



Intra Osseous (IO) training resources

from medscape



EZ-IO® **15 mm Needle Set** 3-39kg



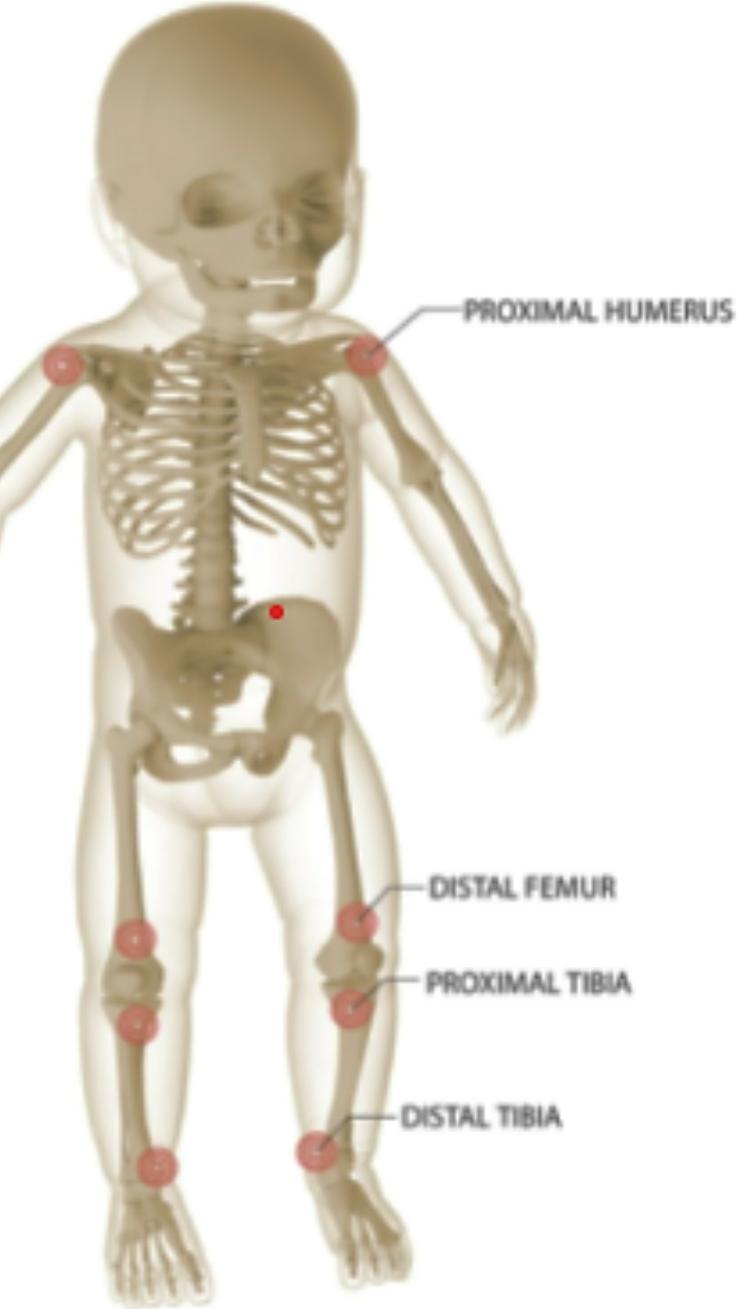
EZ-IO® **25 mm Needle Set** 3kg and over



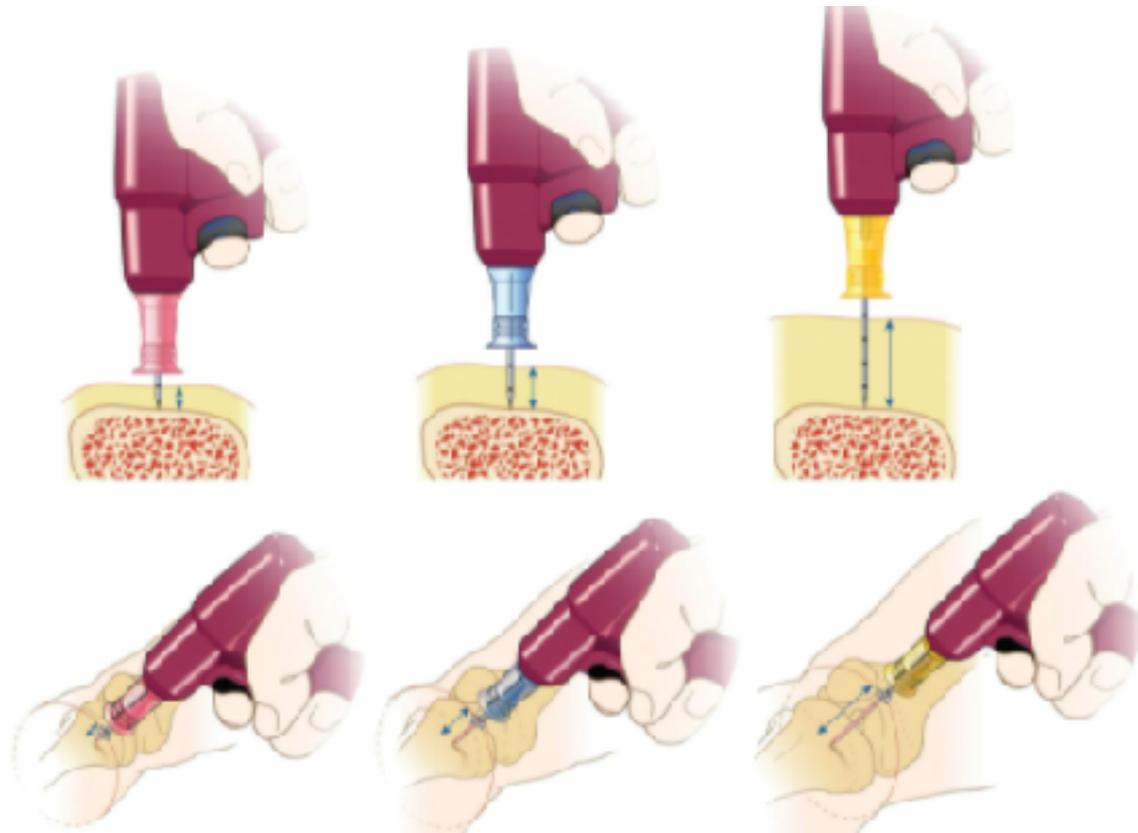
EZ-IO® **45 mm Needle Set** 40kg and over

SITES

EZ-IO needle size comparison at a tibial bone site. Always use clinical judgment to determine selection of the appropriate needle based on the patient's weight, the bone anatomy, and the tissue depth overlying the insertion site.



PEDIATRIC INSERTION SITES



Complications

Extravasation

Soft-tissue necrosis

Bone fractures

Injury to growth plates

Infiltration of medications

Infection

Subcutaneous abscess

Osteomyelitis

Fat emboli

Extravasation of fluid

Commonest complication

Needle tip is not appropriately placed within marrow cavity.

Caustic or hypertonic medications can result in necrosis of surrounding muscle tissue.

calcium chloride

sodium bicarbonate

dopamine

Higher risk with increased movement increasing diameter of insertion point.

Continued infusion (under pressure) in an unconscious patient can lead to compartment syndrome

Contraindications

Absolute contraindication: fracture at site

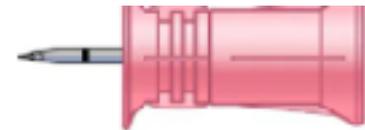
Relative Contraindication

- Cellulitis overlying the insertion site
- Inferior vena cava injury
- Previous attempt on the same leg bone
- Osteogenesis imperfecta (because of a higher likelihood of fractures occurring)
- Known bone fragility (osteopetrosis and osteopenia)
- Crush injuries in same limb
- Site trauma
- Extremity with a vascular cutdown
- Loss of skin integrity
- Known osteomyelitis at the site
- Known right-to-left intra-cardiac shunt–related CHD

The Arrow EZ-IO

lithium battery-powered, reusable IO driver,
15-G 45mm (yellow) needles for $\geq 40\text{kg}$ with
excess tissue/oedema over insertion site,
which includes proximal and distal tibia and
humeral head (c/i sternum)

prehospital setting :
90% success rate.



EZ-IO® 15 mm Needle Set 3-39kg



EZ-IO® 25 mm Needle Set 3kg and over



EZ-IO® 45 mm Needle Set 40kg and over

Components



Equipment

Assembled prior to the procedure:

Antiseptic

5ml syringe for aspiration

Primed extension set connected to:

5-10cc Syringe with 1% lidocaine for flush

IO needle

Drill

Pressure bag and three way tap for fluids or

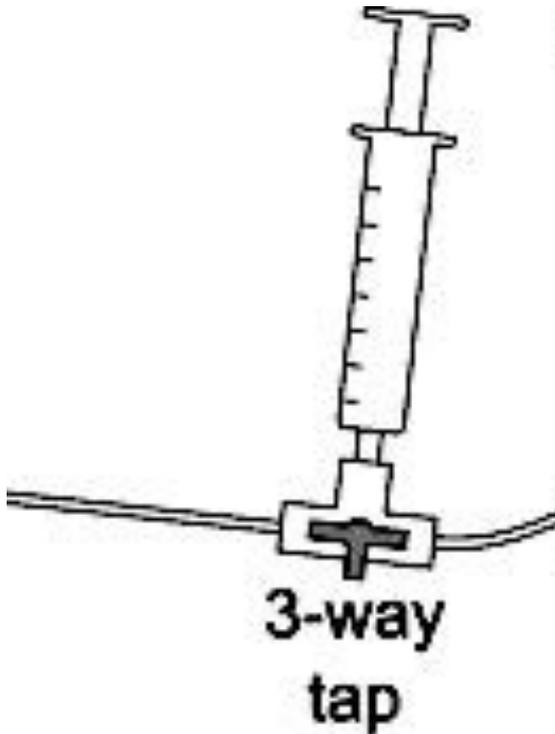
Syringes of fluid (usually 50 ml)

Bolus for children is 20ml/kg for illness (10 ml/kg for trauma)

Pitfall:
line not primed
NO pressure
system



Don't Forget
FLUID GOES IN UNDER PRESSURE



OR



IO Needle catheters are 15 gauge giving gravity flow rates of approximately 60-100ml/min.

SIGNIFICANTLY INCREASED WITH PRESSURE SYSTEMS

EZ-IO proximal tibia insertion site identification (infant/child)

Extend the selected leg

Insertion site is 1 cm medial to tibial tuberosity, or just below the patella (ie, one finger width) slightly medial (one finger width), along flat aspect of tibia.

Pinch tibia to identify centre of medial /lateral borders.



EZ-IO proximal tibia insertion technique (infant/child)

Prepare site with selected antiseptic (clinician's choice)

Use a clean, “no touch” technique.

Remove needle set cap.

Stabilize extremity.

Aim needle set at a 90° angle to centre of bone.

Push needle set tip through skin until tip rests against bone.
5-mm mark must be visible above skin
(for adequate needle set length)

Gently drill

Immediately release the trigger when
“pop” or “give” is felt as needle
set enters medullary space.

**Avoid recoil—do NOT pull back on driver
when releasing trigger.**

Hold hub in place, and pull driver straight off.

Continue to hold the hub while twisting the stylet off hub with
counterclockwise rotations.

Catheter should feel firmly seated in bone
(1st confirmation of placement).



Confirming / securing IO

Place the stylet in a sharps container.

Place EZ-Stabilizer dressing over hub.

(I tend to avoid the stabiliser as it causes unnecessary delays)

Attach a primed (1ml 1% lignocaine) EZ-Connect extension set to hub; firmly secure it by twisting it clockwise.

Pull tabs off the EZ-Stabilizer dressing to expose adhesive; apply to skin. (optional)

Aspirate for blood/bone marrow (second confirmation of placement)

N.B. $\leq 50\%$ get more than 1ml aspirate



What tests can be performed on aspirate

Marrow will clog
POCT/ Lab machines



emrap 3 minute EZ-IO video



shoulder IO youtube video



[https://dontforgetthebubbles.com/
intraosseous-access/](https://dontforgetthebubbles.com/intraosseous-access/)



shoulder IO speed to heart: 3 seconds



EZ-IO removal technique: out at



Stabilize catheter hub, and attach a Luer lock syringe to hub.

While maintaining axial alignment, twist catheter clockwise and pull straight out.

Do not rock syringe.

Dispose of catheter with syringe attached into a sharps container.



EZ-IO Distal Femur Site Identification and Insertion



Secure the selected leg in the outstretched position to ensure the knee does not bend.

Identify the patella by palpation.

Insertion site is just **proximal to the patella** (maximum 1 cm)

approximately 1-2 cm medial to the midline.

Prepare the site with the selected antiseptic

Use a clean, “no touch” technique.

Remove the EZ-IO needle set cap.

(Stabilize the extremity.)

Aim the needle set toward the centre of the bone at a 90° angle.

Push the needle set tip through the skin until the tip rests against the bone.

The 5-mm mark must be visible above the skin for confirmation of adequate needle set length.

Gently drill, *immediately* release the trigger when the “pop” or “give” is felt as the needle set enters the medullary space. *Avoid recoil—do NOT pull back on the driver when releasing the trigger.*

Hold the hub in place, and pull the driver straight off

Continue to hold the hub while twisting the stylet off the hub with counterclockwise rotations. The catheter should feel firmly seated in the bone (first confirmation of placement).



PITFALL

GOING TOO
MEDIAL
AND
TOO HIGH :
RISK OF
FEMORAL
ARTERY
INJURY