

Sierra – Sacramento Valley EMS Agency Program Policy

Vascular Access

	Effective: 12/01/2017	Next Review: 09/2020	1101
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PURPOSE:

To establish vascular access and fluid administration guidelines for prehospital personnel.

AUTHORITY:

- A. California Health and Safety Code, Division 2.5, § 1797.220 and 1798.
- B. California Code of Regulations, Title 22, Division 9, Chapters 3 & 4.

POLICY:

A. Vascular Access Guidelines

1. Over-the-needle catheters may be inserted into peripheral veins of the limbs and external jugular vein for administration of intravenous medications/fluid boluses, or the anticipated need to administer intravenous medications/fluid boluses.
2. Avoid more than three (3) attempts at vascular access per patient unless necessary for emergent treatment.
3. Do not establish access in an extremity that has a functioning dialysis shunt.
4. Do not connect the primary IV tubing directly to the IV catheter. IV extension/saline lock tubing shall be utilized between the primary IV tubing and the IV catheter.
5. Saline locks are optional and encouraged when fluid boluses or numerous medication administrations are not expected to be necessary.
6. When large volumes of fluid may be required, large bore catheters (14-18 gauge) should be used, and placed in proximal veins when available. This includes, but is not limited to, patients requiring adenosine, STEMI patients, stroke patients, trauma patients, and patients in cardiac arrest.
7. Consider establishing two (2) IV's in patients who have, or are at risk for decompensation (e.g. hypovolemic shock). Do not delay patient transport to establish additional vascular access.

8. 'TKO' indicates a rate of 25-30 mL per hour (25-30 micro drops per minute, or 5 macro drops per minute). TKO shall be the default rate unless otherwise specified in the applicable treatment protocol.
9. A 'fluid bolus' in an adult patient consists of up to 1000 mL (unless otherwise specified in the applicable treatment protocol) of crystalloid solution delivered as rapidly as possible, with reassessment of hemodynamic parameters, respiratory status and lung sounds before and after administration.
10. A 'fluid bolus' in a pediatric patient consists of 20 mL/kg of crystalloid solution delivered as rapidly as possible, with reassessment of hemodynamic parameters, respiratory status and lung sounds before and after administration.

B. External Jugular (EJ) Vein Cannulation

1. EJ vein cannulation may be utilized in any situation where an IO would be acceptable.
2. Contraindications (Relative):
 - Suspected coagulopathy (e.g. advanced liver disease or taking coumadin).
 - Suspected cervical spine injury.
 - Inability to tolerate supine position.
 - Stable patient.
3. Procedure:
 - Place patient in trendelenburg or supine position and elevate shoulders.
 - Turn head 45 to 60 degrees to side opposite of intended venipuncture site.
 - Palpate to assure no pulsatile quality to vessel.
 - Prep site with a recognized antiseptic agent, wipe dry with a sterile gauze pad.
 - "Tourniquet" vein by placing finger just above clavicle near midclavicular line.
 - Stabilize skin over vein with thumb.
 - Point needle toward shoulder in direction of vein, and puncture vein midway between jaw and clavicle over belly of sternocleidomastoid muscle.
 - Maintain compression of vein at clavicle area until needle is withdrawn and IV tubing has been connected in order to prevent air from entering vein.
 - Secure IV site.
4. Possible Complications:
 - Air embolism.
 - Hematoma requiring compression of neck.
 - Extravasation of fluid or medication, infection, thrombosis.

C. Intraosseous Infusion

1. Indications:

- Emergency situations when lifesaving fluids or drugs should be administered and IV cannulation is difficult, impossible, or too time consuming (if a peripheral IV cannot be established after two (2) attempts or within 60-90 seconds).
- For adult (paramedics) and pediatric (paramedic or AEMT) patients, weighing ≥ 3 kg, who present with one (1) or more of the following clinical conditions:
 - Cardiac arrest.
 - Hemodynamic instability (B/P < 90 mmHg & clinical signs of shock).
 - Imminent respiratory failure.
 - Status epilepticus with prolonged seizure activity greater than 10 minutes, and refractory to IN/IM anticonvulsants.
 - Toxic conditions requiring immediate IV access for antidote.
- IO placement may be considered prior to peripheral IV attempts in cases of cardiopulmonary or traumatic arrest, in which it may be obvious that attempts at placing a peripheral IV would likely be unsuccessful or too time consuming, resulting in a delay of life-saving fluids or drugs.

2. Contraindications:

- Fracture or suspected vascular compromise in targeted bone.
- Excessive tissue or absence of adequate anatomical landmarks.
- Infection at area of insertion site.
- Previous significant orthopedic procedure at site (e.g. prosthetic limb/joint).
- IO access in targeted bone within past 48 hours.

3. Site Selection:

- Site selection depends on patient age/size/anatomy, presenting condition, ability to locate anatomical landmarks, provider training/experience, and clinical judgment. Site selection is also dependent on the absence of contraindications, accessibility of the site and the ability to monitor and secure the site. Humeral site may be preferred for high volume fluid administration and/or lower extremity trauma (see 'IO Insertion Site Instructions' at the end of this policy).
- No more than one (1) attempt allowed in each bone.

4. Insertion Procedure:

- Prep site with a recognized antiseptic agent, wipe dry with a sterile gauze pad.
- Insert the device according to manufacturer specific directions.
- Attach primed extension set to needle and secure needle per manufacturer instructions.

- For patients unresponsive to pain:
 - Rapid flush with 10 mL of normal saline.
- For patients responsive to pain:
 - Prime extension set with 2% lidocaine
 - Slowly administer 2% lidocaine over 120 seconds.
 - Adult – 40 mg.
 - Pediatric – 0.5 mg/kg (maximum 40 mg).
 - Allow lidocaine to dwell in IO space 60 seconds.
 - Rapid flush with 10 mL of normal saline.
 - Slowly administer a subsequent ½ dose of 2% lidocaine over 60 seconds.
 - Adult – 20 mg.
 - Pediatric – ½ the initial dose (maximum 20 mg).
- Connect fluids to extension set using IV tubing – infusion may need to be pressurized to achieve desired rate.
- Dress site and secure tubing.

5. Possible Complications:

- Infiltration of fluids/drugs into the subcutaneous tissue due to improper placement.
- Cessation of the infusion due to clotting in the needle, or the bevel of the needle being lodged against the posterior cortex.
- Osteomyelitis or sepsis.
- Fluid overload.
- Fat or bone emboli.
- Fracture.

6. S-SV EMS Agency Approved IO Devices:

- NIO™
- EZ-IO®.
- Manual IO device – bone marrow type needles, 15 and 18 gauge size.

D. Preexisting Vascular Access Device (PVAD)

1. Paramedic personnel may access the following types of PVADs on any patient who is in extremis and no other vascular access is available or appropriate:
 - Indwelling catheter/device exiting externally inserted into the superior vena cava or right atrium (Broviac, Hickman, PICC and others).
 - Hemodialysis shunt (fistulas/grafts).

Note: Access that is subcutaneous requiring entry through the skin and special equipment to access is not approved for use by prehospital personnel.

2. Indications:

In the absence of any other observable vascular access, when the patient has one or more of the following:

- Cardiopulmonary arrest.
- Extremis due to circulatory shock.
- Critical need for pharmacological intervention.

3. Complications:

- Infection: Due to the location of the catheter, strict adherence to aseptic technique is crucial when handling a PVAD.
 - Use of sterile gloves is recommended.
 - Prep injectable port and surrounding skin with chlorhexidine prior to attaching I.V. tubing.
 - Use new supplies if equipment becomes contaminated.
 - Re-cover port with sterile dressing and securely tape.
- Air Embolism: The PVAD provides a direct line into the central circulation; introduction of air into these devices can be hazardous.

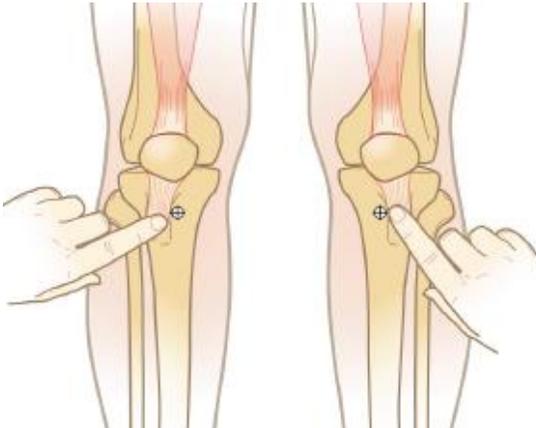
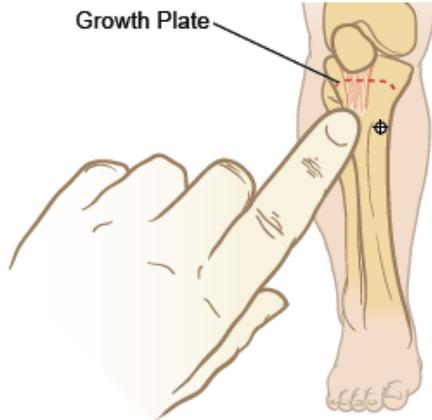
4. Approved Infusions:

- Intravenous solutions.
- All medications except diazepam (Valium) as it interacts with silicone causing crystallization of the medications and deterioration of the silicone.

5. Procedure:

- Do not remove injection cap from catheter.
- Do not use a syringe smaller than 10 ml to prevent catheter damage from excess infusion pressure.
- Always expel air from syringe prior to administration.
- Follow all medications with 5 ml of saline to avoid clots.
- Do not inject medications or fluids if resistance is met when establishing patency.
- Do not allow I.V. fluids to run dry.
- Do not manipulate or remove an indwelling catheter under any circumstances.
- Should damage occur to the external catheter, clamp immediately between the skin exit site and the damaged area to prevent air embolism or blood loss.

IO Insertion Site Instructions

Proximal Tibia – Adults	Proximal Tibia – Infants & Small Children
<p>Extend the leg - insertion site is approx. 3 cm (2 finger widths) below the patella and approx. 2 cm (1 finger width) medial, along the flat aspect of the tibia.</p> 	<p>Extend the leg - insertion site is just below the patella, approx. 1 cm (1 finger width) and slightly medial, approx. 1 cm (1 finger width) along the flat aspect of the tibia. Pinch the tibia between your fingers to identify the center of the medial and lateral borders.</p> 
Distal Tibia – Adults	Distal Tibia – Infants & Small Children
<p>Approx. 3 cm (2 finger widths) proximal to the most prominent aspect of the medial malleolus. Palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.</p> 	<p>Approx. 1-2 cm (1 finger width) proximal to the most prominent aspect of the medial malleolus. Palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.</p> 

Distal Femur – Infants & Small Children

Secure the leg out-stretched to ensure the knee does not bend. Identify the patella by palpation. The insertion site is just proximal to the patella (maximum 1 cm) and approximately 1-2 cm medial to midline.



Humerus – Adult Only

- Place pts hand over the abdomen (elbow adducted and humerus internally rotated).
- Place your palm on the pts shoulder anteriorly.
 - The area that feels like a “ball” under your palm is the general target area.
 - You should be able to feel this ball, even on obese pts, by pushing deeply.
- Place the ulnar aspect of one hand vertically over the axilla.
- Place the ulnar aspect of the opposite hand along the midline of the upper arm laterally.
- Place your thumbs together over the arm - this identifies the vertical line of insertion on the proximal humerus
- Palpate deeply as you climb up the humerus to the surgical neck.
 - It will feel like a golf ball on a tee – the spot where the “ball” meets the “tee” is the surgical neck.
 - The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.

