SUBJECT: **USE OF THE INTRAOSSEOUS (IO) DRIVER FOR INSERTION OF AN IO NEEDLE IN ADULT AND PEDIATRIC PATIENTS**

Policy No.: ICU08
Supersedes: 06/2020
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PURPOSE OF PROCEDURE: To provide procedural guidance for insertion and maintenance of the intraosseous infusion system

POLICIES:

1. Intensive care unit (ICU) staff must demonstrate competency in order to insert and remove the intraosseous needle
2. Prior to the use of the IO, the nursing staff will be provided with education and training in site selection, insertion, removal, and maintenance of the IO access
3. The IO access may be maintained and removed by an ICU/PCU registered nurse (RN) who has been trained Key Point: The IO access will be removed once as a central line is established or as soon as the device is no longer needed. The IO must be removed within a maximum of 24 hours. Patients with an IO access will be transferred to ICU or PCU for proper maintenance.

INDICATIONS

1. To be used any time peripheral vascular access is difficult/unable to obtain in emergent, urgent, or medically necessary cases.

CONTRAINDICATIONS

1. Fracture on target bone site
2. Previous IO insertion or attempted insertion on target bone within 48 hours
3. Prosthesis or orthopedic procedure near insertion site
4. Severe bone disease (e.g. osteoporosis, osteomyelitis)
5. Peripheral vascular disease with limb ischemia
6. Inability to locate landmarks or excessive tissue at insertion site
7. Patient receiving thrombolytic therapy such as Activase (tPA)
8. Infection at target site

SAFETY

1. Patient should not have an MRI with IO access in place. If MRI is needed, IO access must be discontinued.

EQUIPMENT

1. IO Driver
2. IO needle set
3. IO stabilizer
4. Chlorhexidine swab
5. Extension set

6. 10 mLs syringe
7. IO wrist band
8. 2% Epinephrine-free, preservative-free Lidocaine
9. 10 mLs Sodium Chloride 0.9% for flush
10. Lab supplies if needed (e.g. blood collection tubes)

PROCEDURE:

1. If the patient is conscious, advise of EMERGENT NEED for this procedure and obtain verbal consent or assent
2. Perform hand hygiene and don personal protective equipment (PPE) as needed
3. Prime extension set with Saline or Lidocaine as appropriate
   Key Point: for small doses consider attaching the Lidocaine-filled syringe directly on the IO catheter hub
4. Locate appropriate insertion site
   a. Adult
      i. Proximal Tibia
      ii. Distal Tibia
      iii. Proximal Humerus
   b. Pediatric
      i. Proximal Humerus
      ii. Distal Femur
      iii. Proximal Tibia
      iv. Distal Tibia
5. Prep the site with chlorhexidine gluconate (CHG) scrubbing the skin for 30 seconds
6. Prepare IO driver and appropriate needle set
7. Remove cap
8. Stabilize extremity
9. Insert needle at a 90 degree angle to the bone (45 degrees for proximal humerus) until it hits the bone ensuring visibility of 5mm black mark on needle above the skin
10. Press trigger of driver into bone until there is decreased resistance which indicates entry into intraosseous space
11. Remove stylet and place in the sharps container or sharps block
12. Secure with stabilizer
13. Administer Lidocaine as ordered
    a. Recommended Adult dose
       i. 40mg over 120 seconds
       ii. Allow to dwell for 60 seconds
       iii. Flush rapidly with 5-10 mLs of Normal Saline
       iv. May repeat with half of the initial dose
    b. Recommended Pediatric dose
       i. 0.5mg/kg (NOT to exceed 40mg) over 120 seconds
       ii. Allow to dwell for 60 seconds
       iii. Flush rapidly with 2-5 mLs of Normal Saline
       iv. May repeat with half of initial dose
14. If volume infusion is needed, use pressure bag or IV pump
15. Monitor placement and infusion
16. Place IO wrist band on patient indicating date and time of insertion

NURSING CLINICAL PROTOCOL

1. Assessment – Assess the following immediately after insertion and at a minimum of every 2 hours:
   a. Peripheral pulses
   b. Pain score

c. Signs of extravasation or infiltration
d. Paresthesia

Key Point: Assess site hourly if on continuous infusion

NURSING CONSIDERATIONS

1. Flow rate: Due to the anatomy of the IO space, flow rates may appear to be slower than those achieved with an IV catheter
2. Ensure the administration of an appropriate rapid syringe flush prior to any infusion (No flush = No flow)
3. Pain – Insertion of the IO in a conscious patient has been noted to cause mild to moderate discomfort. However IO infusion has been noted to cause severe discomfort. Administer Lidocaine slowly as ordered.
   Key Point: Total parenteral nutrition and hypertonic saline are not to be administered through IO access
4. Laboratory results are not reliable for CO2, platelets, and WBC when blood sample is obtained from IO access
5. Always indicate that blood sample was obtained from an IO access. Consult with laboratory staff as needed.
6. Maintain strict aseptic technique during tubing change and medication administration

REPORTABLE CONDITIONS

1. Immediately stop infusion and notify physician for any of the following
   a. Signs and symptoms of infiltration or extravasation
   b. IO needle dislodgement
   c. Inability to achieve or maintain desired medication effect within ordered parameters
   d. Increased agitation which places the IO line at risk for accidental dislodgement
   e. Signs and symptoms of infection at the site
   f. Increased pain

PATIENT/FAMILY EDUCATION

1. Instruct patient and family regarding the purpose of the IO access, risks, benefits, and precautions
2. Do not touch, manipulate extremity or IV tubing

REMOVAL OF IO ACCESS PROCEDURE:

1. Remove the extension set and stabilizer
2. Attach a new and empty 5 or 10 mL luer lock syringe to the catheter hub (this will act as a longer handle easing the removal process)
3. Make sure the syringe does not have air or solution in it
4. Gently twist syringe and hub clockwise while slowly applying traction (this relieves the tension between the caterer and the bone).
5. While continuing to rotate begin gently pulling the catheter out without excessive force.
   Key Point: Use of excessive force may cause recoil, injuring the nurse or the patient.
6. Immediately upon removal, place the needle in a sharps container
7. There is usually a minimal amount of bleeding at the site after IO removal. If there is slow bleeding, hold direct pressure with a 4X4 gauze until bleeding subsides. Apply a band aid to the site.

DOCUMENTATION

1. Insertion
   a. Site of insertion and needle description
   b. Name and dose of anesthetic use in MAR

   c. Date and time of insertion
2. Maintenance
   a. Assessment or the insertion site and appearance
   b. Pain assessment at insertion site or on extremity
3. Removal
   a. Date and time
   b. Assessment of insertion site
   c. Dressing application

CLEANING AND DISINFECTING OF EQUIPMENT

1. IO driver must be cleaned and disinfected after each use
2. Don gloves
3. Wipe entire surface of the power driver with hospital-approved disinfectant
4. Gently wipe the exterior surface until visible debris is removed
5. Using sterile swabs moistened with antimicrobial disinfectant solution, gently clean inside opening around metal drive shaft.
6. After cleaning, inspect to ensure no visible debris remains and no damage has occurred

References:

AACN. (2017). *Procedure manual for high acuity, progressive and critical care* (7 ed.). (D. L. Wiegand, Ed.) St. Louis, MI: Elsevier.

Teleflex. (2023). *Resources and Literature. .* Retrieved from Teleflex: https://www.teleflex.com/usa/en/product-areas/emergency-medicine/intraosseous-access/arrow-ez-io-system/clinical-resources/#literature

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