

**What is the meaning of  
“No Flush, No Flow?”**

- If you do not flush, it will not flow
- A vigorous flush of 10 mls normal saline must be initiated before the intraosseous line will flow
- The intraosseous space is occupied with bone marrow, which is held in place by a thick fibrin network
- In order to obtain maximum flow rates the clinician must displace this thick fibrin mesh
- The initial flush will be met with inherent resistance as the fibrin mesh is being displaced
- After the first flush of normal saline is given, IO flow rates are easy and rapid.
- Occasionally, patients require more than one flush
- Blood draws and lidocaine administration (if needed) should occur before the flush

**What can be  
given through the  
intraosseous route?**

- Any medication that can safely be given peripherally can be given via the intraosseous route. IV and IO doses are the same

**Do fluids have to be  
infused with pressure?**

- Yes. The pressure in the medullary space is approximately 1/3 of the patient's mean arterial pressure. This is important to remember because the pressure outside the bone in the IV bag must be higher than the pressure inside the bone to achieve flow
- Fluids or meds must be delivered under pressure (pressure bag) to obtain maximum flow rates. Rapid infusers (Hot Line, Level I) can be used for aggressive fluid resuscitation

**How long can the  
IO stay in place?**

- 24 hours or less

**How is the IO removed?**

- Remove all tubing
- Attach 10 ml syringe
- Rotate syringe and hub clockwise several revolutions
- While continuously rotating syringe and hub clockwise, start pulling straight back
- Do this until catheter is completely removed from bone and skin
- Discard sharp/syringe in an appropriate approved sharps container
- There should be little to no bleeding at the site. If there is bleeding present, apply direct pressure for a period of time sufficient to control bleeding. Apply adhesive bandage

**Additional questions? Resources needed?**  
[www.vidacare.com](http://www.vidacare.com)  
**1.800.680.4911**

# Intraosseous (IO) Insertion Using EZ-IO System

## Commonly Asked Questions and Answers

**What is intraosseous access?**

- A method for accessing noncollapsible venous plexuses through the bone marrow cavity to systemic circulation

**Who needs an IO? Acute patients who...**

- Present with complicated vascular access
- Require multiple IV sticks to obtain vascular access for medication or fluid infusion
- Have limited or no vascular access
- Require rapid intubation or sedation
- Previously required central venous access for infusion due to difficult vascular access
- Are in cardiac or respiratory arrest
- Are in shock

**What are the contraindications for EZ-IO access?**

- Fracture (targeted bone)
- Previous orthopedic procedures near insertion site (prosthetic limb/joint)
- IO within past 24 hours (targeted bone)
- Infection at insertion site
- Inability to locate landmarks or excessive tissue



**AIR LINK**  
REGIONAL WEST

**How do you locate the proximal tibia landmark?**

- Remember “Big toe – IO.” The tibia is on the big toe side.
- Locate tibial tuberosity and slide just medial
- Insertion site is approximately 2 cm below the patella and approximately 2 cm (depending on patient anatomy) medial to the tibial tuberosity

**How do you locate the proximal humerus landmark?**

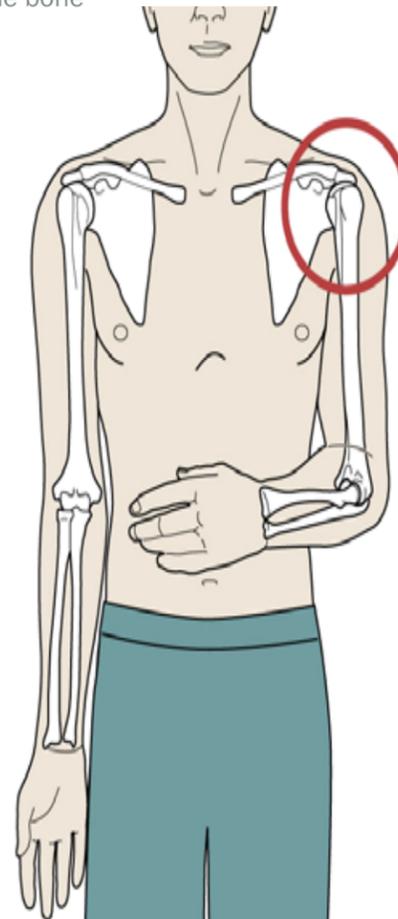
- Patient positioning is important! Ensure that the patient’s hand is resting on the abdomen and that the elbow is adducted (close to the body)
- Insertion site is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle; this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site
- Aim for “big bump” (greater tubercle). Two finger widths inferior to coracoid process and acromion, then slightly anterior

**How do you locate the distal tibia landmark?**

- Big Toe – IO.”
- Insertion site is located approximately 3 cm proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone

**How do you select the correct needle?**

- The EZ-IO system has three needle sets to choose from
- The pink needle is 15 mm in length (3-39 kg)
- The blue needle is 25 mm in length ( $\geq 40$  kg)
- The yellow needle is 45 mm in length (excessive tissue)
- All three needle sets are 15 gauge
- Frequently the pink needle is not long enough to reach the IO space even though the patient is between 3-39 kg. May need blue needle.
- The 45 mm needle should be considered for all proximal humerus insertions – patients  $> 40$  kg
- Special situations requiring longer needle: excessive soft tissue, excessive muscle tissue, edema



**What is the 5 mm mark?**

- It is the black mark closest to the EZ-IO hub
- Once the landmark has been identified and cleaned, insert (DO NOT depress trigger button) needle set at a 90° angle to the bone – insert through the skin until you touch bone
- At this point if there is any doubt that the needle set is not long enough – verify that you can see the 5 mm mark
- If the 5 mm mark is visible, continue with insertion
- If the 5 mm mark is not visible, abandon procedure (catheter will not reach the IO space) as a result of excessive tissue

**Why is lidocaine administered for the conscious patient?**

- Once the catheter is in position one should be aware that infusion pain will occur in the conscious patient. For this reason, it is recommended that awake patients receive 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) via the EZ-IO catheter prior to any fluid flush, bolus, or infusion

**How is lidocaine administered for the conscious patient?**

- If prescribed by a provider, the 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) must be infused slowly (over one minute) to prevent it from being sent directly into the central circulation. Medications intended to remain in the medullary space, such as a local anesthetic, must be administered very slowly until the desired anesthetic effect is achieved. Wait one minute after lidocaine administration to administer vigorous NS flush.
- Prime extension set with lidocaine in these situations
- The dosing of lidocaine must follow local protocols. Health care providers have reported achieving effective pain management with as little as 20 mg and some patients that need as much as 100 mg
- Titrate lidocaine to effect and repeat as needed to a max dose of 3 mg/kg in 24 hours
- NEVER administer more than 20 mg (1 ml) per dose, as greater than 1 ml at a time leaves the medullary cavity and enters the central circulation
- Lidocaine dosing for pediatric patients is 0.5 mg/kg

