INTRAOSSEOUS INFUSION

Effective Date: February 7, 2014
Replaces: June 2012
Review: November 2016

I. Purpose

The purpose of Policy 700 – M08 is to describe the process of initiating intraosseous infusion and the equipment required to deliver treatment.

II. Definition

Intraosseous infusion provides an effective alternative means of providing fluids and medications to severely ill patients for whom an intravenous line is unsuccessful after two attempts.

III. Indications

a. Any ALS patient for whom immediate fluid or medication treatment is indicated. In addition, patients must have at least one of the following:

1. An altered mental status
2. Respiratory compromise
3. Hemodynamic instability

b. For children and adolescents care should be taken to avoid growth plate areas when inserting the IO needle. In pediatric and adolescent patients, the growth plates are present at both ends of the long bones.

IV. Contraindications

IO infusion is generally not indicated in patients who are awake and is not allowed in patients who do not require immediate fluid or medication therapy, or...
in whom an intravenous line can be established in a timely fashion. **IO insertion shall never be performed for prophylaxis.**

Other contraindications include:

A. Fracture of bone selected for IO infusion
B. Previous orthopedic procedures in bone selected for IO infusion
C. Preexisting medical condition (tumor at the insertion site, significant peripheral vascular disease (etc.)
D. Severe burn or infection at site of insertion
E. Previous IO attempt at chosen site
F. Successful insertion of IV line after 1 or 2 attempts
G. Inability to identify landmarks required to perform procedure
H. *The humeral IO site is contraindicated in pediatric patients* (14 years and <)

V. **Equipment**

A. Alcohol and Betadine pads/swabs
B. Intraosseous needle
C. Pressure bag
D. IV Infusion set, flushed and ready to go
E. 10cc syringes (2)
   (1) A 10cc empty syringe for aspiration
   (2) A 10 cc syringe filled with normal saline for immediate flush
F. 3 way stop-cock

VI. **Procedure**

Select the appropriate IO insertion site (tibial site or humeral site). The humeral site should be reserved as a last resort method.
<table>
<thead>
<tr>
<th>1. Tibial Site</th>
<th>2. Humeral Site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locate the insertion site:</strong></td>
<td><strong>Locate the insertion site:</strong></td>
</tr>
<tr>
<td>• The insertion site is approximately 2-3 cm below the patella and approximately 2 cm (depending on the patient's anatomy) medial to the tibial tuberosity.</td>
<td>• Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body).</td>
</tr>
<tr>
<td>• Clean the site with Betadine</td>
<td>• The insertion site is located directly on the most prominent aspect of the greater tubercle. Slide your thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the <strong>surgical neck</strong>. Approximately 1 cm (depending on the patient’s anatomy) above the <strong>surgical neck</strong> is the insertion site.</td>
</tr>
<tr>
<td>• Use an FDA approved device for insertion and follow the manufacturer’s instructions for use.</td>
<td>• Clean skin with Betadine</td>
</tr>
<tr>
<td>• Stabilize the leg and position the IO insertion device on the insertion site - maintaining a 90 degree angle during the insertion process.</td>
<td>• Use an FDA approved device for insertion and follow the manufacturer’s instructions for use.</td>
</tr>
<tr>
<td><strong>IMPORTANT - Stabilize the needle set prior to any attempt at removing the driver.</strong></td>
<td>• Stabilize the arm and position the IO insertion device on the insertion site - maintaining a 90 degree angle during the insertion process.</td>
</tr>
<tr>
<td>• Remove the stylet and connect the 3 way stop-cock.</td>
<td><strong>IMPORTANT - Stabilize the needle set prior to any attempt at removing the driver.</strong></td>
</tr>
<tr>
<td>• Aspirate the IO with one 10cc syringe.</td>
<td>• Remove the stylet and connect the 3 way stop-cock.</td>
</tr>
<tr>
<td>• The presence of fluid during aspiration is a confirmation of proper placement.</td>
<td>• Aspirate the IO line with one 10cc syringe.</td>
</tr>
<tr>
<td>• Once proper placement is confirmed, flush the IO line with 10cc of normal saline.</td>
<td>• The presence of fluid during aspiration is a</td>
</tr>
<tr>
<td>• Check for infiltration around the IO site.</td>
<td>confirmation of proper placement.</td>
</tr>
</tbody>
</table>

**Drawings courtesy of Viscare Corp., San Antonio, Texas.**
• IMPORTANT – IO infusion is very painful for conscious patients. If conscious, administer Lidocaine to the patient via the IO, 40 mg in adult patients for local anesthesia prior to fluid administration.
• Avoid rocking of the catheter during usage.

confirmation of proper placement.
• Once proper placement is confirmed, flush the IO line with 10cc of normal saline.
• Check for infiltration around the IO site.

VII. Complications

• Embolism
• Subcutaneous infiltration
• Fracture
• Osteomyelitis (bone infection)

VIII. Documentation

• IV attempts
• IO attempts and IO location
• Volume infused upon transfer of patient care to the hospital

IX. Special Circumstances

The EMS medical director authorized prehospital providers to use the drill-inserted IO device in patients who weigh less than 3kg. This authorization is based on recommendations from the manufacturer. There is no need to make base hospital contact for this use. There have been case reports of successful use of drill-inserted IO needles in patients who weigh less than 1.5kg.
Please remember the following:

A. Prehospital personnel may utilize any size needle without the driver. The instructions from the manufacturer clearly state that in the event of driver failure, the paramedic will disconnect the driver and complete the insertion manually.

B. If the child is premature or small in size, it is appropriate to utilize the 15mm needle manually if needed.

C. The paramedic will use a gently twisting motion with firm pressure to accomplish the insertion. The sudden release or “pop” will be an indication of successful entry.

D. If the provider can’t place an intraosseous needle, then it is appropriate to attempt peripheral intravenous access.
INTRAOSSEOUS INFUSION

Introduction:
Intraosseous infusion provides an effective alternative means of providing fluids and medications to severely ill patients for whom an intravenous line is unsuccessful after 2 attempts.

Indications:
- Any ALS patient for whom immediate fluid or medication treatment is indicated. In addition, patients must have at least one of the following:
  > An altered mental status
  > Respiratory compromise
  > Hemodynamic instability
- For children and adolescents care should be taken to avoid growth plate areas when inserting the IO needle. In the pediatric and adolescent patient the growth plates are present at both ends of the long bones.

Contraindications:
IO is generally not indicated in patient who is awake. IO administration is not allowed in patients who do not require immediate fluid or medication therapy, or in whom an intravenous line can be established in a timely fashion. **IO insertion shall never be performed for prophylaxis.**
- Fracture of bone selected for IO infusion.
- Previous orthopedic procedures in bone selected for IO infusion,
- Preexisting medical condition (tumor at the insertion site, significant peripheral vascular disease (etc)
- Severe burn or infection at site of insertion
- Previous IO attempt at chosen site
- Successful insertion of IV line after 1 or 2 attempts
- Inability to identify landmarks required to perform procedure.

Equipment
- Alcohol and Betadine pads/swabs
- Intraosseous needle
- Pressure bag
- IV Infusion set, flushed and ready to go
- 10cc syringes (2)
  - 10cc empty syringe for aspiration
  - 10 cc syringe filled with normal saline for immediate flush
- 3 way stop-cock

**Procedure**
- Select insertion site on antero-medial leg, 1 to 3 cm below tibial tuberosity.
- Clean skin with Betadine
- If conscious the patient will be administered Lidocaine IO, 40 mg in adult patients and 0.5 mg/kg (max dose 40 mg) in pediatric patients, for local anesthesia prior to fluid administration.
- Use an FDA approved device for insertion and follow the manufacturer’s instructions for use.
- Remove stylet and apply 3 way stop-cock.
- Flush with pre-filled syringe and infuse with pre-flushed IV set. Avoid any delay as the needle can quickly clot closed.
- Check for evidence of infiltration.
- Administer fluids using either a syringe or a 250 ml bag of NS under pressure, in 10 ml increments.

**Complications**
- Embolism
- Subcutaneous infiltration
- Fracture
- Osteomyelitis (bone infection)

**Documentation**
- IV attempts
- IO attempts
- Volume infused upon transfer of patient care to the hospital

**Special Circumstances:**
The EMS Medical Director authorized prehospital providers to use the drill-inserted IO device in patients who weigh less than 3kg. This authorization is based on recommendations from the manufacturer. There is no need to make base Hospital contact for this use. There have been case reports of successful use of drill-inserted IO needles in patients who weigh less than 1.5kg.

Please remember the following:
- Prehospital personnel may utilize any size needle without the driver. The instructions from the manufacturer clearly state that in the event of driver failure, the paramedic will disconnect the driver and complete the insertion manually.
- If the child is premature or small in size, it is appropriate to utilize the 15mm needle manually if needed.
- The paramedic will use a gently twisting motion with firm pressure to accomplish the insertion. The sudden release or “pop” will be an indication of successful entry.

If the provider can’t place an intraosseous needle, then it is appropriate to attempt peripheral intravenous access.