SKILLS

EZ-IO INSERTION (S10)

FR/EMR	EMT	PARAMEDIC

INDICATIONS
Adult and pediatric patients in extremis with difficult vascular access.

CONTRAINDICATIONS
1. Fracture of the targeted bone.
2. Previous significant orthopedic procedures at insertion site (e.g. prosthetic limb or joint).
3. IO in the targeted bone within the past 48 hours.
4. Infection at area of insertion.
5. Excessive tissue or absence of adequate anatomical landmarks.

EQUIPMENT/SUPPLIES
1. EZ-IO® Power Driver
2. EZ-IO® Needle Set
3. Luer lock syringe with sterile Normal Saline flush (5-10 mL for adults, 2-5 mL for infant/child)
4. 2% lidocaine

INSERTION SITE IDENTIFICATION
Proximal Humerus (Adult)
1. Place the patient's hand over the abdomen (elbow adducted & humerus internally rotated)
2. Place your palm on the patient's shoulder anteriorly; the "ball" under your palm is the general target area. You should be able to feel this ball, even on obese patients, by pushing deeply.
3. Place the ulnar aspect of your hand vertically over the axilla & the ulnar aspect of your other hand along the midline of the upper arm laterally.
4. Place your thumbs together over the arm; this identifies the vertical line of insertion on the proximal humerus.
5. Palpate deeply up the humerus to the surgical neck. This may feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck. The insertion site is 1 to 2 cm/0.4 to 0.8 inch above the surgical neck, on the most prominent aspect of the greater tubercle.

Proximal Tibia (Adult)
1. Extend the leg.
2. Insertion site is approximately 2 cm/0.8 inch medial to the tibial tuberosity, or approximately 3 cm/1.25 inches below the patella and approximately 2 cm/0.8 inch medial, along the flat aspect of the tibia.

Proximal Tibia (Infant/Child)
1. Extend the leg. Pinch the tibia between your fingers to identify the medial & lateral borders.
2. Insertion site is approximately 1 cm/0.4 inch medial to the tibial tuberosity, or just below the patella (approx. 1 cm/0.4 inch) and slightly medial (approx. 1 cm/0.4 inch), along the flat aspect of the tibia.

NEEDLE SET SELECTION
Prior to drilling, with the EZ-IO® Needle Set inserted through the soft tissue and the needle tip touching bone, adequate needle length is determined by the ability to see the 5 mm black line above the skin.
1. **EZ-IO® 45 mm Needle Set (yellow hub)** should be used for proximal humerus insertion in patients ≥ 40 kg and patients with excessive tissue over any insertion site.
2. **EZ-IO® 25 mm Needle Set (blue hub)** should be used for patients approximately 3-39 kg.
3. **EZ-IO® 15 mm Needle Set (pink hub)** should be used for patients ≤ 3 kg.

INSERTION

SKILLS

Proximal Humerus - Adult

1. Aim the needle set at a 45-degree angle to the anterior plane and posteromedial.
2. 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 to assure correct needle set length.**
3. Gently drill into the humerus approximately 2 cm/0.4 inch or until the hub is close to the skin; the hub of the needle set should be perpendicular to the skin.

Tibia - Adult

1. Aim the needle set at a 90-degree angle to the bone.
2. 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 to assure correct needle set length.**
3. Gently drill, advancing the needle set approximately 1-2 cm/0.4 to 0.8 inch after entry into the medullary space or until the needle set hub is close to the skin.

Tibia – Infant/Child

1. Aim the needle set at a 90-degree angle to the bone.
2. 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 to assure correct needle set length.**
3. Gently drill, immediately release the trigger when you feel the loss of resistance as the needle set enters the medullary space; avoid recoil – do NOT pull back on the driver when releasing the trigger.

INSERTION COMPLETION

1. Hold the hub in place and pull the driver straight off; continue to hold the hub while twisting the stylet off the hub with counter clockwise rotations; catheter should feel firmly seated in the bone (1st confirmation of placement).
2. Stabilize IO needle hub & dress insertion site.
3. Attach a primed extension set to the catheter hub, firmly secure by twisting clockwise
4. Aspirate for blood/bone marrow (2nd confirmation of placement). ***Inability to aspirate blood from the catheter hub does not mean the insertion was unsuccessful.***
5. Flush the IO catheter with normal saline (5-10 mL for adults, 2-5 mL for infant/child).

PATIENT EXPERIENCING PAIN AT INSERTION SITE

1. Administer lidocaine, 40 mg adult or 0.5 mg/kg not to exceed 40 mg infant/child, IO over 2 minutes.
2. Allow lidocaine to dwell in IO space for 1 minute.
3. Flush with normal saline (5-10 mL for adults, 2-5 mL for infant/child).
4. Administer ½ of original dose of lidocaine IO over 1 minute.

PRECAUTIONS

1. Do not exceed 300 mmHg when using a pressure bag or BP cuff for rapid infusions.
2. Verify placement/patency prior to all infusions. Use caution when infusing hypertonic solutions, chemotherapeutic agents, or vesicant drugs.
3. Stabilize and monitor site and limb for extravasation or other complications.
   a. For proximal humerus insertions, apply arm immobilizer or other method.