University of Colorado Hospital Policy and Procedure
Intraosseous Lines

Related Policies and Procedures:
Administration of Blood Components
Peripheral Venous Lines
Intravenous (IV) Care and Maintenance

Approved by:  Professional Practice Policy and Procedure Committee
Effective:  2/09
Revised:  3/13

Description:  This policy addresses the insertion, care, and discontinuation of Intraosseous (IO) catheters. Refer to Vascular Access Website for pictures and descriptions of the different IO brands.

Accountability:
Physician may insert IO (Intraosseous) access devices.
Registered nurse (RN) may do the following: Insert IO devices (if competency trained to do so), prime/change IO tubing, perform simple dressing changes including IO site care, access IO lines and draw samples for laboratory testing, administer fluids and medication via IO lines and discontinue a peripheral IO catheter after demonstrating competency.
Emergency medical technicians – paramedic (EMT-P) and emergency medical technicians – basic with IV certification (EMT-B) may do the following: prime/change IO tubing, perform simple dressing changes including IO site care after demonstrating competency and discontinue a peripheral IO catheter. In addition an EMT-P can also insert IO access devices after being competency trained to do so.
Physicians, RNs, EMT-Ps or EMT-Bs are responsible for labeling the IV bag and tubing with any appropriate medication labels and “Day of Change” labels.

Definitions:
Extravasation:  Inadvertent administration of vesicant solution/medication into surrounding tissue.
Infiltration:  Inadvertent administration of non vesicant solution/medication into surrounding tissue.
Intermittent:  Stopping and starting an infusion that is disconnected and reconnected at intervals.
IO:  Intraosseous infusion is the process of injection directly into the marrow of the bone. The needle is injected through the bone's hard cortex and into the soft marrow interior.
IV Tubing:  IV administration sets used to deliver fluids and/or medications via gravity or through an IV infusion pump. These sets include: primary tubing, secondary tubing, extension tubing, and stopcocks.
Intraosseous Lines

Table of Contents

IO Line Insertion .................................................................................................................. 2
IO Line Contraindications ...................................................................................................... 2
IO Line Medication Administration ....................................................................................... 2
IO Site Assessment and Care ................................................................................................. 2
IO Line Discontinuation ......................................................................................................... 3
References ............................................................................................................................ 3
Appendices ............................................................................................................................. 5

Policies and Procedures:

I. Insertion of IO (Intraosseous) Access Devices
   A. Intraosseous (IO) access is intended to be a rapid access route for administering medications, fluids and colloids when vascular access cannot be obtained
   B. Only physicians and competency trained RN’s and EMT-P’s may insert IO access devices
   C. IO access may be present in patients who arrive via field Emergency Medical Services (EMS).
   D. Correct placement and patency is determined by: ability to aspirate blood or marrow from intraosseous site and/or smoothly deliver of intravenous fluid (IV) into the IO site.
   E. Once IO catheter is inserted, check for signs of extravasation of fluid around the IO insertion site. If swelling or infiltration is observed, remove IO device immediately.
   F. Contra-indications for IO placement sites include: fractured extremity of targeted bone, prosthetic joint near insertion site, previous attempt at insertion site, osteoporosis, and infections near insertion site.

II. IO Medication Administration
   A. Appropriate drugs approved to be administered through IO: medications, crytalloids, blood and blood products
   B. Drugs that cannot be infused through IO: TPN, Chemotherapy, IV contrast, and hypertonic saline
   C. Any infusion set with gravity drip tubing may require a pressure infusion device to assist in maintaining an adequate flow rate.
   D. Can use Level One rapid infuser

III. IO Site Assessment and Care
   A. Catheter must be removed within 24 hours or sooner if peripheral or central venous access is obtained.
   B. See Appendix A for additional care and flushing protocols specific to IO Brand being utilized in the patient
   C. Secure the IO device in place, using the IO stabilizer dressing. Of no stabilizer dressing available, may use 4x4 gauze on two sides of needle to stabilize needle before taping in place.
   D. NO LABS can be drawn through IO site due to inconsistency with results

Deleted: Intraosseous Access is intended for rapid emergency vascular access only.
Deleted: inability to aspirate marrow does not indicate incorrect placement.
Deleted: fracture to side more proximal to site, recent fracture of bone, previous orthopedic surgery at insertion site, osteomyelitis, infection present on insertion site, peripheral vascular disease, unidentifiable landmarks, a recent IO placement on same limb/insertion site within last 24 hours.
Deleted: Any drug that can be infused IV (Intravenous) can be infused IO such as blood products, fluids and medications.
Deleted: as soon
Deleted: as
Deleted: used
Deleted: Tape
Deleted: may use 4x4 gauze on two sides of needle to stabilize needle before taping in place.
Deleted: Use hinge tape technique for extension tubing.
A total of 2-5 ml of marrow may be aspirated and sent to the lab for testing. Discard first 2 ml of marrow prior to sending sample.
Intraosseous Lines

E. The IV site and infusion equipment will be checked and documented at least every four hours. More frequent IO site assessments and documentation may be necessary depending on infusion solutions, rates or patient circumstances.

F. Continuously monitor for swelling and other signs of infiltration, extravasation or infection and notify MD if signs or symptoms are present. Inspect the site for the following signs/symptoms: pain, discomfort, phlebitis, infiltration, infection, discoloration, sensation changes, edema, localized swelling, and exudate. Document IO site assessment and care in the medical record.

G. Potential complications of IO access are: compartment syndrome, extravasation, fractures caused by insertion, osteomyelitis, fat embolus, necrosis, and infection at the insertion site.

H. Equipment Inspection: Inspect and monitor the following access equipment: catheter, connections, fluids being infused, and pump function including flow rate.

I. If an IO-related infection is suspected, remove catheter and notify MD.

J. Provide pain relief measures as needed and document patient response.

IV. IO Line Discontinuation

A. See Appendix A for removal techniques specific to IO Brand being used.

B. If unsure which IO brand is in place, consult vascular access website

C. Cannula must be removed with a specific order from the physician when therapy is completed, 24 hours after insertion, when contamination or complication is suspected, as soon as other peripheral or central access is obtained.

1. Gather equipment:
   • Gauze and tape, or Band-Aid
   • Gloves

2. Prior to beginning procedure, wash hands, don gloves

3. Discontinue administration of all infusates.

4. Remove dressing and tape

5. Inspect catheter-skin junction.

6. Remove IO catheter by rotating and gently pulling the catheter away from the site (See Appendix A for removal techniques specific to IO Brand being used).

7. Verify that catheter is intact. (If not intact, notify physician immediately.)

8. Cover site with stabilizer dressing or gauze and tape


10. Continue to monitor site post removal for infection, discoloration, sensation changes, edema, localized swelling, and exudate.

References:
Intraosseous Lines

## Intraosseous Lines

### APPENDIX A

<table>
<thead>
<tr>
<th>Type</th>
<th>Infusion Rates</th>
<th>Flushing Protocol</th>
<th>Removal Technique</th>
<th>Sizes Available</th>
<th>Appropriate Site</th>
<th>Location</th>
<th>Site Care</th>
<th>Deleted:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZ-IO</td>
<td>Any infusion set to gravity drip rate may require a pressure infusion device to assist in maintaining an adequate flow rate, <strong>level one</strong></td>
<td>10ml of normal saline</td>
<td>Support patient’s leg: simultaneously connect a sterile luer lock syringe to the hub of the catheter. Once connected, rotate the syringe and catheter clockwise-while gently pulling. <strong>Do not</strong> rock or bend the catheter while removing.</td>
<td>15G in 15mm, 25mm and 45mm</td>
<td>Proximal and Distal Tibia, Proximal humerus</td>
<td></td>
<td></td>
<td>Abnormal Labs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gauze</td>
</tr>
<tr>
<td>Fast Sternal IO</td>
<td>Gravity drip 30-80ml/min. Pressure Cuff 125ml/min. Syringe 250ml/min.</td>
<td>10ml of normal saline</td>
<td>New FAST1 with blue tip does not require a removal tool. Simply grasp the tube firmly at the insertion and pull to remove. With older FAST1 without the blue tip a remover tool must be used.</td>
<td>one size available</td>
<td>Manubrium, midline 1.5cm below sternal notch</td>
<td></td>
<td></td>
<td>Discard the first 2 ml of marrow</td>
</tr>
<tr>
<td>Bone Injection Gun (B.I.G.)</td>
<td>Optimal flow maintained with pressure bag inflated to 300 mm Hg</td>
<td>Flush with 20-30ml of normal saline prior to initial injection of fluids or drugs. After administration of fluids or drugs flush with 10-20ml of normal saline.</td>
<td>Match the square hole on the safety latch to the square portion of the cannula then twist gently and pull up and out of the bone.</td>
<td>18g and 15g in 5cm and 1.5cm</td>
<td>Tibia tuberosity alternate site: Humerus</td>
<td></td>
<td></td>
<td>Discard the first 2 ml of marrow</td>
</tr>
</tbody>
</table>

### Deleted:
- Abnormal Labs
- Gauze
- Discard the first 2 ml of marrow
- Sternum
- Adult needle is 15 g needle
- Discard the first 2 ml of marrow
<table>
<thead>
<tr>
<th>Type</th>
<th>Infusion Rates</th>
<th>Flushing Protocol</th>
<th>Removal Technique</th>
<th>Sizes Available</th>
<th>Locations</th>
<th>Site Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook IO</td>
<td>Use extension tubing to decrease needle manipulation and potential displacement</td>
<td>May require use of a pressure bag to maintain flow</td>
<td>Gently rotate the cannula and withdraw smoothly.</td>
<td>14g, 16g and 18g in 3cm and 4cm</td>
<td>Tibia</td>
<td>Continuously monitor for swelling and other signs of extravasation.</td>
</tr>
</tbody>
</table>

** Please note, Lab levels are not accurate and inconsistent with IO, therefore DO NOT send labs drawn from IO device.

**Deleted:** Abnormal Labs

**Deleted:** Discard the first 2 ml of marrow.

**Deleted:** General

**Deleted:** Inability to aspirate marrow does not indicate incorrect placement. If the needle is properly placed, fluid should flow smoothly, with only occasional flushes necessary to keep it open. A clinical response to fluid or medications should be seen at approximately the same time and in the same magnitude as with IV administration.

**Deleted:** Crystalloid infusion studies in animals have demonstrated that infusion rates of 10 to 17 mL/min may be achieved with gravity infusion and rates as high as 42 mL/min with a pressure infusion.

**Deleted:** Cover puncture site with sterile gauze and apply pressure for several minutes.

**Deleted:** Total of 2-5 ml of bone marrow can be aspirated for laboratory testing.

**Deleted:** Use hinge tape technique for extension tubing.

Immobilize extremity at joints above and below the site of infusion. Continuously monitor for swelling and other signs of extravasations. Tape in place, may use 4x4 gauze on two sides of needle to stabilize needle before taping in place.