

# PR12: Intraosseous Cannulation

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## Applicable To

■ ☐ **PCP: requires completion of scope expansion education**

■ ACP and higher

## Introduction

Intraosseous cannulation is available as an option for paramedics requiring vascular access when peripheral attempts have failed.

## Indications

■ PCP

- ☐ **Requires completion of PCP scope expansion education:**
  - Following two unsuccessful peripheral IV attempts or an inability to visualize peripheral veins
  - PCPs may attempt IO cannulation in patients **in cardiac arrest ≥ 12 years old** where there is a **clear clinical history of hypovolemia**, where fluid administration is a critical component of the resuscitation plan.
  - **-OR-**
  - IO's may also be placed under direct supervision of a BCEHS ACP or higher
- The tibial site is the only site approved for PCP use. PCPs are limited to two collective attempts per patient only. Do not attempt to re-cannulate a site that has failed or been dislodged.

■ ACP

- Following two unsuccessful peripheral IV attempts or an inability to visualize peripheral veins (including external jugular vein)
- Unstable patient requiring medications or fluid replacement
- Important considerations:
  - The ACP (or higher) remains responsible for any anesthesia or pain management requirements.
  - Intraosseous placement must **not** delay or impair the delivery of high-quality CPR, effective airway management, or defibrillation. Placement should be deferred until at least three rounds of chest compressions, with AED analyses, have been completed.

## Contraindications

- Skeletal or tissue damage in the extremity to be used
- Prior proximal tibial surgery or knee joint replacement
- Signs of infection around the site
- Intraosseous placement at the same site in previous 48 hours
- ■ PCP: Not authorized for use in patients under 12 years of age (aligns with restrictions on IV initiation)

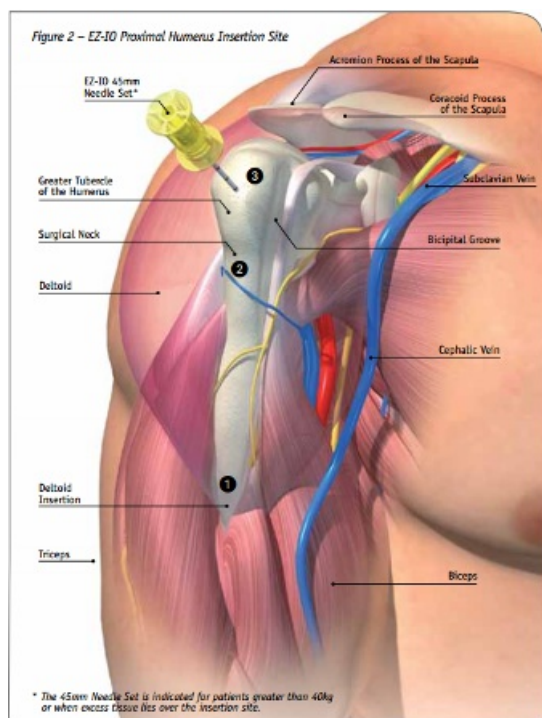
## Procedure

1. Assemble equipment, including EZ-IO driver, needle, primed EZ-Connect extension, infusion fluid and line set, and 10 mL syringe of normal saline.
2. Select the site of needle insertion and clean the skin.
3. Using aseptic techniques, drive the needle into the bone. Press gently: let the drill do most of the work.

4. Remove the stylet and securely discard the sharp. Place the stabilizer dressing over the needle hub.
5. Connect a primed EZ-Connect extension.
  - ■ **ACP (or PCP under direction of an on-scene ACP):** In patients who are conscious, prime the EZ-Connect extension with lidocaine - see step 7.
6. Aspirate for the presence of bone marrow or blood to confirm the placement. If patent, connect the IV tubing to the EZ-Connect extension set. If unsuccessful, change to another site on a different limb. Do not reuse the same limb.
7. ■ **ACP (or PCP under direction of an on-scene ACP):** In patients who are conscious, administer [lidocaine](#), 40 mg (0.5 mg/kg in children to a maximum of 40 mg)
  - Instill the lidocaine slowly, over 120 seconds, making sure to administer the appropriate amount of lidocaine through the extension, and allow it to dwell in the bone marrow for 60 seconds.
  - Slowly flush the IO with 5-10 mL normal saline (2-5 mL in children) following the administration of lidocaine.
8. Connect the 10 mL syringe to the proximal access port on the IV tubing. Flush the line and the extension set, pushing *firmly* and *briskly* on the syringe plunger.
9. Set the appropriate flow rate. Pressure infusers or intermittent boluses may be required.
10. Protect the site and monitor for signs of extravasation.

## Notes

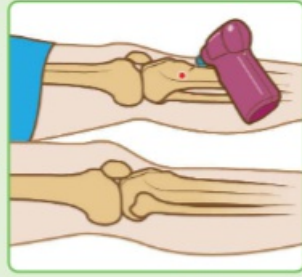
- Needle placement in the proximal humerus has been demonstrated to have significantly improved infusion rates compared to the tibial plateau. It should be considered as the preferred IO site in patients **under ACP care**. If using the humerus, choose the larger (yellow) needle. To review anatomy and landmarks, see video below.



- Tibial placement is the only permissible insertion site for PCPs.

## Proximal Tibia

- Extend the leg. Find the tibial tuberosity. Insertion site is approximately 2 cm medial or the mid-point between the medial and lateral portion along the flat aspect of the anterior tibia (depending on patient anatomy).



- If unable to palpate the tibial tuberosity, the insertion site is approximately 3 cm below the inferior border of the patella at the same site if tuberosity were palpated.
- Aim needle at a 90-degree angle to the bone for insertion.

- Paramedics should review [this educational material](#) for additional information about intraosseous site selection. Contact a Paramedic Practice Educator for specific questions or concerns.
- Intraosseous catheters are approved for use in patients for up to 24 hours when placed in the proximal humerus and both the proximal and distal tibia. It may be extended for up to 48 hours in patients over the age of 12 under exceptional circumstances.

## Resources

Arrow®  
EZ-IO®  
Intraosseous Vascular Access System

### Proximal Humerus

#### Arm Positioning

Using either method below, adduct elbow, rotate humerus internally.



Place the patient's hand over the abdomen with arm tight to the body.



Place the arm tight against the body, rotate the hand so the palm is facing outward, thumb pointing down.

#### Landmarking



Place your palm on the patient's shoulder anteriorly.

- The area that feels like a "ball" under your palm is the general target area.
- You should be able to feel this ball, even on obese patients, by pushing deeply.



Place the ulnar aspect of one hand vertically over the axilla. Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.



Place your thumbs together over the arm.

- This identifies the vertical line of insertion on the proximal humerus.



Palpate deeply as you climb up the humerus to the surgical neck.

- It will feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck.

The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.



Point the needle tip at a 45-degree angle to the anterior plane and posteromedial.



24 Hour Clinical Support: 1-888-413-3104

### Tibial placement:

#### **Humeral landmarking:**

## **References**

- 2024-05-01: updated PCP scope information
- 2023-09-29: added PCP scope information

