

Pediatric Vascular Access

Memorial

EMS 

Pediatric Intravenous Cannulation Protocol
(ILS & ALS ONLY)

IV Access

Intravenous cannulation is used in the pre-hospital setting to establish a route for drug administration and/or to provide fluid replacement. Intravenous cannulation should not significantly delay scene times or be attempted while on scene with a trauma patient who meets load-and-go criteria.

1. Explain to the patient the need for and a brief description of the procedure. Use distraction therapy to put the pediatric patient more at ease.
2. Observe the universal precautions for body substance exposure.
3. Obtain an appropriately sized catheter:
 - a) 18 or 20 gauge for trauma patients.
 - b) 20 or 22 gauge for fluid replacement.
4. Check the fluid:
 - a) Is it the right fluid?
 - b) Check the expiration date.
 - c) Check for color and clarity (IVF should be clear with no particles).
5. Connect the administration set to the IV fluid. Make sure that air bubbles are expelled from the tubing and that all chambers have the appropriate fluid levels.
6. Prepare veniguard (or tape).
7. Maintain a clean environment and protect the administration set from contamination. *Any IV supplies that become contaminated (e.g. an uncapped administration set dropped on the floor) should be discarded and replaced with clean equipment.*
8. Apply a venous tourniquet just proximal to the antecubital area.
9. Select (by palpation) a prominent vein. Choose a distal vein on the forearm or back of the hand. The antecubital space may be used if needed for drug administration, fluid replacement, the patient condition requires a more proximal site, or in cases where no other vein is accessible.
10. Cleanse the site with an alcohol prep pad using a circular motion moving outward from the site.
11. Stabilize the vein by applying traction below the puncture site.
12. Inform the patient of your intent to puncture the site.
13. Enter the vein directly from above or from the side of the site. With the bevel of the needle upward, puncture the skin at a 30 to 45 degree angle.
14. If blood returns through the catheter, proceed with insertion. If you do not see blood return, release the tourniquet and discontinue the attempt. If time and patient condition allows, you may attempt another site with a new catheter (do not exceed more than two (2) attempts).

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IV Access {Continued}

15. Insert the catheter. Carefully lower the catheter and advance the needle and catheter just enough to stabilize the needle in the vein. Slide the catheter off of the needle into the vein.
16. Slightly occlude the vein proximal to the catheter with gentle finger pressure. Remove the needle and immediately dispose of it in an approved sharps container.
17. Release the tourniquet.
18. Connect the administration set to the catheter.
19. Open the flow regulator on the administration set and briefly allow IV fluid to run freely to assure a patent line (less than 20mL). If the line is patent, adjust flow rate as indicated by protocol or Medical Control order.
20. Secure the catheter and tubing using a veniguard or tape. Loop the IV tubing and secure to the patient's arm. Do not apply tape circumferentially to the extremity.



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Saline Locks

Saline locks may be used if fluid replacement is not indicated:

1. Assemble the pre-filled saline syringe.
2. Obtain and inspect an injection site link. Inject saline and expel air from the injection site chamber leaving the syringe attached.
3. After successful venipuncture, connect the saline lock to the catheter.
4. Pull back (aspirate) on the syringe to confirm placement by observing for blood return. If blood is aspirated, continue by injecting 2-3mL of saline into the chamber. If no blood is aspirated, discontinue the attempt and prepare to repeat the procedure at a new site.
5. If fluid replacement becomes necessary, attach an administration set to the injection port by needleless device or Luer adapter.
6. Secure the catheter and link using a veniguard or tape.



MEMORIAL EMS SYSTEM
PEDIATRIC PREHOSPITAL CARE MANUAL

**Pediatric Intravenous Cannulation Protocol
(ILS & ALS ONLY)**

Fluid Replacement

Age	Average Weight for Age in Pounds (lbs)	Average Weight for Age in Kilograms (kg)	Fluid Bolus at 20mL/kg
Newborn	7	3	60
3 months	13	6	120
6 months	15	7	140
9 months	20	9	180
12 months	22	10	200
2 years	26	12	240
4 years	35	16	320
6 years	44	20	400
8 years	57	26	520
10 years	66	30	600
12 years	90	41	820

****Total fluid bolus must not exceed 40mL/kg without Medical Control Order. Maximum fluid replacement not to exceed 60mL/kg.**

Pediatric Intraosseous Infusion Procedure (ILS & ALS ONLY)

Intraosseous infusion is defined as a puncture into the medullary cavity of a bone that provides a rapid access route for fluids and medications. Obtaining emergency intravenous access in critically ill pediatric patients (especially those less than 3 years old) can be extremely difficult, time consuming and, at times, impossible. Intraosseous access is performed on critically ill children in whom fluid and/or drug treatment is paramount and intravascular access is not rapidly accessible or feasible.

Indications for IO (*No I.V. attempts required*)

- Any infant/ child in extremis and in need of immediate drug administration or fluid resuscitation.
- Unresponsive or severely altered LOC that is not readily explainable (i.e. not Post-ictal, Hypoglycemia etc.).
- Cardiac/ respiratory arrest.

EZ-IO Procedure

NOTE: The EZ-IO System is the preferred device. However, this device can only be used on children **greater than 3kg**. For children <3kg, refer to the Jamshidi procedure.

1. Observe universal precautions.
2. Prepare the EZ-IO driver and pediatric needle set:
 - a) 15ga, 15mm long needle (*pink*) for patients weighing **between 3kg and 39k**
 - b) 15ga, 25mm long needle (*blue*) for patients weighing **greater than 40kg**
3. Locate landmark of insertion site by palpating the anterior surface of the tibial bone 1-3 cm below the tibial tuberosity and slightly medial. Landmark for insertion must avoid the joint and epiphyseal plate.
4. Prep the site with Betadine and set up infusion solution as for regular IV.
5. Stabilize site and insert appropriate needle set.
6. Remove EZ-IO driver from needle set while stabilizing catheter hub.
7. Remove stylet from the catheter; place stylet in EZ-IO shuttle or approved sharps container.
8. Attach 5-10mL syringe and aspirate bone marrow to confirm placement.
 - a) IO catheter should be at a 90 degree angle and firmly seated in the tibial bone.
 - b) Blood may be visible at the tip of the stylet.
 - c) The IO catheter should flush freely without difficulty or evidence of extravasation.
9. Connect the luer-lock equipped IV administration set.
10. For **conscious** patients you may first administer **Lidocaine (slowly): 0.5mg/kg IO (maximum dose; 40mg)**.

**Pediatric Intraosseous Infusion Procedure
(ILS & ALS ONLY)**

EZ-IO Procedure {Continued}

11. Then rapidly flush the IO catheter with 5mL of normal saline.
12. Utilize a pressure bag for continuous infusions where applicable. If a pressure bag is not available, wrap a BP cuff around the bag of IV fluids and inflate the cuff until desired flow rate is achieved.
13. Dress site, secure tubing and apply wristband as directed.
14. Closely monitor EZ-IO site en route.

Critical Thinking Elements

- Do not access a site that is fractured at or above the insertion site or has obvious indications of infection
- Do not use an area previously used for IO attempts.
- **Sometimes marrow cannot be aspirated and does not necessarily indicate improper placement.**
- Excessive movement of the IO needle may result in leakage.
- The volume of pediatric fluid resuscitation is based on weight and clinical response. Pediatric fluid administration must be carefully regulated.

Pediatric Intraosseous Infusion (IO) Procedure (ALS ONLY)

Jamshidi Style IO Procedure- ALS Only

NOTE: The EZ-IO System is the preferred device for children weighing greater than 3kg. The Jamshidi IO should be used in children weighing less than 3kg.

1. Observe universal precautions.
2. Assemble and prepare equipment.
3. Locate landmarks of insertion site by palpating the anterior surface of the tibial bone 1-3 cm below the tibial tuberosity and slightly medial. Landmark for insertion must avoid the joint and epiphyseal plate.
4. Prep the site with Betadine and set up infusion solution as for regular IV.
5. With sterile technique, using a commercial IO (Jamshidi) needle, insert needle at a 90 degree angle and slightly 10-15 degrees inferior through the bone using firm downward pressure with a twisting motion. You should feel a “pop” when the needle goes into the medullary space.
6. Remove the inner stylet and attach a 5-10mL syringe. Aspirate for bone marrow contents, and then connect a conventional IV line with pressure infuser (or BP cuff).
7. Secure the line with tape and dressing.
8. Administer drugs and fluids as needed.
9. Assess sight for signs of infiltration or leakage. Discontinue IO line if either of these occurs.

Critical Thinking Elements

- Do not access a site that is fractured at or above the insertion site or has obvious indications of infection.
- Do not use an area previously used for IO attempts.
- Sometimes marrow cannot be aspirated and does not necessarily indicate improper placement.