

IRISH ASSOCIATION FOR
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IAEM Clinical Guideline

Intraosseous Access in Adult Patients

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DISCLAIMER

IAEM recognizes that patients, their situations, Emergency Departments, and staff all vary. These guidelines cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of these guidelines, the use of current information, and a patient's overall care and well-being resides with the treating clinician.

Revision History	Section	Summary of Changes	Author
Final version V1.0	All		

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GLOSSARY OF TERMS

ED	Emergency Department
IO	Intraosseous
IV	Intravenous
mmHg	Millimetre of Mercury
PRN	Pro Re Nata (when necessary, or as needed)

Intraosseous Access in Adult Patients

INTRODUCTION

Intraosseous vascular access refers to the placement of a specialized hollow-bore needle through the cortex of a bone into the medullary space for infusion of medical therapy and laboratory tests.^{1,2} The IO route is an option when standard venous access would delay therapy or is not easily obtained.³

All resuscitation drugs can be given by the IO route.⁴

Contrast injection for radiological evaluation can be given via the IO route⁵.

PARAMETERS

Target audience This guideline is intended for use by clinicians managing patients requiring urgent IV/IO infusion of medications.

Patient population: Patients who require urgent IV/IO infusion.

Indications: Cardiopulmonary arrest in patient without intravenous access.

Any critical emergency where gaining intravenous access cannot be achieved within a timely manner (60-90 seconds, depending on source).

Oral, transmucosal, intramuscular or inhalation routes are not adequate to meet the patient's needs for fluids and/or medications when intravenous access is unobtainable.

Contraindications: Adequate venous access.

Fracture of site/proximal to site.

Cellulitis or infection at the site.

Osteogenesis imperfecta.

Previous IO attempted at site.

AIM

To provide a practical, evidence-based guideline for siting intraosseous access.

INSERTION SITE IDENTIFICATION⁶

Proximal Tibia

Extend the leg. The insertion site is approximately 2cm medial to the tibial tuberosity on the flat aspect of the tibia. Alternatively, the site is approximately 3cm below the inferior border of the patella and approximately 2cm medial, along the flat aspect of the tibia. Aim the needle at a 90-degree angle to the bone for insertion.

Proximal Humerus

Adduct and internally rotate the arm. To identify the landmark on the anterior shoulder, palpate the greater tubercle by letting it sink into the palm of your hand. Insert the needle at this landmark at an approximate 45-degree angle as if aiming toward the opposite hip.

Distal Tibia

The insertion site is approximately 3cm proximal to the medial malleolus. Identify the anterior and posterior borders of the tibia so that the site is on the flat centre aspect of the bone. Aim the needle perpendicular to the bone for insertion.

METHOD OF INSERTING IO NEEDLE

Equipment

- Alcohol swabs
- Intraosseous needle
- 20mL syringe
- Infusion fluid
- Extension set and 3-way tap

Insertion

1. Prepare the skin.
2. For a non-screw-in needle:
 - Insert the needle through the skin, and then use a screwing motion perpendicularly/slightly away from the growth plate to enter the marrow cavity of the bone.
 - There is a 'give' as the marrow cavity is entered.
3. For a screw-in needle the give may be less pronounced.

METHOD OF INSERTION USING EZ IO⁶

Equipment

- Alcohol swab
- EZ-Connect Extension set
- Open EZ-Stabiliser package
- Needle set
- EZ-IO Power Driver
- Sterile gloves



Figure 1: Equipment

Needle Selection

1. Select EZ-IO® Needle Set based on patient weight (kg), anatomy, and clinical judgment.
2. The EZ-IO® Needle Set is marked with black lines. Prior to insertion, with the EZ-IO® Needle Set inserted through the soft tissue and the needle tip touching bone, the correct needle length is determined by the ability to see at least one black line outside the skin.
3. EZ-IO® 45mm Needle Set (yellow hub) is indicated for patients ≥ 40 kg. This needle length should be considered for the proximal humerus site in most patients weighing ≥ 40 kg.
4. To ensure adequate needle length and reduce the occurrence of dislodgement due to inadvertent movement, this needle length should also be considered for patients with excessive tissue over any insertion site.
 - EZ-IO® 25mm Needle Set (blue hub) is indicated for patients ≥ 3 kg
 - EZ-IO® 15mm Needle Set (pink hub) is indicated for patients 3-39kg

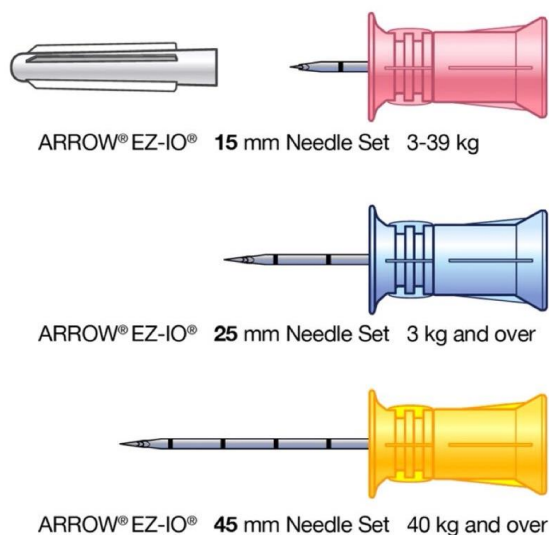


Figure 2: IO Needles⁶

Insertion

1. Identify site.
2. Clean site.
3. Connect EZ-IO needle to the driver and remove cap.
4. Stabilise the insertion site.
5. Carefully pierce skin until needle tip touches bone.
6. Pull the trigger and apply steady downward pressure.
7. Gently drill, pushing the needle 1-2cm more after loss of resistance, which signifies entry into the medullary space, or until the needle hub is close to the skin.
8. Hold the hub, take the driver off, and twist the stylet off the hub. Put the stylet in a sharp's bin.
9. The catheter should feel firmly seated in the bone (first confirmation of placement).
10. Place the EZ-Stabilizer dressing over the hub. The dressing has a hole in the middle to expose the hub. Attach the primed extension set, turning clockwise to secure. Remove the tabs from the dressing, and stick to the skin.
11. Aspirate for blood/bone marrow (second confirmation of placement). Lack of aspirate does not mean that the placement has been unsuccessful.

To Insert Needle Set:

- Locate landmarks **1**
- Clean site **2**
- Insert EZ-IO® Needle Set **3**
- Remove stylet from catheter **4**
- Attach primed EZ-Connect®
- Consider IO 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) for patients responsive to pain – prior to flush

Follow institutional protocols/policy

- 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
- Syringe bolus (flush) IO with 10 ml normal saline..... **5**
- Start infusion under pressure **6**

A Medical Director or qualified prescriber must authorize appropriate dosage range.

Figure 3: IO Insertion⁶



Figure 4: EZ-Stabiliser Dressing

IO Infusion Pain Management using 2% Lidocaine⁹

Consider using anaesthetic for patients responsive to pain.

Observe the usual contraindications and dosing constraints for lidocaine use.

1. Check maximum Lidocaine dose considering the patient's weight.
2. Prime the EZ-Connect® extension set with lidocaine (approximately 1ml).
3. Slowly inject the lidocaine over 2 minutes. The typical initial dose is 40mg.
4. Leave lidocaine in the IO space for 1 minute.
5. Flush with 5-10ml of normal saline solution.
6. Slowly inject an additional dose of lidocaine IO over 1 minute. Consider repeating PRN. The typical dose is 20mg.
7. Consider systemic analgesia for patients not responding to IO lidocaine.

CARE AND MAINTENANCE

- Inject medications and fluids as ordered, and pressurize fluids to 300mmHg for maximum flow.
- Verify placement/patency prior to all infusions. Use caution when infusing hypertonic solutions, chemotherapeutic agents, or vesicant drugs.
- Keep the limb still, and monitor the area for extravasation or other complications;
 - For proximal humerus insertions: keep the upper limb in place across the trunk, or in adducted position. Do not adduct the arm more than 45 degrees to prevent needle dislodgement.
 - For distal femur insertions: keep the extremity still, and secure site with the leg straight to prevent inadvertent needle dislodgement.
 - For proximal and distal tibia insertions: minimize potential for cannula and leg movement with use of a leg board, or other method.

- Document date and time on pink wristband, and place on patient.

REMOVAL OF IO ACCESS

1. Twist off EZ-Connect® Extension Set.
2. Peel off EZ-Stabilizer® Dressing.
3. Hold the cannula hub and attach a Luer lock syringe to the hub.
4. Holding the syringe and hub together as one unit, and keeping axial alignment, twist clockwise and pull straight out. Do not rock or bend the cannula.
5. Put the cannula and syringe into sharps bin.
6. Dress the site.

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