NHS CATS
Children's Acute Transport Service

Clinical Guidelines

Intra Osseous (IO) Line Insertion

Document Control Information

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Applicable to	**All CATS employees**		

Introduction

The insertion of IO access is indicated when immediate IV access needs to be obtained and previous IV-line insertion attempts have failed. IO access is the recommended technique for circulatory access in decompensated shock. IO access should be established if vascular access is not rapidly achieved.

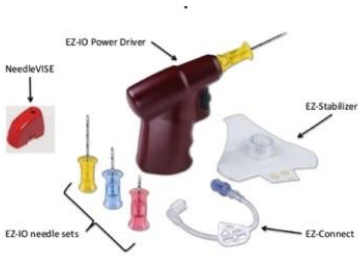
N.B. IO Lines can be used for any drug infusion or fluid bolus. Treat an IO as akin to a central line, for example to administer inotropes, electrolytes and resus drugs.

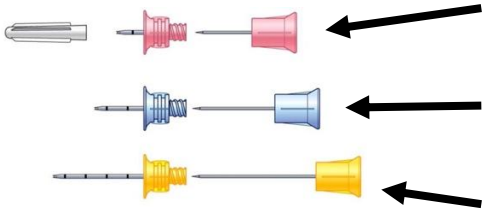
Contraindications

- Proximal ipsilateral fracture
- Ipsilateral vascular injury
- Osteogenesis imperfecta-> *if using a Cook device*
- Infection at site of insertion
- Landmarking not identifiable
- Failed IO attempt in selected bone
- Orthopaedic procedure near site

Selecting IO size

EZI-IO with Drill





Preterm neonates 15mm

Neonates and paediatrics 25mm

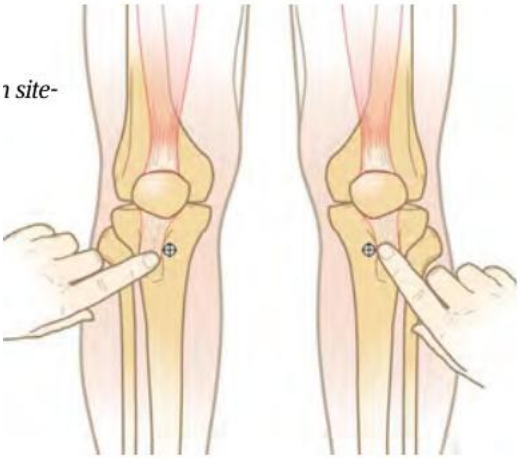
Adolescents 45mm

- Do not base it on the weight indicated on the IO packet guide.
- Some patients require a longer IO needle to reach the desired bone site
- Use your clinical judgment when selecting IO needle size
- Most post-natal patients will require the blue 25mm needle

Manual Cook IO

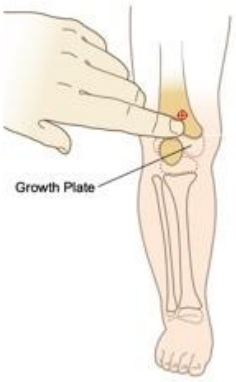
IO Site Location

Proximal Tibia



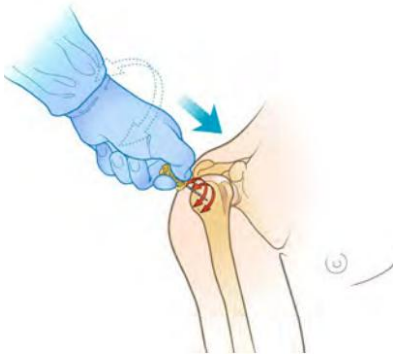
1. Position: Infant: flexed knee, Adolescent: straight leg
2. Palpate tibial tuberosity (bony thickness below patella)
3. Insert 2-3cm below + medial to tibial tuberosity into the flat

Proximal Femur



1. Position straight leg
2. Palpate 2-3cm above condyle
3. Insert just medial to midline to avoid tendon

Proximal Humeral Head



1. Position: Elbow adducted, hand over the umbilicus
2. From the mid-shaft humerus, palpate up, toward the proximal aspect of humeral head
3. Palpate small bony protrusion close to shoulder

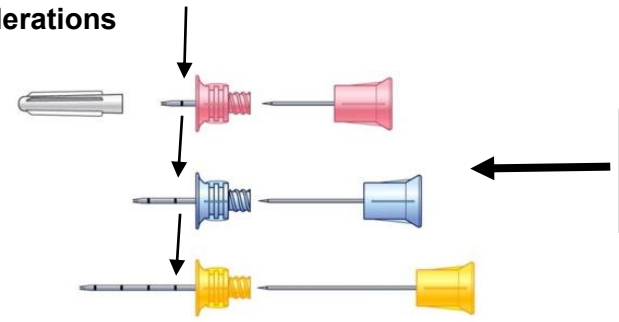
Preparing the IO site and equipment

- Prepare the equipment, needle, drill, 2ml syringe, extension set, EZ stabiliser dressing or equivalent, prime the extension set with 0.9% sodium chloride, and a 10ml flush of 0.9% sodium chloride.
- Stabilise the extremity, ensuring the operator hand is not behind limb to minimise risk of injury.
- Prepare the skin, clean well with antiseptic solution.

Insertion technique

- Gently insert the needle through the skin, pressing down until the tip touches bone.
- Using the IO drill, apply gentle steady pressure until you feel a pop or give as the marrow cavity is entered.
- The 5-mm mark, the closest blackline to the hub must be visible above skin for needle set length confirmation.
- If using a manual IO, apply gently steady pressure in a perpendicular screwing motion until you feel a pop or give as the marrow cavity is entered.
- Remove the trocar and confirm position by aspirating bone marrow through a 5ml syringe.
- Marrow cannot always be aspirated but it should flush easily.
- Secure the needle with IO dressing.
- Look for signs of extravasation, swelling.
- If IO insertion unsuccessful, mark the limb with limb band.

Considerations



*After inserting through soft tissue ensure **at least one** black marker is visible above the skin*

- When giving a fluid bolus through the IO, support the IO and the limb, and give the bolus slowly. This will prevent the IO popping out of bone cavity.
- Monitor limb for signs of swelling, extravasation-> limb colour, limb perfusion.
- Consider local anaesthetic if putting IO in an awake patient.

Complications

- Failure to enter the bone marrow, with extravasation or subperiosteal infusion
- Penetration through the bone
- Osteomyelitis (rare in short term use)
- Physeal plate injury
- Local infection, skin necrosis, pain, compartment syndrome, fat and bone micro emboli have all been reported but are rare

Transport Considerations

- Secure the IO line with appropriate dressing
- Monitor IO site for extravasation
- Document location and size of IO needle use
- Document drugs given through IO line
- Document any failed IO attempts
- Hand over to accepting PICU IO details