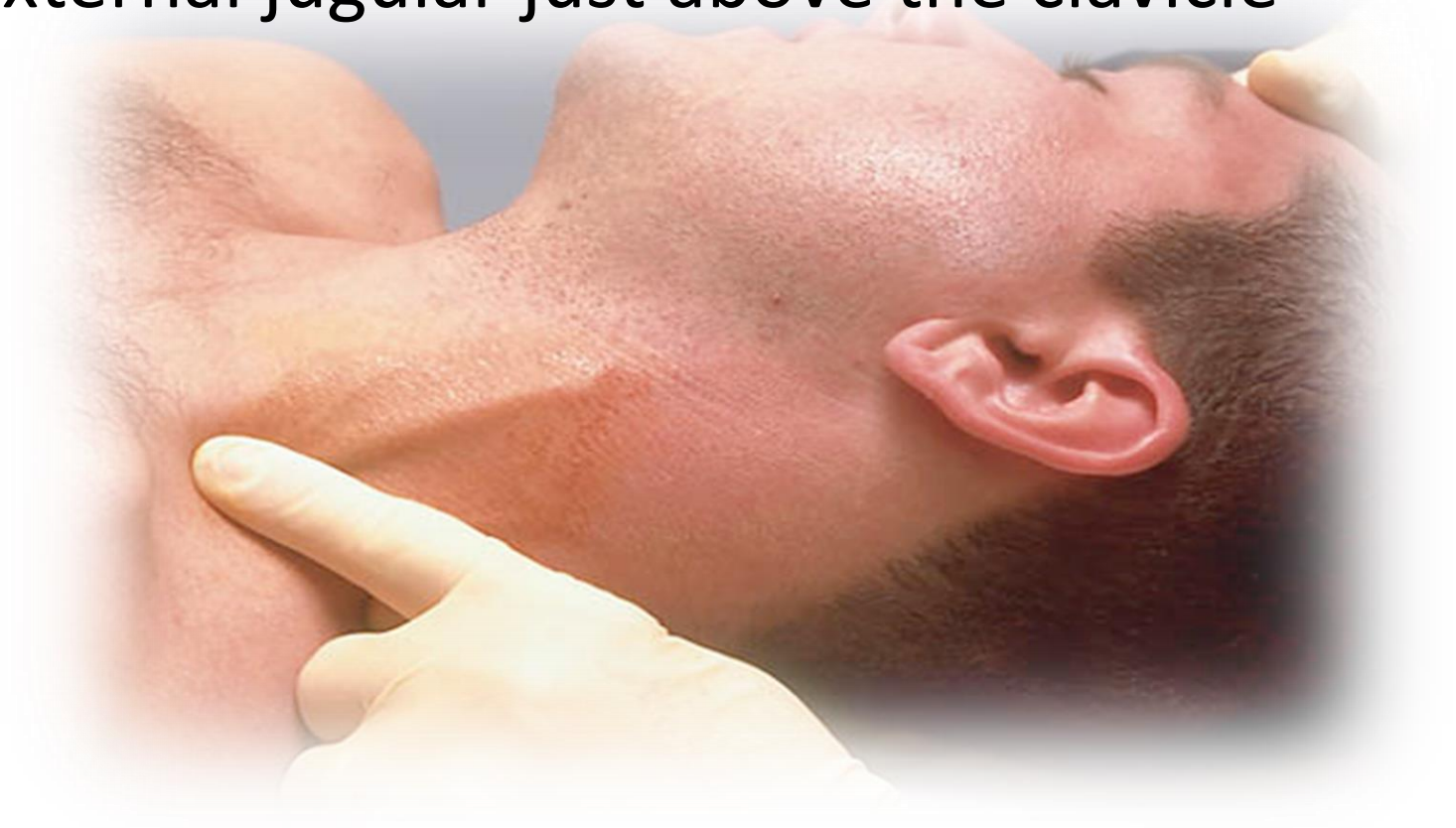
- Place the patient in a supine or Trendelenburg position

External Jugular

- Turn the patient's head to the side opposite of access and cleanse the site

External Jugular

- Occlude venous return by placing a finger on the external jugular just above the clavicle



External Jugular

- Point the catheter at the medial third of the clavicle and insert it, bevel up, at a 10°– 30° angle

External Jugular

- Enter the jugular while withdrawing on the plunger of the attached syringe

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INTRAVENOUS ACCESS WITH A MEASURED VOLUME ADMINISTRATION SET

Burette

- Prepare the tubing

Burette

- Open the uppermost clamp and fill the burette chamber with approximately 20 ml of fluid

Burette

- Close the uppermost clamp and open the flow regulator

Factors Affecting IV Flow Rates

- Constricting band
- Edema at puncture site
- Cannula abutting the vein wall or valve
- Administration set control valves
- IV bag height
- Completely filled drip chamber
- Catheter patency

IV Access Complications

- Pain
- Local infection
- Pyrogenic reaction
- Allergic reaction
- Catheter shear
- Inadvertent arterial puncture
- Circulatory overload
- Thrombophlebitis
- Thrombus formation
- Air embolism
- Necrosis
- Anticoagulants

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Changing an IV Bag or Bottle

- Prepare the new bag or bottle.
- Occlude the flow from depleted bag or bottle.
- Remove spike from depleted bag or bottle.
- Insert spike into the new IV bag or bottle.
- Open the clamp to appropriate flow rate.

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INTRAVENOUS BOLUS ADMINISTRATION

IV Medication Administration

- Prepare the equipment

IV Medication Administration

- Prepare the medication

IV Medication Administration

- Check the label

IV Medication Administration

- Select and clean an administration port

IV Medication Administration

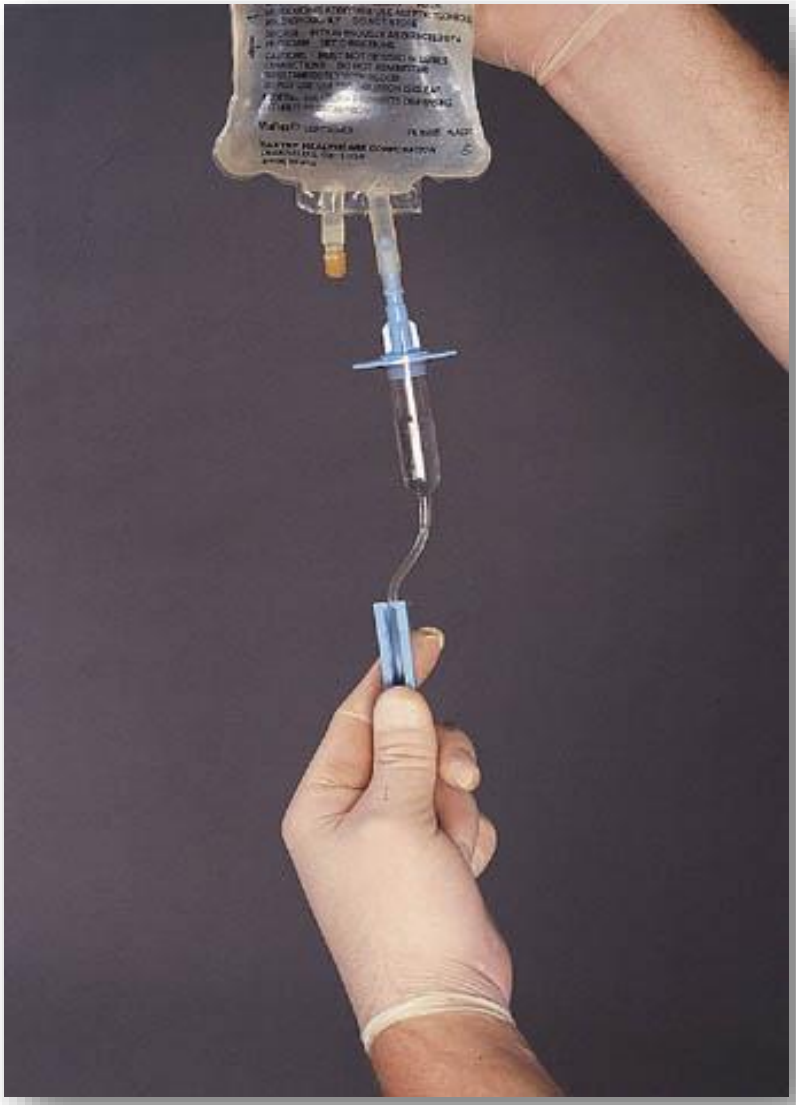
- Pinch the line

IV Medication Administration

- Administer the medication

IV Medication Administration

- Adjust the IV flow rate



IV Medication Administration

- Monitor the patient

Saline Lock

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Infusion Pump

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Syringe Type Infusion Pump

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DRAWING BLOOD

Indications

- You should obtain venous blood in the following situations:
  - During peripheral access
  - When drug administration may be needed
  - Before drug administration

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Blood Tubes

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Blood Tubes

Order #	Tube Colour	Collection Tube	Purpose
1	Aerobic/Anaerobic	Blood Cultures	
2	Light Blue	Sodium Citrate Tube	sodium citrate as an anticoagulant - coagulation studies
3	Red	Serum Tube	contains no anticoagulant - serum for selected chemistry tests, clotted blood for immunohematology
4	Gold	SST Gel Separator Tube	contain a special gel that separates blood cells from serum, as well as particles to cause blood to clot quickly
5	Light Green	PST Gel Separator Tube with Heparin	Contains lithium heparin for plasma separation
6	Dark Green	Heparin Tube	contains sodium heparin - used for collection of heparinized plasma or whole blood for special tests
7	Lavender	EDTA Tube	EDTA as an anticoagulant - used for most hematological procedure
8	Grey	Fluoride Tube	contains potassium oxalate as an anticoagulant and sodium fluoride as a preservative - used to preserve glucose in whole blood and for some special chemistry tests

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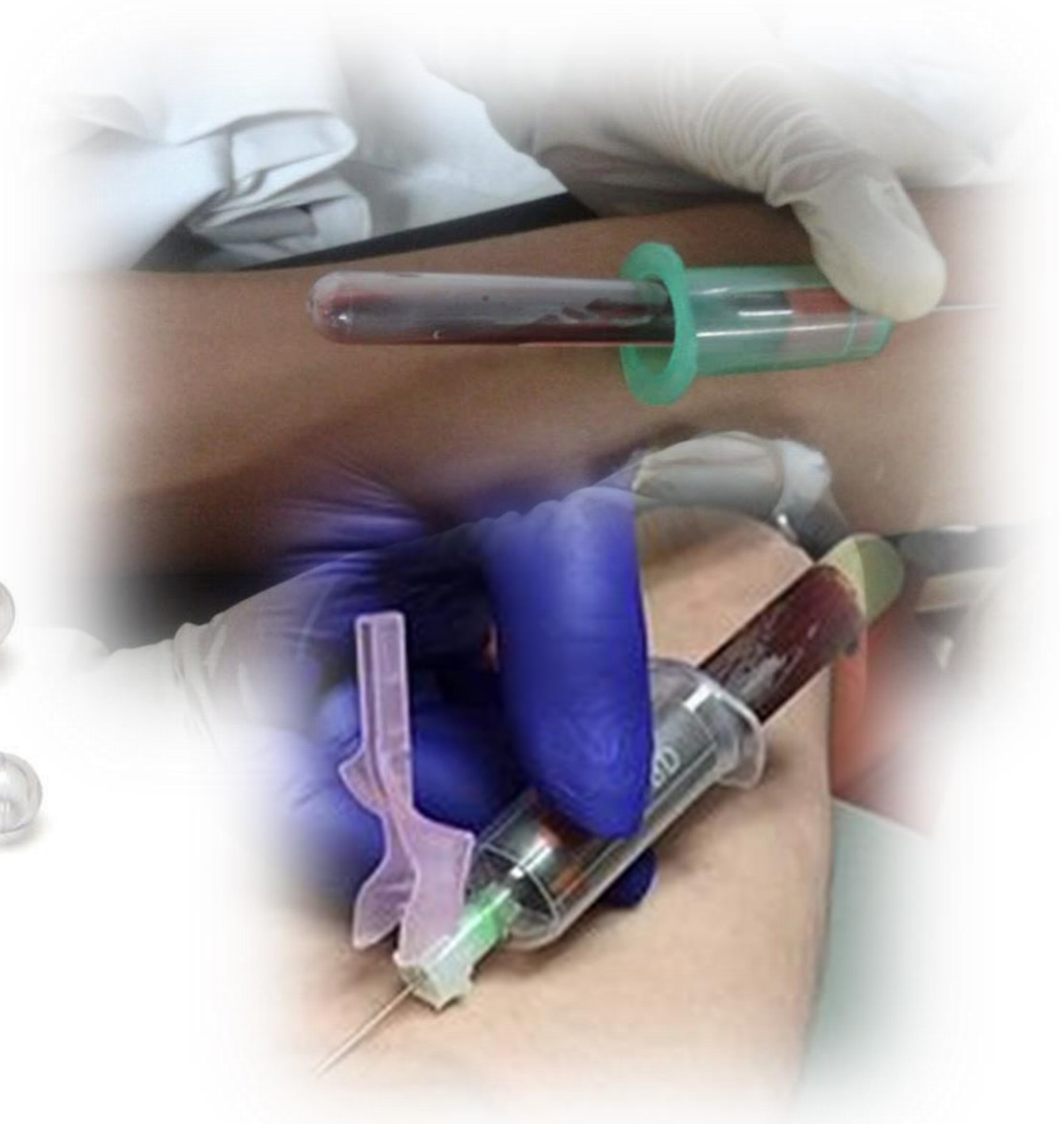
Vacutainer and Luer Lock



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Obtaining a Blood Sample

- Obtaining a blood sample with a 20 ml syringe

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Luer Sampling Needle

Discontinue

- Remove any IV that will not flow or has fulfilled its need

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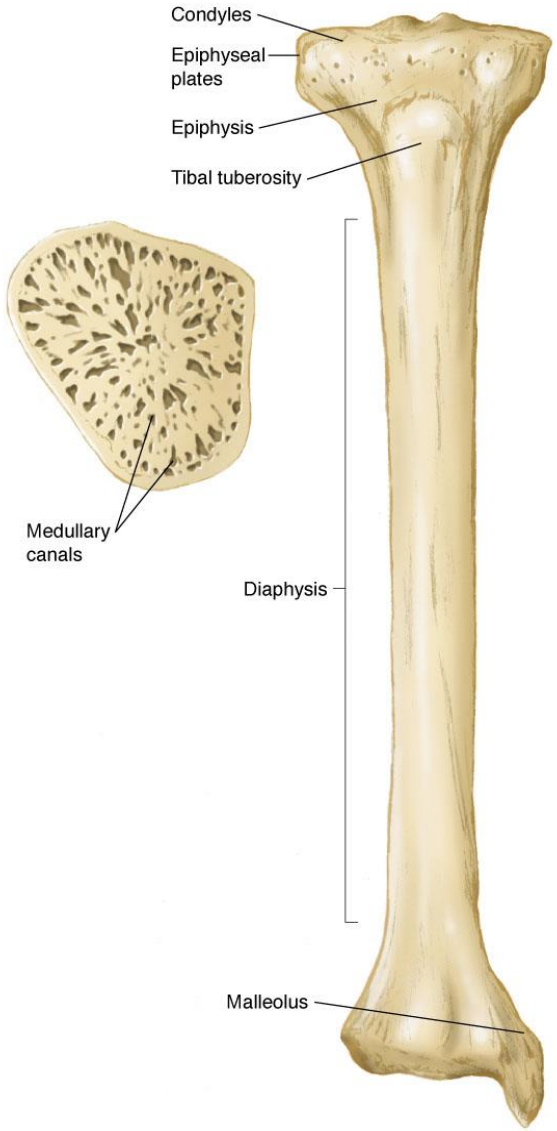
IV, IO, Blood Sample

INTEROSSEOUS INFUSION

Intraosseous Infusion

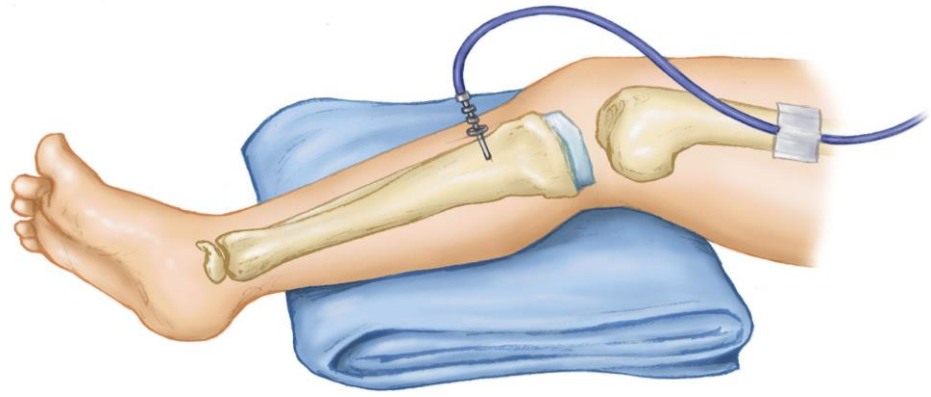
- A rigid needle is inserted into the cavity of a long bone.
- Used for critical situations when a peripheral IV is unable to be obtained.
- Initiate after 90 seconds or three unsuccessful IV attempts.

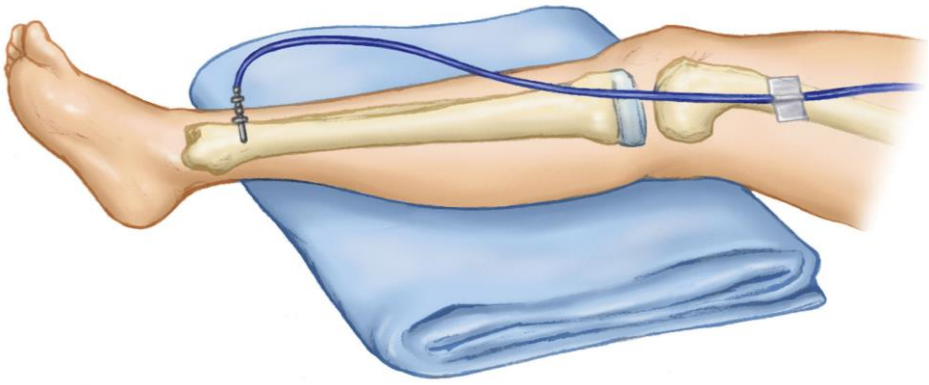
Tibia


Condyles
Epiphyseal plates
Epiphysis
Tibal tuberosity
Medullary canals
Diaphysis
Malleolus

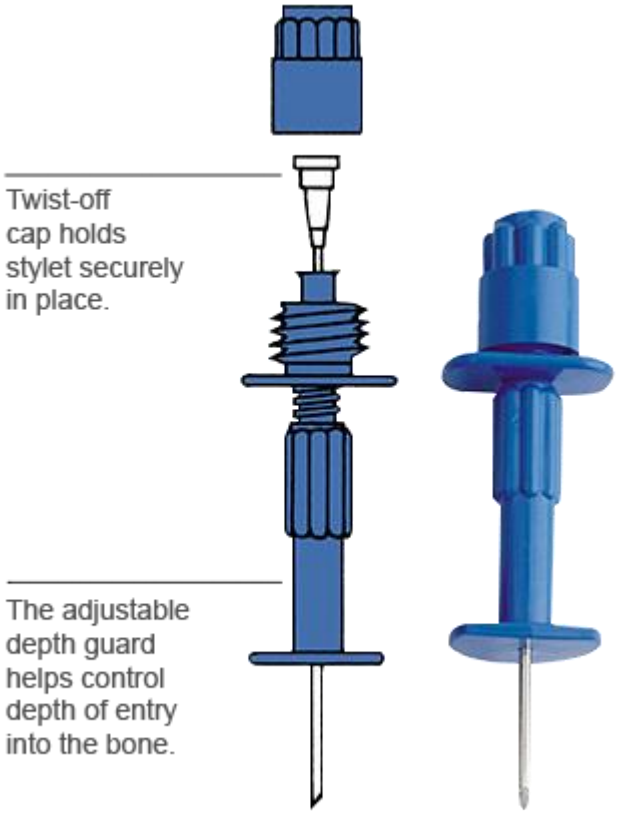
IO Needle Placement

- Pediatric and adult intraosseous needle placement sites.
  - Proximal humerus
  - Proximal tibia (most common)
  - Distal tibia
  - Sternum





Intraosseous Needles



Illinois IO Needle

EZ-IO System

Interosseous

- Prepare the equipment
- Select the appropriate site
- Clean the site
- Make the puncture

Interosseous

- Aspirate to confirm proper placement.

Interosseous

- Connect the IV fluid tubing

Interosseous

- Secure the needle appropriately
- Adjust flow rate accordingly

Complications

- Fracture
- Infiltration
- Growth plate damage
- Complete insertion
- Pulmonary embolism
- Infection
- Thrombophlebitis
- Air embolism
- Circulatory overload
- Allergic reaction

Contraindications

- Fracture to tibia or femur on side of access
- Osteogenesis imperfecta
  - Congenital bone disease resulting in fragile bones
- Osteoporosis
- Establishment of a peripheral IV line

IV, IO, Blood Sample

INTRAOSSEOUS MEDICATION ADMINISTRATION

Interosseous Medication Administration

- Administer the medication
- Monitor the patient for effects

Summary

- Types of intravenous access
- Equipment for intravenous access
- IV drug administration
- Venous blood sampling
- Intraosseous infusion