Intravenous Therapy

Department of EMS Professions
Temple College
IV Therapy Overview

- Definitions & Indications
- Fluid Resuscitation
- Equipment and Supplies
- Choosing Fluids and Catheters
- Procedure and Technique Tips
  - Peripheral Venipuncture
  - Intraosseous Access
- Potential Complications
Definitions

- IV / Venipuncture
- Peripheral / Central
- Intraosseous Access
- Fluid Resuscitation
- Medication Access
- Crystalloids
- Colloids
- Hypertonic
- Isotonic
- Drip Rates
- KVO / TKO
Indications for Venipuncture

- **Volume**
  - Dehydration
  - Water
  - Electrolytes
  - Blood Loss
  - Colloids
  - Crystalloids

- **Venous Access to Circulation**
  - Blood collection
    - Labs
    - Field Chemistry
  - Medication Administration
Fluid Resuscitation

- **Dehydration and Volume Loss**
  - Replace Lost Fluid or Blood
  - Often requires 2-3 times the amount lost (2:1 rule)

- **Shock Management**
  - Controversial
  - Definitive therapy = Surgery and blood replacement
  - EMS → judicious replacement
  - Improve end organ perfusion (BP at 90 - 100 mm Hg)
Equipment and Supplies

- **Fluids**
  - Normal Saline (0.9% NaCl)
  - Lactated Ringers (LR or RL)
  - 5% Dextrose in Water (D₅W)
  - Other (D₅ 1/2 NS)

- **Supplies**
  - IV Catheters
    - Over the needle catheter
    - Thru the needle catheter
    - Hollow needle / Butterfly needles
    - Intraosseous needle
Equipment and Supplies

- Supplies (cont’d)
  - Infusion Sets
    - 10 or 15 gtt/cc (large/macro drip)
    - 60 gtt/cc (small/micro drip)
    - “Select-3”
  - Alcohol and Betadine
  - Restricting Band
  - “Tegaderm” / “Venigard”
  - Tape
  - Armboard (optional)
  - Labels
  - Saline Lock (optional)
Choosing Fluids & Catheters

- **Crystalloid Fluids**
  - Volume replacement and ↑ CO/BP
  - Isotonic
  - No proteins
  - Moves into tissue over short time

- **Colloid Fluids**
  - Large proteins
  - Remain in vascular space
  - Blood replacement products
  - Plasma Substitutes (Hypertonic)
    - Dextran
    - Hetastarch
Choosing Fluids & Catheters

■ Catheters
  – Over the needle preferred (or IO in peds)
  – Size depends on patient’s needs and vein size
  – Large gauge and short length for volume replacement

■ Vein Selection
  – For *most* patients, choose most distal
  – Hand, forearm, antecubital space, and external jugular
  – Normal Anatomy provides clues to locations
  – Avoid injury, fistula, mastectomy side
Flow = \frac{\text{diameter}^4}{\text{length}}

- Larger catheters = higher flow
- Short catheters = somewhat higher flow

Other factors affecting flow
- Tubing length
- Size of Vein
- Temperature and viscosity of fluid
  - Warm fluids flow better than cold
Tips on Increasing Flow

- Use a large vein
  - Large AC preferred for cardiac arrest, trauma, adenosine & D50 administration
- Use a short, large bore catheter
  - 1 1/4 ” 14 g
- Use short tubing with large drip set
  - Macrodrip (10 gtts/ml) and NO extension set
- Use warm fluid with pressure infuser
Venipuncture Procedure: Tips

- Talk to your patient
- Prepare & Assemble equipment ahead of time or direct this task
- Inspect fluid date, appearance, and sterility
- Flush air from tubing
- Select the most distal site if at all possible
  - antecubital
  - saphenous
  - external jugular
Venipuncture Procedure: Tips

- Stabilize extremity
- Stabilize adjacent skin
- Remove restricting band
  - before removing needle
  - after drawing blood
- Remove needle & place in sharps
- Check for adequate flow
- RECHECK drip rate
Intraosseous (IO) Infusion & Vascular Access

- Common IV sites for Pediatric patients
  - Peripheral extremities (hand, wrist, dorsal foot, antecubital)
  - Peripheral other (external jugular, scalp, intraosseous
  - Neonate (umbilical vein)

- Any drug or fluid that can be given IV may be given by the IO route

- Little interference during Resuscitation
Intraosseous (IO) Infusion

Initial IV access sites
Intraosseous (IO) Infusion

Potential IV sites
Intraosseous (IO) Infusion

■ Indications
  – Required drug or fluid resuscitation due to an immediate life-threat (e.g. CPR, Shock)
  – At least 2 unsuccessful peripheral IV attempts

■ Contraindications
  – Placement in or distal to a fractured bone/pelvis
  – Placement at a burn site (relative)
  – Placement in a leg with a missed IO attempt
  – ↑ difficulty in patients > 6 years of age
Intraosseous (IO) Infusion

■ Placement Location
  - Anteromedial surface of the tibia
  - Approximately 1-3 fingers (1-3 cm) below the tibial tuberosity
  - Generally safe location with large marrow cavity
  - Avoid closer locations to knee due to growth plate
Intraosseous (IO) Infusion

- Tibial tuberosity
- Anterior border
- 90° to medial surface
Intraosseous (IO) Infusion

**Procedure**
- Same as peripheral IV
- Place leg on firm surface. Locate landmarks
- Grasp the thigh and knee. Do not place hand behind insertion site.
- Palpate landmarks and identify site of insertion.
- Clean site if time permits

**Procedure (contd)**
- Insert needle at 90° angle. Apply pressure with firm twisting motion.
- Stop advancing once needle resistance is decreased
- Remove stylet.
- Inject saline. Check for resistance or soft tissue swelling.
- Connect infusion set
- Stabilize
Intraosseous (IO) Infusion

Considerations

- Gravity flow of IV fluids will typically be ineffective. Use pressure bags if continuous infusion is required
- Fluid is best administered as a syringe bolus using an extension set or T-connector
- PROTECT YOUR IO SITE!
Potential Complications

- Sepsis (infection)
- Hematoma
- Cellulitis
- Thrombosis
- Phlebitis
- Catheter fragment embolism
- Infiltration
- Air embolism
Demonstration & Practice

- Questions?