

Medical Control Guideline: VASCULAR ACCESS

PRINCIPLES:

1. Vascular access is a catheter inserted intravenously (IV) or a needle inserted intraosseously (IO), through which medications and/or fluids can be administered.
2. Not all patients will require vascular access.
3. Peripheral IV, placed by EMS, is the preferred vascular access method for patients requiring parenteral therapy.
4. Intraosseous (IO) placement or use of a pre-existing vascular access device (PVAD) may be necessary for patients requiring emergent prehospital vascular access in whom an IV cannot be readily placed.

GUIDELINES:

Intravenous Lines

1. Paramedics should first attempt placement of an IV saline lock for patients requiring parenteral access for medications or fluid volume.
2. In patients whose clinical condition allows, a minimum of two attempts at IV insertion should be made prior to consideration of IO placement.

Intraosseous Lines

3. IO access is indicated for adult and pediatric patients in cardiopulmonary arrest, shock/poor perfusion, severe burns and extremis when intravenous (IV) access is not possible or cannot be achieved quickly.
 - a. IO contraindications:
 - Deformity, suspected fracture, or infection at the placement site
 - Inability to identify landmarks
 - Knee replacement site
 - b. The most common complication of IO placement is local infiltration of fluid resulting in tissue damage or compartment syndrome. Other, rare complications include skin or bone infection, fat embolism into the patient's circulation, and growth plate injury in pediatric patients.
 - c. If the patient requires vascular access for medication/fluid administration, but does not meet the indications above, **CONTACT BASE** to discuss IO placement.
 - d. If an IO is in place, IV medications may be given by IO route even if not specifically stated in the Treatment Protocol.
4. IO placement is approved for all Provider Agencies for placement at the flat surface of the proximal medial tibia, utilizing the tibial tuberosity (pediatric and adult patients) as the landmark for proper placement. It may also be placed in the greater tuberosity of the

humeral head (adults only - with prior Provider Agency approval by the EMS Agency). The preferred IO site should be free from signs of infection or trauma.

- a. Explain the plan to use the IO as a vascular access site to the patient, family or caregiver if present during the resuscitation.
 - b. IO placement may be attempted once on each tibia and/or each proximal humerus. Note that the proximal humerus site may be more effective for delivering resuscitation medications. However, humeral IO placement should not be attempted unless the paramedic has been trained in use of this location.
 - c. Prior to using the IO line slowly flush with 10mL normal saline. The IO site can be used if it flushes easily without signs of swelling in the soft tissues around or behind the bone.
 - d. Document all sites where IO access is attempted and/or achieved.
 - e. If swelling occurs or infiltration is suspected, stop infusion, remove IO needle, and apply pressure bandage to the IO site.
5. Pain management: If utilizing IO for conditions other than cardiopulmonary arrest, lidocaine should be instilled to decrease pain associated with medication/fluid administration, prior to administration of any other medications/fluids. Infuse lidocaine 2% at the dosage listed below. Slow infusion is necessary to ensure the lidocaine remains in the medullary space of the bone. Allow lidocaine to dwell in space for 60 seconds prior to flushing with normal saline. If patient experiences pain on medication or NS flush after initial dose of lidocaine, repeat with half of the initial dose.
- Adults: **Lidocaine 2% 40mg** slow IO push
 - Pediatric: **Lidocaine 2% (20 mg/ml) 0.5mg/kg** slow IO push, dose per *MCG 1309*. Not to exceed the adult dose.

Pre-existing Vascular Access Devices (PVAD)

6. PVADs (e.g. PICC lines, ports) provide access to the central circulation through a long catheter inserted beneath the skin, allowing rapid, pain-free administration of medications and intravenous fluid.
 - Patients and caregivers can often provide valuable information regarding PVAD.
7. EMS personnel should consider other routes of medication administration such as intramuscular (IM) or intranasal (IN) before using pre-existing vascular access devices in patients without cardiopulmonary arrest.
8. EMS personnel may utilize the following PVADs with externally visible access ports without base order for patients in cardiopulmonary arrest or shock requiring immediate treatment, if unable to place IV or IO successfully at other sites.
 - a. *Peripherally Inserted Central Catheters (PICC lines)* – Figure 1
 - Swab ports with alcohol swabs twice, utilizing two separate alcohol swabs
 - Withdraw 5-10 mL of blood into a syringe to clear any small clots that may have formed before infusing medications/fluids

- b. *Tunneling catheters such as Broviac, Hickman, and Groshong* – Figure 2
 - c. *Non-tunneled, dual lumen catheters used for temporary dialysis access, i.e., Quinton catheters*
9. Base hospital order is required to use any PVADs for patients not in cardiopulmonary arrest or shock.
 10. **Devices that require puncture of the skin (those without visible external access ports) may be accessed ONLY IN CARDIAC ARREST AND WITH BASE ORDER.**
 - a. Arteriovenous shunts (synthetic bridges between the arterial and venous circulation used for dialysis; located under the skin of the forearm) – Figures 3 and 4
 - b. Subcutaneous internal access devices that require access through the skin (often found in the upper chest or forearm) for example, Port-a-Cath – Figure 5
 11. Observe adherence to sterile technique when handling PVADs. Contamination of these devices may cause severe infection or dysfunction requiring surgical removal.
 12. Do not introduce air or allow IV fluids to run dry; these are direct lines into the central circulation.
 13. Use padded hemostats to clamp the catheter if catheter gets damaged during access.

Images: ACCESSIBLE DEVICES – devices with externally visible access ports

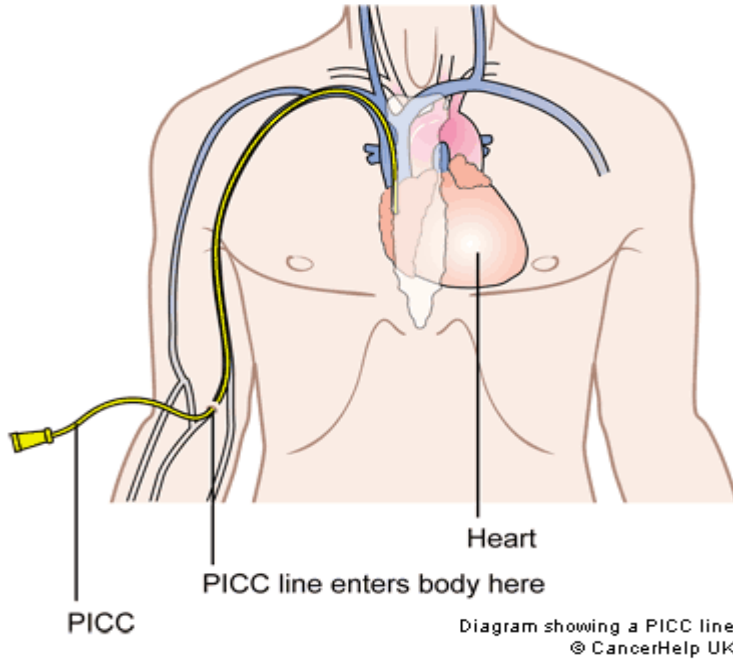


Figure 1: Peripherally Inserted Central Catheter Line (PICC)

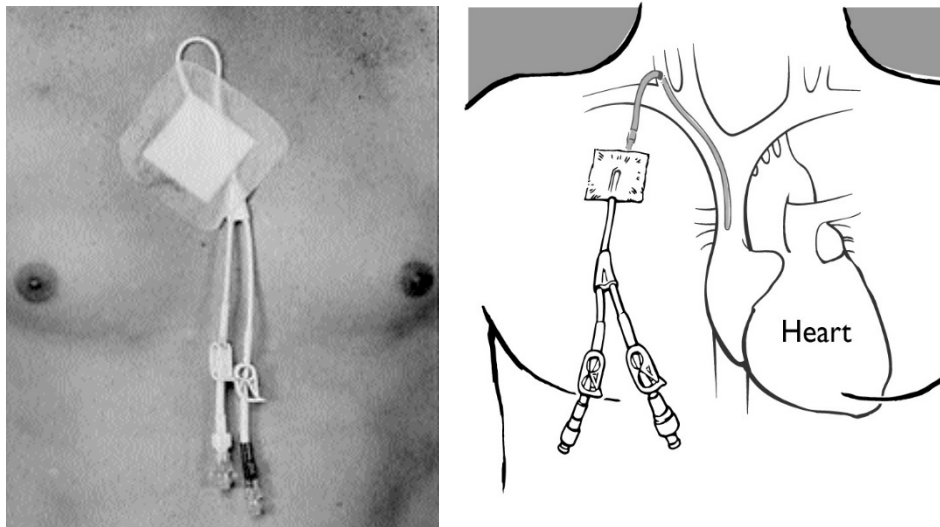
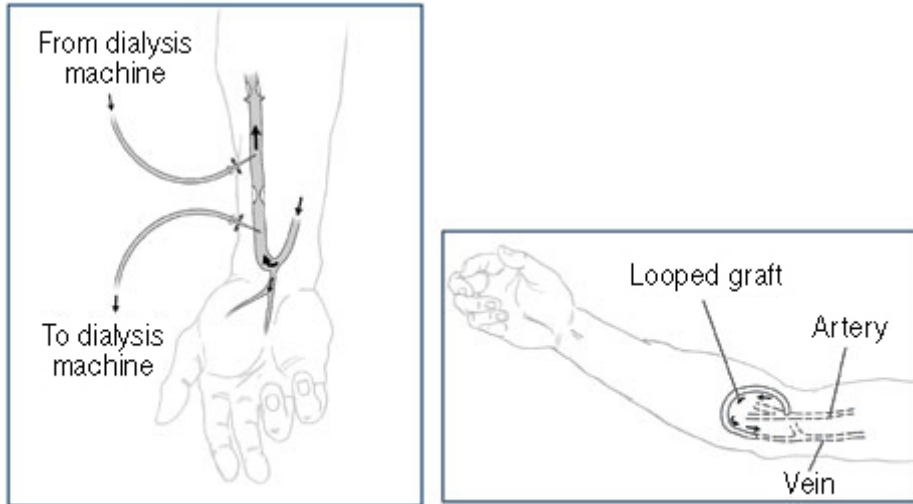


Figure 2: External and internal views: Tunneling Catheter, e.g., Groshong, Hickman, Broviac, and Quinton Cath™.

Images: DEVICES ACCESSIBLE ONLY IN CARDIAC ARREST AND WITH BASE ORDER –no visible external access ports; require skin puncture for subcutaneous internal access.



Figures 3 and 4: Arteriovenous fistula and arteriovenous graft used for dialysis



Figure 5: Port-a-Cath