

	06-0113	Air Ambulance Providers Optional Scope of Practice – Intraosseous Cannulation
Nor-Cal EMS Policy & Procedure Manual	EMS Aircraft	
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Authority

Health and Safety Code Division 2.5, California Code of Regulations, Title 22, Division 9.

Purpose

To serve as a patient treatment standard for Air Ambulance Provider Paramedics.

Policy

Function

To facilitate infusion of fluids and/or resuscitative chemicals when intravenous access is not immediately available.

1. IO needle per manufacturer specification (e.g., EZIO needle sets 15mm, 25mm and 45mm lengths).
2. Manual IO needles (< 3 kg).

Circumstances Under Which Clinical Personnel May Perform Function

1. Setting: Patient Care with urgent requirement for fluids.
2. Supervision: None – Qualified Paramedics may utilize.
3. Patient conditions:
 - A. Intravenous fluids or medications are needed (i.e. Hemodynamic instability, ALOC, respiratory compromise, etc.) and a peripheral IV cannot be established in 90 seconds.
 - B. For IO insertion in patients less than 3 kg, refer to the manual IO insertion procedure.

Indications

An IO insertion may be considered after two failed IV attempts or PRIOR to peripheral IV attempts in the following situations:

1. Cardiac arrest (medical or trauma).
2. Profound hypovolemia with alternation of mental status.
3. Patient in extremis with immediate need for delivery of medications and or fluids.

Contraindications

1. Fracture of the extremity (*consider alternate site*).
2. Excessive tissue at insertion site with the absence of anatomical landmarks (*consider alternate site*).
3. Previous significant orthopedic procedures e.g. IO within 48 hours, prosthesis, etc. (*consider alternate site*).

Cautions

1. Infection in the area of anticipated insertion.
2. History of bone disease that affects bone strength or hardness (e.g., Osteogenesis imperfecta, Osteopetrosis).
3. Adult patients with excess tissue over the insertion site may require the longest needle.

Considerations

1. Flow rates:

Due to the anatomy of the IO space you will sometimes note flow rates to be slower than those achieved with IV catheters.

- A. Ensure the administration of an appropriate rapid syringe bolus (flush) prior to infusion **NO FLUSH = NO FLOW**.
 - a. Rapid syringe bolus (flush) based on type and size of needle (e.g., EZ-IO AD® with 10 ml of normal saline).
 - b. Repeat syringe bolus (flush) as needed.

- B. To improve continuous infusion flow rates always use a syringe, pressure bag (for adults only) or infusion pump. To improve infusion rates for pediatric patients, use a syringe and 3-way stopcock to deliver bolus infusions.
2. Pain.

For patients who are conscious and/or responsive to pain Insertion of an IO in conscious patients has been noted to cause mild to moderate discomfort (usually no more painful than a large bore IV). However, IO infusion for conscious patients has been noted to cause severe discomfort. If pain control is required (use clinical judgment), perform the following:

 - A. Upon insertion of the IO, aspirate to check placement. Then SLOWLY (over 30 seconds) administer Lidocaine 2% (Preservative Free) through the hub prior to either a bolus or continuous infusion via the IO.
 - a. For all patients >3kg: Slowly administer 0.5mg/kg Lidocaine 2% (up to maximum dose of 40mg). Half of this bolus dose may be repeated x 1 via IO for pain relief.
 - b. Do NOT administer lidocaine bolus for patients < 3 kg.
 3. All fluids or medications typically administered intravenously may be given via an intraosseous line.
 4. IO is a bridge device that will facilitate medication and fluid administration until peripheral or central vascular access can be established. If possible, a peripheral IV should be initiated as soon as practical.

Procedure

Initiation Using the EZ-IO (Patients \geq 3kg)

1. Locate appropriate insertion site.
 - A. Proximal Tibia – Insertion site is approximately 2 cm below the patella and approximately 2 cm medial to the tibial tuberosity.
 - B. Distal Tibia - 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 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.
 - C. Proximal Humerus (adults only)– Insertion site is located directly on the most prominent aspect of the greater tubercle. Ensure that the patient’s hand is resting on the abdomen and that the elbow is adducted (close to the body). (please follow link to review):
<http://www.teleflex.com/en/usa/ezioeducation/index.html>
2. Prepare insertion site using aseptic technique.
3. Select appropriate IO needle:
 - A. Pediatric tibial insertion sites (3-39kg): 15mm needle set (consider 25mm needle set for patients with excessive tissue at insertion site).
 - B. Adult tibial insertion sites: 25mm needle set (consider 45mm needle set for patients with excessive tissue at insertion site).
 - C. Adult patients <40kg proximal humerus site: 25mm needle set.
 - D. Adult patients >40kg proximal humerus site: 45mm needle set.
4. Prepare the EZ-IO driver.
5. Stabilize site and insert appropriate needle set.
 - A. Position the driver at the insertion site with the needle set at a 90-degree angle to the bone surface. Gently pierce the skin with the needle set until the needle set tip touches the bone.
 - B. Check to ensure that at least one black line is visible. If no black line is visible, patient may have excessive soft tissue over selected insertion site and needle set may not reach the medullary space. Consider an alternative site for insertion or a longer needle set.
 - C. Penetrate the bone cortex by squeezing driver’s trigger and applying gentle, consistent, downward pressure.
6. Release the driver’s trigger and stop the insertion process when:
 - A. On adult patients, you may stop by releasing the trigger when the hub is almost flush with the skin.
 - B. On pediatric patients, release the trigger when you feel a decrease in resistance indicating the needle set has entered the medullary space.
7. Remove stylet from catheter.

8. Connect primed EZ-Connect.
9. Confirm placement with return of blood (marrow), or if no return of blood, easy flushing without evidence of extravasation.
10. For patients who are conscious and/or responsive to pain, SLOWLY (over 30 seconds) administer appropriate dose of Lidocaine 2% through the IO.
11. Syringe bolus (flush) the EZ-IO catheter with the appropriate amount of normal saline.
12. Utilize pressure (pressure bag or infusion pump) for continuous infusions.
13. Begin infusion.
14. Secure site with IO stabilization device as indicated by manufacturer.
15. Document time and date of placement in chart and communicate upon TOC.
16. Continuously monitor site and patient condition.

Initiation Using a Manual IO Needle (Patients Less Than 3kg)

1. Locate appropriate insertion site (proximal tibia).
2. Prepare insertion site using aseptic technique.
3. Stabilize site and utilize a rotary (drilling or twisting back and forth) motion to facilitate advancement of the standard IO needle (18 gauge) through the cortex.
4. Remove stylet from catheter.
5. Confirm placement with return of bone marrow, or if no return of bone marrow, easy flushing without evidence of extravasation.
6. Stabilize and secure site with dressings.
7. Begin infusion.
8. Continuously monitor site and patient condition.

Educate the Family

1. Intraosseous cannulation is vital to patient's care.
2. Needle is positioned in the bone tissue and appears different than a standard intravenous infusion placement.
3. Intraosseous cannulation is a temporizing measure for delivery of vital fluids and/or medications.

Ongoing Monitoring

1. Monitor patency of intraosseous device.
2. Monitor site for any signs of subcutaneous infiltration, (anterior and posterior to bone) and fluid leakage from the hub. Palpate/observe.
3. Monitor distal pulses and skin temperature.
4. If in doubt as to the proper position of the tip of the intraosseous needle, attempt to aspirate blood/marrow. If still in doubt, utilize this port for administration of intravenous chemicals only as a last resort. Instead, attempt to start a direct intravenous infusion or another intraosseous line in a different bone.

Recordkeeping

1. Document the following information for all IO insertions:
 - A. Time of insertion.
 - B. Site.
 - C. Needle set selection.
 - D. Confirmation method (aspiration of marrow, flush without difficulty).
 - E. Total mg of Lidocaine use for pain management (if applicable).
 - F. Total fluids infused through IO.
2. Document on the patient care record any untoward effects of the intraosseous cannulation/infusion and any further interventions.