INTRAOSSEOUS INFUSION

INDICATIONS:

Intraosseous (IO) access may be performed by paramedics as a standing order when intravenous fluids or medication are required for an emergency condition and a peripheral IV cannot be established AND the patient exhibits one or more of the following:

- Cardiopulmonary Arrest (adult or child)
- Respiratory Arrest (adult or child)
- Traumatic Arrest (adult or child)
- Medical or trauma patient with unstable vital signs as defined in Treatment Guideline I-40
- Unconscious diabetic with hypoglycemia, unresponsive to IM glucagon.

CONTRAINDICATIONS:

- Fracture of the extremity selected for IO infusion
- Excessive tissue at insertion site that prevents identification of anatomical landmarks
- Previous orthopedic procedures within past 6 weeks on selected extremity
- Infection at the site selected for insertion

PROCEDURE:

1. Determine patient's weight. (Use the Broselow tape to estimate pediatric weights.)
2. Assemble correct equipment, clear IV extension tubing with fluids, and select correct IO needle for age.
3. Locate appropriate insertion site at either proximal tibia:
   - Locate the tibial tuberosity. Insertion site is at the level of the bone that is 2 finger-tip widths below the tibial tuberosity and then immediately inside the anterior midline of the tibia on the flat table-like anteromedial surface of the tibia (the top surface and knee joint must be avoided).
   - For younger children who do not have a palpable tibial tuberosity (~ 3-12 kg) – two finger-tip widths below the lower edge of the patella and then immediately inside the anterior midline of the tibia on the flat table-like anteromedial surface of the tibia (the top surface and knee joint must be avoided).
   - Do not perform more than one attempt in each tibia.
4. Put on sterile gloves and prepare insertion site with alcohol prep or Chloraprep.
5. Prepare IO device with appropriate size needle.
6. Stabilize site and insert appropriate IO needle.
7. Determine penetration of needle into marrow space by feeling loss of resistance as needle penetrates bone table or needle guard reaches skin.
8. Remove driver (if used) from needle while stabilizing catheter hub.
9. Remove stylet from catheter; place stylet in shuttle or approved sharps container.
10. Connect extension tubing to needle hub.
11. Confirm placement:
    - Catheter is firmly seated and does not move.
    - Observe blood on the stylet tip prior to placing stylet in the shuttle or bio hazard container.
    - Observe blood at the catheter hub or able to aspirate blood from the catheter.
12. *If patient is conscious*, to decrease pain related to the IO procedure and infusion, slowly, over one minute, administer Lidocaine 2% (Preservative Free) through IO needle:
    - Adults: 20 mg lidocaine 2%. May repeat 20 mg once (maximum total 40 mg) for pain control.
    - Child: 0.5 mg/kg lidocaine 2% (maximum dose 20 mg). Do not repeat dose.
13. Syringe flush IO catheter with normal saline prior to infusion of fluid or medications:
    - Adults: flush IO needle with 10 mL of normal saline
    - Pediatrics: flush IO needle with 5 mL of normal saline

- Comments:
  - Repeat rapid syringe flush as needed
  - Failure to "syringe flush" may result in limited or no flow through IO
  - To improve continuous infusion after syringe flush, it may be necessary to pressurize the IV infusion bag by inflating a BP cuff around bag

14. Begin infusion.
    - A pressurized IV bag may be needed to ensure continuous infusion or when treating hypovolemia. A BP cuff wrapped around the IV bag may also be utilized.
15. Secure tubing and protect catheter from accidental bumping or dislodgement.
16. Frequently monitor the IO, the infusion flow and the extremity.

DOCUMENTATION:

- Document on PCR all IO attempts and IO insertion site and time placed.
- Notify receiving hospital staff of IO use (even when not successful) and time placed.

REMOVAL OF IO NEEDLE:

If a patient who has received an IO and has signed AMA, the patient should be informed that the IO needle had been placed and requires removal. After the needle has been removed, the site should be dressed and the patient warned of a risk of infection and advised to see their physician within 24-72 hours.

To Remove an IO needle:
1. Attach a sterile syringe to the IO needle hub.
2. Support the patient's extremity while rotating the needle/syringe clockwise and gently pulling.
3. Dispose of the IO needle in a sharps container.

NOTES:

1. Adenosine should not be administered by the IO route because the medication may be metabolized prior to reaching target receptors at the heart.

2. Potential IO procedure complications include:
   - Local infiltration of fluids/drugs into the subcutaneous tissue due to improper needle placement
   - Infusion does not flow due to clotting of the catheter
   - Osteomyelitis or sepsis
   - Fluid overload
   - Fat or bone emboli
   - Fracture

3. IO at selected extremity within 24 hours or prosthesis—use other extremity.

4. Do not place an IO when patient has suspected acute stroke or acute myocardial infarction (MI) and stable vital signs as defined in Treatment Guideline I-40 (these patients may receive anti-clotting drugs that can cause excessive bleeding at the IO site).