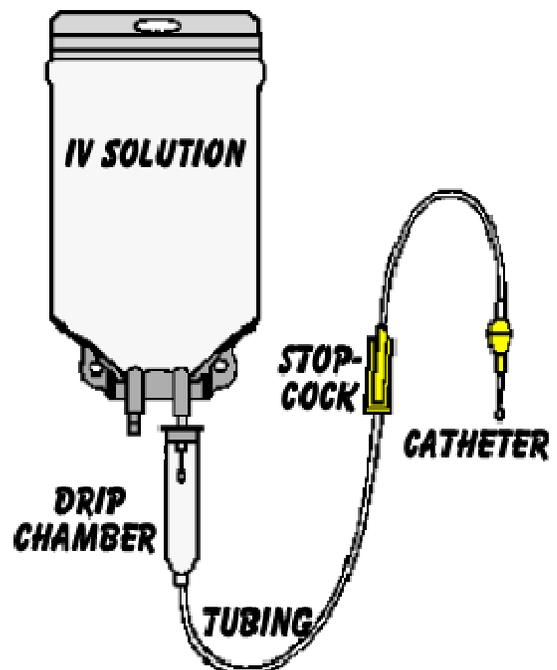




Objectives:

- Identify the various components of a peripheral limb IV.
- Identify the types of IV solutions that may be transported by the EMT-Basic according to Maryland Medical Protocols pages 189-191.
- Identify situations requiring an ALS provider to transport the patient with a peripheral limb IV.
- Identify the complications that may arise from IV therapy and the EMTB interventions to mitigate them.
- Describe the procedure to discontinue a peripheral limb IV.
- Identify the documentation required on the run report when transporting a patient with an established IV.
- Identify situations requiring the EMTB to by-pass the local Emergency Department on a patient with a peripheral limb IV.



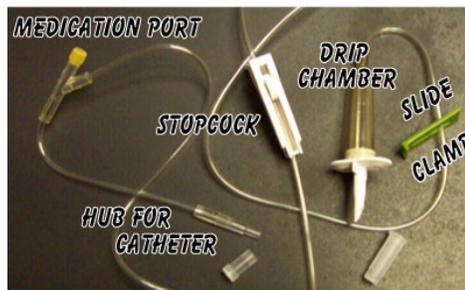
IV SOLUTIONS

IV solutions are usually packaged in 250ml, 500ml and 1000ml bags. You may see IV bags as small as 50ml in use in the hospital. These small IV bags are usually either for pediatrics or are medicated IVs.

Per Maryland Protocol, the EMTB may transport and maintain the IV in patients with the following IV solutions:

- Lactated Ringer's solution.
- 2.5% up to 10% dextrose in water.
- 0.25% up to 0.9% saline solution.
- Potassium Chloride (KCL) added to any of the above solutions not to exceed 20 milliequivalents per liter (20mEq/L).
- Total Parenteral Nutrition (TPN) - a patient being fed through an IV.

Administration Sets



Administration sets carry the IV fluid from the IV bag to the IV catheter, which is inserted into one of the patient's veins. Administration sets provide fluids in larger volume (macro-drip) or in very small volume (micro-drip or mini-drip). The tubing can vary in size from 24" to as much as 6 feet.

NOTE: Not all administration sets have a slide clamp

Large volume sets (macro-drip) deliver fluid at a rate of 10 or 15 drops per milliliter. These are used for fluid replacement and the infusion of whole blood or blood products. Among their many uses, you will find them used on trauma patients and dehydrated patients. The normal KVO (keep vein open) rate for an IV is 1 ml/minute. So a 10-drop set would be 10 drops per minute, or 1 drop every 6 seconds. A 15 drop set require 15 drops/minute or 1 drop every 4 seconds.



Mini-drip sets deliver at a rate of 60 drops per milliliter. They can often be identified by the small, metal tube inside the drip chamber, although manufacturers conceal this tube in the upper end of the chamber. There may also be the number "60" stamped on one of the 'wings' at the top of the chamber, indicating that it is a 60 drop/ml administration set.



Because of their low flow rates, mini-drips are well suited for precise medication administration where a medication is injected into the IV bag, then infused via IV drip over an extended period of time. Since a mini-drip set needs 60 drops to deliver 1 ml of fluid, the KVO flow rate would be 1 drop every second to deliver 1ml/minute.



You may also find an extension set or a 3- or 4-way stopcock valve extension set used to 'piggyback' IVs or administer medications directly into the IV tubing, rather than the bag, via IV push.

Patient Controlled IVs

- The EMTB is authorized to be the primary caregiver for patients with established IV therapy under the following conditions:
 - The reason for transport is NOT related to complications associated with the IV line or the medications being infused, and
 - The patient has been caring for the IV line, fluids, and/or medications without the assistance of a healthcare provider.
 - The patient's current illness/crisis has not rendered them unable to manage their IV (i.e. altered LOC, unconscious, seizures, etc.).

If the patient does NOT manage their own IV, the EMTB may transport the patient ONLY if one of the following persons accompanies the patient in the patient compartment of the ambulance:

- The family member who has been trained and daily manages the patient's IV line, fluids and medications.
- A Registered Nurse.
- An appropriately trained ALS provider.



If the patient has an infusion pump and is not capable of managing their IV due to the current illness/crisis, one of the above persons MUST accompany the patient in the patient compartment of the ambulance.

UNDER NO CIRCUMSTANCES SHALL THE EMTB ATTEMPT TO MAKE ANY ADJUSTMENTS TO INFUSION PUMPS, NOR SHOULD THE EMTB ADMINISTER ANY ADDITIONAL MEDICATIONS OR IV FLUIDS.

Transport Criteria

- **Reason for patient transport must not be related to the IV or medications or solutions being infused.**
- **IV must contain only fluid permitted by Maryland Medical Protocols:**
 - Lactated Ringer's solution.
 - 2.5% up to 10% dextrose in water.
 - 0.25% up to 0.9% saline solution.
 - Potassium Chloride (KCL) added to any of the above solutions not to exceed 20 milliequivalents per liter (20mEq/L).
 - Total Parenteral Nutrition (TPN) - a patient being fed through an IV.
- **Confirm the appropriate drip rate prior to transport and ensure that the IV is flowing at the prescribed rate.**
- **Ensure that the IV bag contains an adequate volume of fluid for the transport. Rule of thumb: at least 50% more fluid than necessary for a non-emergency transport to the receiving facility.**
 - If fluid is inadequate, have the healthcare facility replace the solution with a bag with adequate volume or have them discontinue the IV.
- **Patient must have no signs or symptoms of complications of IV Therapy**

If IV does not meet criteria above, an appropriate level health care provider must accompany the patient in the patient compartment of the ambulance.

- If appropriate healthcare provider is not available to accompany the patient, personnel at the healthcare facility need to replace the IV solution with an acceptable solution, or the IV needs to be discontinued and/or secured with a saline/heparin lock.
- OR call for an ALS unit for transport
- **On a call to a residence, if the patient has a primary hospital that is not the closest hospital, transport to the patient's primary care hospital.**
 - **Example:** Child with Special Healthcare Needs is treated at Children's Hospital National Medical Center, the child should be transported there. If not reasonable to do so, consult with Children's and the receiving hospital.

CONTRAINDICATIONS

for EMTB Transport:

- All of the following situations require ALS transport for the patient with an IV if:



- The reason for transport (Chief Complaint) is related to a complication with the IV line.
 - The reason for transport (Chief Complaint) is related to a reaction with the IV solution or medication.
 - The patient has a central line (including PICC) that is running fluids and or medications. If the central line is capped (heparin-locked) and no fluids are running, the patient may be transported via BLS ambulance.
 - The IV solution contains medications
 - The IV solution contains whole blood or blood products, such as plasma, platelets, or packed red blood cells.
- ALS interventions are required to care for the patient.
 - The patient's fluids or TPN are controlled by an infusion pump and the primary care-giver is not accompanying the patient or if patient controlled, the patient is not capable of caring for the IV during transport.
 - IV was initiated by ALS EMS. If ALS initiates the IV, ALS transports the patient.
 - EXCEPTION: ALS initiated IV in a multi-casualty incident where adequate ALS transport is not available and the patient & IV solution meet the EMTB transport criteria.

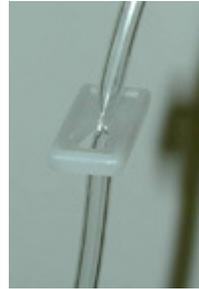
Complications of IV Therapy

- **LOCAL COMPLICATIONS: complications at the IV site.**
 - pain
 - hematoma
 - infiltration
 - blood and/or fluid leaking from the IV site
 - swelling at the puncture site - with or without pain
 - cool skin at IV site
 - flow rate sluggish or absent
 - infection (localized to the IV site)
 - dislodged catheter
 - tissue sloughing
- **CENTRAL COMPLICATIONS: Complications that affect the entire body.**
 - air embolism
 - catheter embolism (catheter or part of the catheter breaks from hub and is carried by the blood through the vein)
 - congestive heart failure (CHF)
 - overhydration
 - pulmonary edema (usually due to overhydration or CHF)
 - pulmonary thromboembolism
 - sepsis (infection)
 - syncope (fainting)
- **GENERAL COMPLICATIONS: Complications that involve the IV components.**
 - restricted flow
 - bent tubing
 - fluid-filled drip chamber
 - inappropriate bag placement
 - empty IV solution bag

Discontinuing IV Therapy

If the patient has any local or central complication of IV therapy, consult for medical direction to discontinue (remove) the IV. The EMTB is authorized to discontinue peripheral limb vein IVs only.

Stop the flow of the IV using the flow regulator or the slide clamp.



Remove the Tegaderm or band-aid from over the catheter site.



Put finger pressure over the catheter site and gently remove catheter.



Hold a pressure dressing over the catheter site for 3-5 minutes, then secure with tape.



Be sure to document the time the IV was discontinued and who gave the order to discontinue.

If medical direction is genuinely not obtainable, the EMTB is to discontinue the IV as soon as possible.

REMEMBER: The EMTB is authorized to discontinue **peripheral limb vein IVs only**: No PICC lines, central catheters, IOs, etc..

Documentation

- It is essential to document the following information on the run report when transporting a patient with an established IV:
 - **Type of IV solution**
 - If provider controlled, must be one of the following:
 - Lactated Ringer's solution.
 - 2.5% up to 10% dextrose in water.
 - 0.25% up to 0.9% saline solution.
 - Potassium Chloride (KCL) added to any of the above solutions not to exceed 20 milliequivalents per liter (20mEq/L).
 - Total Parenteral Nutrition (TPN).
 - If patient controlled:
 - type of solution.
 - Any pre-mixed medication included in the solution.
 - If controlled by another patient-care provider:
 - Care-provider's name & certification/licensure level.
 - type of solution.
 - Any pre-mixed medication included in the solution.
 - **The amount (volume) of fluid infused during transport.**
 - **Any complications encountered en route.**

Quiz

1 A conscious cancer patient has fallen at home and has a possible broken ankle. He has an IV running containing pain medication that he controls himself. After immobilizing the ankle, the EMTB should:

A Consult medical control for permission to transport the patient.

B Call for a Medic Unit to transport and manage the medicated IV.

C Transport the patient to the nearest appropriate hospital.

D Transport the patient only if an authorized caregiver accompanies him to the hospital

2 A 7 month-old infant on a home ventilator has a medicated peripheral limb vein IV running and is suffering from a persistent systemic infection not associated with the IV. The mother is the primary care-giver and calls 911. She will accompany the infant in the back of the ambulance and requests the infant be taken to Children's Hospital National Medical Center. The EMTB should:

A Consult medical control for permission to transport the patient.

B Call for a Medic Unit to transport and manage the medicated IV.

C Transport the mother and baby to the nearest hospital with a Pediatric Emergency Department.

D Transport the mother and baby to Children's Hospital

3

A 5 month-old boy on a home ventilator has a medicated IV running through a PICC line and is suffering from a moderate fever. The mother is the primary care-giver and calls 911. She will accompany the infant in the back of the ambulance and requests the infant be taken to Children's Hospital National Medical Center. The EMTB should:

A

Consult medical control for permission to transport the patient.

B

Call for a Medic Unit to transport and manage the medicated PICC line.

C

Transport the mother and child to the nearest hospital with a Pediatric Emergency Department.

D

Transport the mother and child to Children's Hospital

4

A 3 month-old girl on a home ventilator has a medicated peripheral limb vein IV running and is suffering from a persistent systemic infection not associated with the IV. The mother is the primary care-giver and calls 911. She requests the infant be taken to Children's Hospital National Medical Center, and will follow the ambulance in her personal vehicle (POV). The EMTB should:

A

Consult medical control for permission to transport the patient.

B

Call for a Medic Unit to transport and manage the baby with the medicated IV.

C

Transport the infant to the nearest hospital with a Pediatric Emergency Department.

D

Transport the infant to Children's Hospital.

5

You respond to a nursing home for a sick person to find an 87 year-old female with severe flu-like symptoms. She has an IV in her left forearm running normal saline (NS) with 40 mEq of Potassium Chloride (KCL). The EMTB should:

A

Consult medical control for permission to transport the patient.

B

Call for a Medic Unit to transport and manage the 40 mEq KCL medicated IV.

C

Transport her to the nearest appropriate hospital Emergency Department.

D

Transport her to the nearest Geriatric Referral Center for treatment

6

You have responded to a walk-in clinic for a 19 year old male in severe abdominal pain. The patient has an IV of Lactated Ringers (LR) running at a rate of 10 ml/minute in his right arm with approximately 200 ml of fluid remaining in the bag. Due to traffic, approximate drive time to the receiving hospital is 15-20 minutes. The EMTB should:

A

Consult medical control for permission to transport the patient.

B

Have the clinic staff hang a full bag of LR, or either discontinue or cap-off the IV.

C

Call for a Medic Unit to transport and manage the IV.

D

Transport the patient to the hospital

7

Your 38 year-old female priority 2 patient was complaining of trouble breathing, which was alleviated when you administered a dose from her albuterol inhaler. The ALS unit arrived at the scene 3 minutes behind you, and has started an IV per ALS protocol. After completion of the on-scene care, this patient should be:

A

Transported via BLS after consulting medical control.

B

Transported via ALS because the Medic Unit performed ALS procedures.

C

Transported via BLS ambulance as the patient is not a priority 1 patient.

D

It makes no difference whether this patient is transported via ALS or BLS ambulance.

8

You responded for a 'sick person' who is a 37 year-old male with terminal cancer and a valid DNR-B. He has a patient-controlled medicated IV with pain medication. Recently, his doctor changed his pain medication, and he feels like he's having a reaction to the new medication. This patient should be transported:

A

via BLS after consulting medical control.

B

via ALS because of a complication with the IV.

C

via BLS ambulance as the patient does not have a valid DNR-A.

D

via BLS - the patient is the IV manager.

9

You respond to a nursing home for an 87 year old male patient with the flu who has an IV of Normal Saline in his left arm. The IV catheter site is swollen, discolored and painful. The drip chamber shows almost no flow whatsoever. The EMT should:

A

Have an ALS unit respond for the problematic IV.

B

Improve the fluid flow by adjusting the drip rate to the prescribed rate.

C

Apply pressure to the IV bag to increase the flow through the drip chamber and tubing.

D

Have the nursing home discontinue the IV or consult medical control for permission to discontinue the IV.

10

You are transporting a 47 year-old cancer patient with a capped-off central-line IV who has fallen and injured his knee. On the way to the hospital, the cap comes off of the central line and blood begins to flow from the catheter. The EMT should:

A

Have an ALS unit respond for the problematic IV.

B

Put a dressing over the cap site to stop the bleeding.

C

place a gloved thumb over the open IV catheter to manually control the bleeding from the open cap site.

D

consult medical control for permission to discontinue the IV.

Answers

1. C
2. D
3. D
4. B
5. B
6. B
7. B
8. B
9. D
10. C