



## **INTRAOSSUEOUS INFUSION**

### **INDICATIONS:**

Intraosseous (IO) access is indicated for the following conditions when fluid therapy (e.g., normal saline) or emergency life-saving medication administration is required AND adequate intravenous (IV) access is too difficult to establish rapidly:

- Cardiopulmonary arrest (adult or child)
- Respiratory arrest (adult or child)
- Trauma related arrest (adult or child)
- Life-threatening unstable hypotension
  - Age 0-9 years: Systolic BP < 70 + (2 x age in years) mm Hg
  - Age 10 - 64 years: SBP < 90 mm Hg
  - Age > 65 years: SBP < 110 mm Hg
- Unconscious diabetic with blood glucose less than 60, unresponsive to IM glucagon

### **CONTRAINDICATIONS:**

- Fracture of the extremity selected for IO infusion
- Vascular disruption of the extremity selected for IO infusion
- Excessive soft tissue at the insertion site, such that anatomic landmarks cannot be identified
- Previous orthopedic procedures within the past six (6) weeks on extremity selected for IO Insertion, including prior IO insertion/attempt at that site
- Obvious skin or other infection or burn at the site selected for IO insertion
- Joint replacement or orthopedic hardware adjacent to the site of IO insertion

### **INSERTION SITES:**

- Proximal Tibia—Approved site for all patients of all ages unless unsuccessful or contraindicated.
- Proximal Humerus—Adults age 18 years old and over
- Distal Femur—Pediatric patients up to 6 years old and 3 to 39 kg

Approved:

Review Date: 9/2018; 04/2026  
Initial Release Date: 10/01/2026  
Final Date for Implementation: 04/01/2027  
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**PROCEDURAL HIGHLIGHTS:**

- Site selection:
  - *Tibia:* 1 finger width medial to tibial tuberosity on anterior flat surface, or 2 finger widths below patella if tuberosity not visible.
  - *Humeral Head:* Greater tubercle palpated with arm internally rotated.
  - *Femur:* 1 finger width above and medial to patella superior border (or 3 finger widths above and medial for older children).
  
- Insertion:
  - *Tibia:* 90° perpendicular to bone.
  - *Humerus:* 45° angle (supine toward opposite hip; upright toward same-side scapula).
  - *Femur:* 90° perpendicular.
  
- Aspiration: Check for black marrow line; if absent, switch to longer needle.
  
- Pain management: If utilizing IO for conditions other than cardiopulmonary arrest, lidocaine should be instilled to decrease pain associated with medication/fluid administration, prior to administration of any other medications/fluids. Infuse lidocaine 2% at the dosage listed below. Slow infusion is necessary to ensure the lidocaine remains in the medullary space of the bone. Allow lidocaine to dwell in space for 60 seconds prior to flushing with normal saline. If patient experiences pain on medication or NS flush after initial dose of lidocaine, repeat with half of the initial dose.
  - Adults: Lidocaine 2% 40 mg slow IO push
  - Pediatric: Lidocaine 2% (20 mg / ml) 0.5mg / kg slow IO push (max dose 40mg)
  
- Maintenance: Infused fluid should be pressurized with a pressure bag. Attach primed extension tubing, flush with saline or lidocaine, and secure device per manufacturer's instructions.
  
- Transport: IO insertion should not delay transport; no more than two attempts in the field unless ordered by Base Hospital Physician.

**DOCUMENTATION:**

- Document all IO attempts, reason for site selection, and IO insertion site and time placed.
- Notify receiving hospital staff of IO use and site (even when not successful).

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### NOTES:

- Adenosine is not as effective when administered through an IO site, the IV route is preferred.
- The IV route is preferred for the administration of Amiodarone.
- Potential IO complications include:
  - Local infiltration of infusion fluid or medications
  - Infusion fails to flow due to IO occlusion from clot or tissue
  - Infection at site or sepsis
  - Fat or bone emboli
  - Stress fracture from insertion of IO
  - Dislodgement

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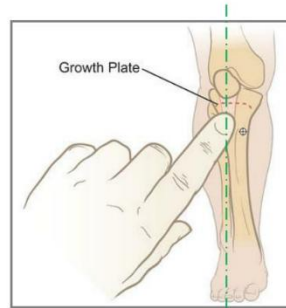
**APPENDIX A – Figures**

**Proximal Tibia**



Adult (Source: medical guidelines.msf.org)

**Proximal tibia**

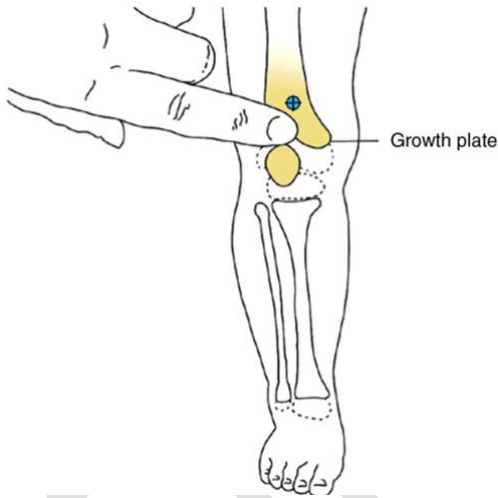


- 2 fingerbreadths below base of patella and 1 fingerbreadth medial

T-509

Infant (Source: EZ-IO)

**Distal Femur**



(Source: starship.org.nz)

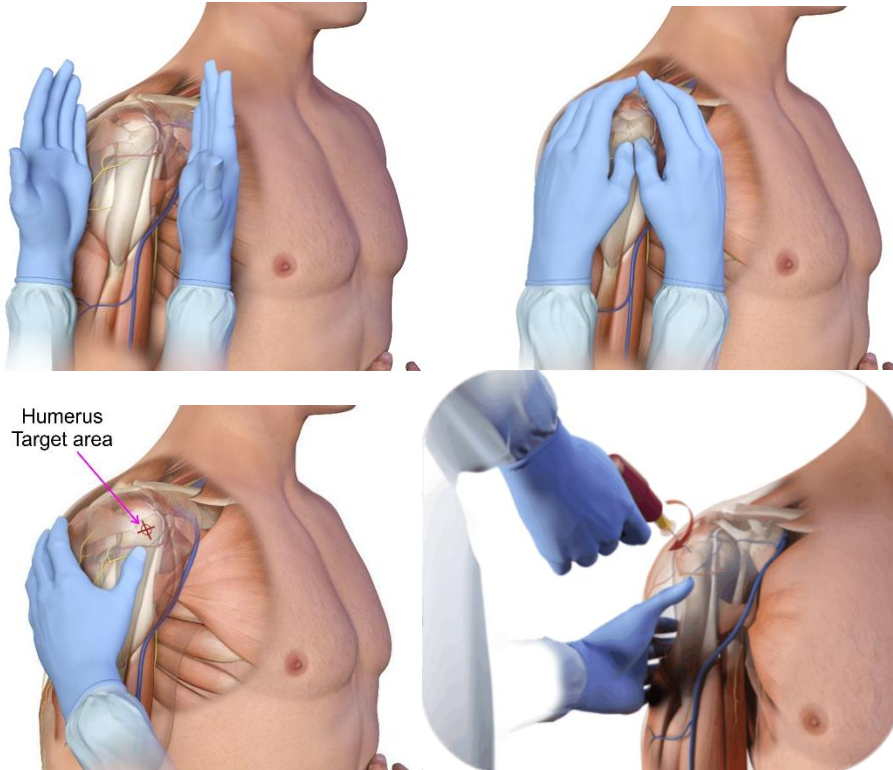
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**INTRAOSSIOUS INFUSION**

Proximal Humerus



Source: EZ IO

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