

## EZ-IO Guidelines for use, insertion and removal

### Indications

System used to gain intraosseous access in adult and paediatric patients in a clinical emergency or when vascular access is difficult but needed urgently.

IO access can be used to deliver ALL drugs including anaesthetic drugs, fluids and blood products until vascular access can be established.

- Complication rate <1% (quoted by Vidacare)
- Success rate >97%

The proximal and distal ends of long bones are usually used due to the thinner cortex and abundance of cancellous bone. Studies have shown proximal humerus infusions reach the heart in three seconds. Vidacare quote 5 liters of fluid per hour for humeral IO and 1l/hr for tibial IO under pressure. Insertion and infusion pain is lower in the humerus and there have been no reports of compartment syndrome at this site.

### Contraindications

- Fracture of targeted bone
- IO insertion/ attempt in previous 48 hours
- Orthopaedic prosthesis or procedure near insertion site
- Infection at insertion site
- Inability to identify anatomy

### Limitations

- Should not be used to infuse chemotherapeutic agents or TPN

### Site Identification

Other sites can be used but this guide will just deal with proximal humerus and proximal tibia.

### Proximal Humerus



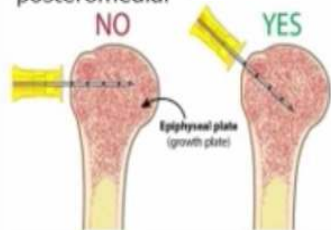
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Critical Care Guidelines  
FOR ICU USE ONLY

1. Rotate humerus internally by placing the hand over the umbilicus
2. Locate the surgical neck of the humerus by palpating up the humerus until the notch at the surgical neck is palpated, alternatively palpate for the bicipital groove at insertion of biceps tendon and feel 1-2 cm laterally
3. Insertion site is approximately 1cm above the surgical neck, the most prominent aspect of the greater tubercle
4. The insertion angle is 45-degrees to the anterior plane and postero-medial

### Insertion Angle

**Humerus:** Insert needle set at a 45° angle to the anterior plane and posteromedial



### Proximal Tibia

#### Proximal Tibia Site Identification



For proximal and distal tibia insertion the angle is 90-degrees to bone.

#### **Adult**

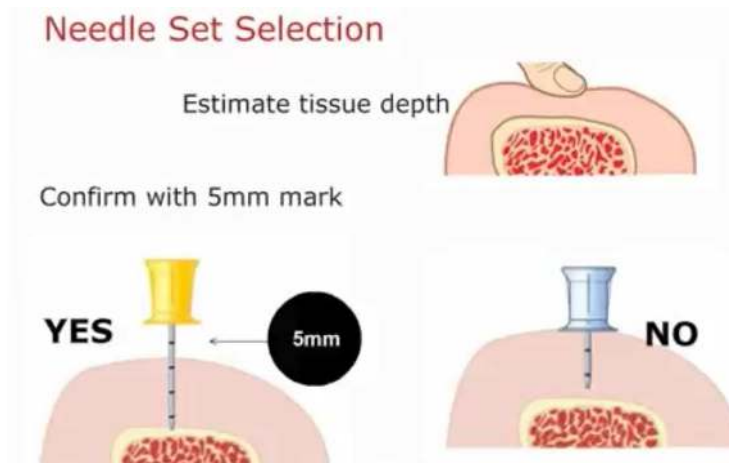
1. Extend the leg
2. Insertion site is 2cm medial to tibial tuberosity or 3cm below patella and 2cm medial along the flat aspect of the tibia

#### **Paediatric**

1. Extend the leg
2. Insertion site is approximately 1cm medial to tibial tuberosity or 1cm below patella and slightly medial

### Needle Set selection

Needle selection should be based on patient weight, anatomy and tissue depth overlying the insertion site.



As a guide:

- 1) The 25mm needle set is adequate for insertion into the proximal tibia in an averaged sized adult.
- 2) The 45mm needle set is recommended for insertion into the proximal humerus in adults

### Insertion

1. Prepare site
2. Open EZ-Connect extension set, prime with saline if unresponsive to pain and consider priming with 2% lidocaine (approximately 1mL) and prepare a saline flush
3. Attach needle set to magnetized driver
4. Push the needle through the skin until it rests against the bone
5. The 5mm mark must be visible to ensure adequate needle length
6. Apply the minimal amount of pressure to keep the needle advancing steadily into bone, 1-2 cm for an adult and until the loss of resistance in children
7. Hold the hub in place, remove the driver
8. Remove stylet, the catheter should feel firmly seated
9. Consider aspirating for blood, label as IO blood and discard first 2mls (inability to aspirate does not mean the insertion was unsuccessful)

Critical Care Guidelines  
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10. Attach primed EZ-Connect extension set
11. Place EZ-IO wrist band – leave in site for 48 hours post removal
12. Perform a rapid saline flush to clear the marrow and fibrin and enable infusion, 10mL in adults 2-5mL in paediatrics, this can be repeated if flow is poor
13. Fluids must be infused using a pump or pressure bag
14. Virtually any medication that can be given via a peripheral IV can be given IO with the same dose, rate and concentration, follow with a flush. Use caution with hypertonic saline of >30 minutes duration.

### **Pain Management**

Pain with infusion can be severe. Consider priming the extension set with 2% lidocaine, infuse 40mg as a slow infusion and allow it to dwell in the IO space for 120 seconds, flush with saline then repeat with a half dose of 20mg lidocaine. In children the initial dose is 0.5 mg/kg not to exceed 40mg as above followed by a half dose. Consider systemic analgesia

### **Monitoring**

Post insertion care is similar to other routes; ensure site is intact and both catheter and connections are secure. Prior to use confirm placement, repeat rapid saline flush as required. Extravasation is the most common complication, which can lead to compartment syndrome and necrosis. The insertion site and local compartments should be monitored for signs of extravasation, localized inflammation, limb perfusion or dislodgment particularly in the first 30 minutes and after manipulation. The catheter should be removed at 24 hours.

### **Removal**

The device should be removed after establishing IV access but it is licensed for use for up to 72hours.

1. Remove the extension set and attach a luer-lock syringe
2. Rotate syringe and catheter clockwise while pulling out straight to withdraw the catheter
3. Do not rock or bend during removal
4. Dress wound and remind patient to alert staff to any pain or symptoms of infection

### **Online resources**

<http://www.brainshark.com/vidacare/vu?pi=zlyz18nGxez2jVuz0&intk=502577441>

<http://www.vidacare.com/EZ-IO/Index.aspx>