



CHARLOTTESVILLE-ALBEMARLE RESCUE SQUAD Clinical Review and Training

Intraosseous Insertion EZ-IO Guideline

QUICK MED REFERENCE

INITIAL IO INFUSION FOR PATIENTS RESPONDING TO PAINFUL STIMULI

Adult	40mg Lidocaine IO as initial flush. Allow 60 seconds to dwell IO for 60 seconds if possible. Then flush with 5-10mL of NS
PEDS	0.5mg/kg (up to max of 40mg) Lidocaine IO as initial flush. Allow 60 seconds to dwell IO for 60 seconds if possible. Then flush with 2-5mL NS

INDICATIONS

The EZ-IO is approved for patients weighing 40kg (88lbs) or more. The EZ-IO PD is approved for patients weighing 3-39kg (6.5-85lbs). Placement is indicated when patient is in or approaching extremis and either intravascular fluid resuscitation or medications are necessary for resuscitation efforts, but traditional vascular access techniques are not possible or require multiple or prolonged attempts. Such patients should undergo two rapid IV attempts prior to utilizing the EZ-IO System.

CONTRAINDICATIONS

- Fracture of the bone you intend to place the IO (tibia or humerus)
- Previous orthopedic procedures (i.e. knee replacement) in the area of intended insertion (as indicated by a large scar)
- The extremity is compromised by a pre-existing condition (i.e. tumor)
- Skin infection at the insertion site (i.e. redness, skin lesions)
- Inability to locate landmarks
- Excessive tissue over the insertion site. (If the 5mm mark on the IO needle is not visible once the needle has been placed through the skin, but has not reached to the bone, then there is too much tissue.)

If any of these contraindications are noted, check another extremity for possible insertion.

EQUIPMENT

- EZ-IO driver and appropriate needle set for patient size (EZ-IO PD (15 mm) is **pink**, EZ-IO AD (25 mm) is **blue**, EZ-IO LD (45 mm) is **yellow**).
- 10mL normal saline flush
- **40mg Lidocaine (TJEMS Drug Box)**
- Alcohol or chlorhexidine swabs
- Extension set or EZ-Connect
- **IV Fluid, Tape or Gauze**
- Pressure bag and/or bolus fluid administration setup.

PROCEDURE

1. Observe BSI precautions and aseptic techniques
2. Locate the proper site for EZ-IO® insertion (tibia only for pediatric patients, tibia or humerus for adult)
 - a. **Adult tibia insertion:** With the leg extended, locate the patella (kneecap), feel the anterior surface of the leg just below the patella, approximately 2 finger widths. This round, oval bump is the tibia tuberosity. From the tibia tuberosity move 1 finger width medial (toward the centerline of the body) to the flat part of the tibia. This is the insertion site.
 - b. **Adult humeral insertion:** Expose the shoulder and place the patient's arm against the patient's body, resting the elbow on the stretcher or ground and the forearm resting on the abdomen. Note the humeral head on the anterior-superior aspect of the upper arm or the anterior-lateral shoulder. Palpate and identify the mid-shaft humerus and continue palpating toward the proximal end (humeral head). Near the shoulder feel for a small protrusion, this is the base of the greater tubercle and the insertion site. With the opposite hand, "pinch" the anterior and inferior aspects of the humeral head, while confirming the identification of the greater tubercle. This will help ensure that you have located the midline of the humerus. **Must use the EZ-IO LD 45 mm needle. In order to insert a humeral head IO, providers must have attended mandatory training.**
 - c. **Pediatric tibia insertion:** If the tibia tuberosity can be palpated, the insertion site is one finger width below the tuberosity and then medial along the flat aspect of the tibia. If the tibia tuberosity cannot be palpated, then the insertion site is two finger widths below the patella and then medial along the flat aspect of the tibia. The EZ-IO PD is only for tibia insertion, not humerus.
3. Clean the insertion site thoroughly using alcohol or Chlorhexidine for at least a 3" diameter around the site.
4. Prepare the EZ-IO
 - a. Remove the driver and the EZ-IO cartridge.



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- b. Open the cartridge and attach the proper size needle set to the driver (you should feel a "snap" as the set connects to the driver)
 - c. Remove the needle set from the cartridge
 - d. Remove the safety cap from the needle set. With needle facing you, grasp the cap tightly and rotate clockwise to loosen and remove. (Attempting to pull the cap may remove the needle set from the driver, and rotating counterclockwise will cause the catheter and stylet to separate.)
5. Insert the EZ-IO needle set
- a. Hold the driver in one hand and stabilize the insertion site laterally with the opposite hand. Make sure your hands and fingers are out of the path of insertion and that the patient is prevented from moving suddenly (i.e. do not position your hand behind the extremity).
 - b. Position the driver at the insertion site with the needle at a 90 degree angle to the bone. Power the needle set through the skin at the insertion site until it encounters the bone surface.
 - c. If in doubt, verify that there is enough needle length (not too much tissue) by observing the 5mm mark.
 - d. Apply firm and steady pressure on the driver and apply power, ensuring the driver is maintained at a constant 90 degree angle to the bone.
 - e. Stop when the needle flange touches the skin or a sudden decrease in resistance is felt. This indicates entry into the marrow cavity. "STOP WHEN YOU FEEL THE POP."
6. Remove the driver from the needle set.
- a. Support the needle set in one hand, gently pull straight up on the driver and lift away.
7. Remove the stylet from the catheter by grasping the hub firmly with one hand, rotate the stylet counterclockwise (unscrew the stylet from the catheter). Pull the stylet out and place in the sharps container.
8. Attach a 10 cc syringe and attempt to aspirate marrow (no aspirate alone does not indicate improper placement).

FOR PATIENTS RESPONSIVE TO PAINFUL STIMULI

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9. Confirm placement with one or more of the following criteria:
- a. Firm 90 degree position
 - b. Blood at the tip of the stylet
 - c. Aspiration of marrow
 - d. The device flushes easily and fluids flow freely without subcutaneous swelling or fluid leakage.
10. Attach the infusion, secure, and stabilize the catheter to the insertion site.
- a. Monitor for any change in placement and remove as necessary.
 - b. Assure that you can fully visualize the area of insertion so that you can fully assess.
11. Due to the anatomy of the IO space, flow rates may be slower compared to normal IV catheters. Use a pressure bag for rapid infusions, or administer by slow bolus via syringe. **PEDIATRICS:** Administration should be by syringe bolus only.
12. Apply wristband to patient to identify that an IO has been placed.
13. Document use of the EZ-IO on the PPCR and complete EZ-IO Form.

Removal

If there is indication of improperly placed EZ-IO, attempt in another extremity. NEVER ATTEMPT A SECOND IO IN THE SAME BONE AS A PREVIOUS ATTEMPT. If improper placement is suspected, seal off the access and advise hospital staff on your arrival of improper placement, so that the site can be properly monitored for any complications during the patient's hospital course. Removal should be a smooth clockwise rotation of the needle using an attached 10 cc syringe.