Indications
1. Intravenous fluids or medications are needed and a peripheral IV cannot be established
2. Consider EZ-IO PRIOR to peripheral IV attempts in the following situations:
   a. Cardiac arrest (medical or traumatic)
   b. Profound hypovolemia with alteration of mental status
   c. Patient in extremis with immediate need for delivery of medications and or fluids

Contraindications
Note: If a specific site is contraindicated, consider alternate sites.
   1. Fracture of the bone selected for IO infusion
   2. Excessive tissue at insertion site with the absence of anatomical landmarks
   3. Previous significant orthopedic procedures
   4. IO Placement within 48 hours
   5. Infection at the site selected for insertion

Special Considerations
- Due to anatomy of IO space, you will note flow rates are slower than those of traditional IV catheters.
- Ensure the administration of an appropriate rapid syringe bolus (flush) prior to infusion
- To improve continuous infusion flow rates always use a syringe, pressure bag or infusion pump
- Pain: Insertion of the EZ-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

Insertion Sites and Needle Selection
G28. Intraosseous Insertion

**Procedure**

1. Determine appropriate location and identify landmarking sites.
   a. (Pink 15 mm) 3-39 kg: Neonates/small infants proximal & distal tibia.
   b. (Blue 25 mm) >30 kg: Neonates/small infants in distal femur, proximal & distal tibia.
   c. (Yellow 45 mm) >40 kg, excessive tissue, humerus

2. Clean insertion site with antiseptic swab.

3. Prime IV lock tubing by unlocking clamp and purging air
   a. Conscious – prime tubing with lidocaine
      i. For adults: 20 – 40 mg Lidocaine 2%
      ii. For pediatrics: 0.5 mg /kg Lidocaine 2%
   b. Unconscious – prime with normal saline

4. Attach appropriately sized EZ-IO Needle to driver and remove safety cap

5. Push needle through skin until tip touches bone.
   a. Each black line on needle is 5mm
   b. At least one black line must be visible outside the skin prior to starting the driver
      i. If one line is not visible, move up to next needle size

6. Squeeze trigger and apply steady, moderate pressure until sudden “give” noted.
   a. If driver stalls and needle will not penetrate bone, operator may be applying too much downward pressure
   b. In the event of driver failure, remove driver and grasp needle set hub to advance needle into medullary space while twisting.

7. Unscrew stylet from hub and place in sharps.

8. Attach IV lock to catheter

9. Confirm IO placement
   a. Aspirate slightly for visual confirmation of bone marrow
   b. Check stability of catheter in bone

10. If conscious, consider using 2% Lidocaine flush for pain management.
    a. SLOWLY administer Lidocaine 2% through the catheter.

11. Flush IO with saline.
    a. Failure to appropriately flush IO may result in limited or no flow. Repeat as needed.
    b. Confirm adequate flow rate
    c. Confirm lack of swelling/indications of infiltration around site

12. Secure IO with commercial device or by using gauze and tape. Reassess securement frequently.

13. May use wristband to document time and date of IO placement

**Removal of IO**

1. Remove all connective tubing from IO catheter.

2. Remove adhesive dressings and/or commercial stabilization.

3. Attach a luer-lock syringe to hub of catheter.

4. Withdraw catheter by applying traction while rotating syringe and catheter clockwise.
   a. Maintain axial alignment during removal.
   b. Do NOT rock or bend the catheter.

5. Place used catheter in sharps container.

6. Cover insertion site with band-aid or gauze dressing.