



INTRAOSSIOUS INFUSION

Effective: September 14, 2021
Replaces: February 12, 2015
Review: September 14, 2023

I. Purpose

The purpose of this policy is to describe the process of establishing an intraosseous line and the equipment required to deliver treatment.

II. Definitions

Intraosseous (IO) infusion provides an effective alternative means of providing fluids and medications to severely ill patients.

III. Indications

- A. An intraosseous line may be established for any ALS patient for whom immediate fluid or medication treatment is indicated and an intravenous line is unsuccessful **after two attempts**.
- B. In addition, patients must have at least one of the following:
 - 1. An altered mental status
 - 2. Respiratory compromise
 - 3. Hemodynamic instability
- C. For children and adolescents take care to avoid growth plate areas when inserting the IO needle. In the pediatric and adolescent patient, the growth plates are present at both ends of the long bones.
- D. For patients in cardiac arrest, it is preferable to immediately establish an IO instead of trying peripheral vascular access.

IV. Contraindications

- A. IO infusion is **not** indicated in patients who are alert and orientated, and is **not** allowed in patients who do not require *immediate* fluid or medication therapy, or in whom an intravenous line can be established in a timely fashion. **IO insertion is never to be performed for prophylaxis.**

B. Other contraindications include:



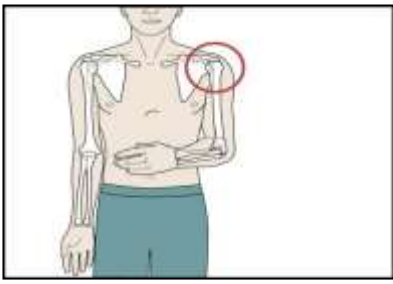
1. Fracture of bone selected for IO infusion
2. Previous orthopedic procedures in bone selected for IO infusion
3. Preexisting medical condition (tumor at the insertion site, significant peripheral vascular disease, etc.)
4. Severe burn or infection at site of insertion
5. Previous IO attempt at chosen site
6. Successful insertion of IV line after 1 or 2 attempts
7. Inability to identify landmarks required to perform procedure
8. **Humeral IO site is contraindicated in pediatric patients (14 years and less)**

V. Equipment

- A. Alcohol and Betadine pads/swabs
- B. Intraosseous needle
- C. Pressure bag
- D. IV Infusion set, flushed and ready to go
- E. Two (2) 10cc syringes:
 1. 10cc empty syringe for aspiration
 2. 10 cc syringe filled with normal saline for immediate flush
- F. EZ-Connect IV tubing

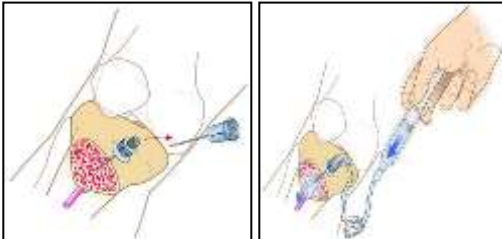
VI. Procedure

A. Select the appropriate IO insertion site (tibial site or humeral site)

Tibial Site	Humeral Site
 <p><small>Drawing courtesy of Vidacare Corp., San Antonio, Texas.</small></p> <p>Locate the insertion site:</p> <ul style="list-style-type: none">• The insertion site is approximately 2-3 cm below the patella and approximately 2 cm (depending on the patient's anatomy) medial to the tibial tuberosity.• Clean the site with Betadine• Use an FDA approved device for insertion and follow the manufacturer's instructions for use.• Stabilize the leg and position the IO insertion device on the insertion site - maintaining a 90 degree angle during the insertion process.	 <p><small>Drawing courtesy of Vidacare Corp., San Antonio, Texas.</small></p> <p>Locate the insertion site:</p> <ul style="list-style-type: none">• Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body). 

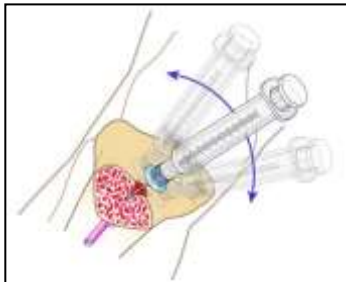


- **IMPORTANT - Stabilize the needle set prior to any attempt at removing the driver.**
- Remove the stylet and connect the EZ-Connect IV tubing to the needle hub.
- Aspirate the IO with one 10cc syringe.
- The presence of fluid during aspiration is a confirmation of proper placement.
- Once proper placement is confirmed, flush the IO line with 10cc of normal saline.
- Check for infiltration around the IO site.



- **IMPORTANT – IO infusion is very painful for conscious patients. If conscious, administer Lidocaine 40 mg SIVP over 30-45 seconds to the patient via the IO for local anesthesia prior to fluid administration.**

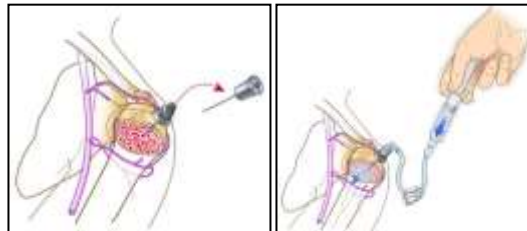
- Avoid rocking of the catheter during usage.



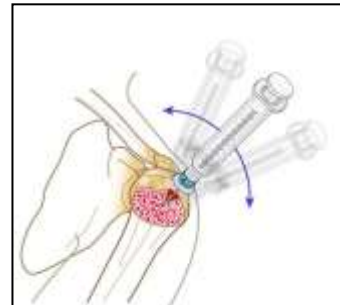
- The insertion site is located directly on the most prominent aspect of the greater tubercle. Slide your thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on the patient's anatomy) above the surgical neck is the insertion site.
- Clean skin with Betadine
- Use an FDA approved device for insertion and follow the manufacturer's instructions for use.
- Stabilize the arm and position the IO insertion device on the insertion site - maintaining a 45 degree angle to the anterior plane during the insertion process.



- **IMPORTANT - Stabilize the needle set prior to any attempt at removing the driver.**
- Remove the stylet and connect the EZ-Connect IV tubing to the needle hub.
- Aspirate from the IV tubing with one 10cc syringe.
- Flush the IV tubing with 10cc of normal saline.
- Check for infiltration around the IO site.



- **IMPORTANT – IO infusion is very painful for conscious patients. If conscious, administer Lidocaine 40 mg SIVP over 30-45 seconds to the patient via the IO for local anesthesia prior to fluid administration.**
- Avoid rocking of the catheter during usage.



VII. Complications

- A. Embolism
- B. Subcutaneous infiltration
- C. Fracture
- D. Osteomyelitis (bone infection)

VIII. Documentation

- A. IV attempts
- B. IO attempts
- C. Volume infused upon transfer of patient care to the hospital

IX. Special Circumstances

- A. The EMS Medical Director authorized prehospital providers to use the drill-inserted IO device in patients who weigh less than 3kg. This authorization is based on recommendations from the manufacturer. There is no need to make base Hospital contact for this use. There have been case reports of successful use of drill-inserted IO needles in patients who weigh less than 1.5kg.
- B. Prehospital personnel may utilize any size needle without the driver. The instructions from the manufacturer clearly state that in the event of driver failure, the paramedic will disconnect the driver and complete the insertion manually. If the child is premature or small in size, it is appropriate to utilize the 15mm needle manually if needed.
 - 1. Use a gentle twisting motion with firm pressure to accomplish the insertion. The sudden release or “pop” will be an indication of successful entry.
- C. If the provider can't place an intraosseous needle, then it is appropriate to attempt peripheral intravenous access.