

# Intravenous Therapy

## **Introduction:**

Intravenous (IV) fluids (solutions infused into a patient's vein) are used to:

Maintain or restore fluid balance when oral replacement is inadequate or impossible

Maintain or replace electrolytes

Administer water-soluble vitamins

Provide a source of calories

Administer drugs

Replace blood and blood products

## **Types of solutions:**

There are two types of IV solutions: crystalloid and colloid

Crystalloid solutions (water and other uniformly dissolved crystals, such as salt and sugar) and colloid solutions (water and molecules of suspended substances, such as blood cells, and blood products such as albumin) are commonly administered intravenously.

## **Crystalloid Solutions**

Crystalloid solutions are classified as isotonic, hypotonic, and hypertonic depending on the concentration of dissolved substances in relation to plasma. The concentration of the solution influences the osmotic distribution of body fluid.

## **Isotonic Solutions**

An isotonic solution (one that contains the same concentration of dissolved substances as normally found in plasma) is generally administered to maintain fluid balance in patients who may not be able to eat or drink for a short period of time. Because of its equal concentration, an isotonic solution does not cause any appreciable redistribution of body fluid.

## **Hypotonic solutions**

A hypotonic solution (one that contains fewer dissolved substances than normally found in plasma) is administered to patients with fluid losses in excess of fluid intake, such as those who have diarrhea or vomiting. Because hypotonic solutions are dilute, the water in the solution passes through the semipermeable membrane of blood cells, causing them to swell. The water also passes through capillary walls and becomes distributed within other body cells and the interstitial spaces. Hypotonic solutions, therefore, are an effective way to rehydrate patients with fluid deficits.

## Hypertonic Solutions

A hypertonic solution (one that is more concentrated than body fluid) draws cellular and interstitial water into the intravascular compartment. This causes cells and tissue spaces to shrink. Hypertonic solutions are not used very frequently, except in extreme cases where it is necessary to reduce cerebral edema or expand the circulatory volume rapidly.

## Colloid Solutions

Colloid solutions are used to replace circulating blood volume, because the suspended molecules pull fluid from other compartments. Examples of colloid solutions are blood, blood products, and solutions known as plasma expanders.

## Venipuncture:

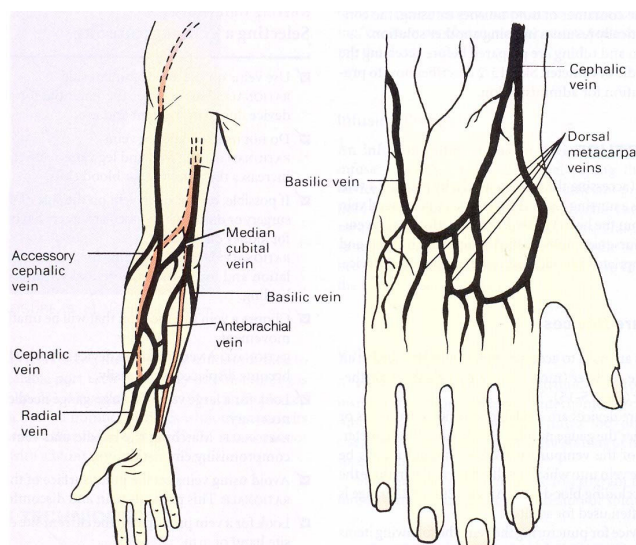
Accessing the venous system by piercing a vein with a needle.

## Equipment:

- 18, 20 or 22-gauge angiocatheter
- Clean and disposable gloves
- Tourniquet
- Alcohol swab
- Transparent dressing
- Adhesive tape

## Vein Selection:

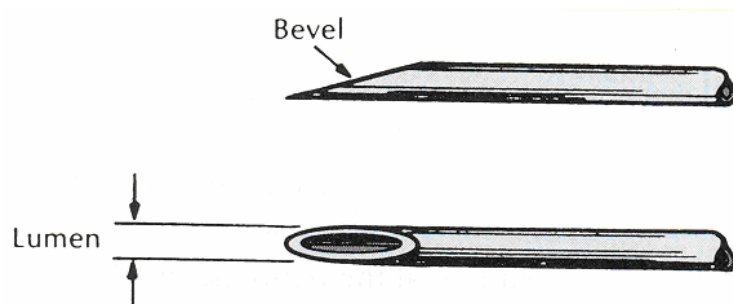
The veins in the hand and forearm are most commonly used for inserting a venipuncture device.



Potential venipuncture sites

## Technique:

١. Review the patient's medical record to determine whether there are any allergies to Iodine or tape.
٢. Bring all the necessary equipment to the bedside.
٣. Position the patient on his or her ba.
٤. Inspect and palpate several potential venipuncture sites. select a site most likely to facilitate the purpose for the infusion and comply with the criteria for vein selection.
٥. Clip body hair at the site if it is excessive.
٦. Apply topical anesthetic such as Numby Stuff or EMLA cream [Lidocain-P (prilocain) is more available and cheaper in Iran]. Tear strips of tape, open the package with the venipuncture device, and place antiseptic ointment on an opened Band-Aid or gauze square, based on the agency's policy.
٧. Wash your hands.
٨. Apply a tourniquet or a blood pressure cuff ٥ to ١٠ cm above the vein that will be used.
٩. Use an antimicrobial solution such as Betadine and/or alcohol to cleanse the skin, starting at the center of the site outward ٥ to ١٠ cm. Allow the antiseptic to dry.
١٠. Don clean gloves.
١١. Use the thumb to stretch and stabilize the vein and soft tissues about ٥cm below the intended site of entry.
١٢. Position the venipuncture device with the bevel up and at approximately a ٤٥° angle above or to the side of the vein.



١٣. Warn the patient just before inserting the needle.
١٤. Feel for a change in resistance and look for blood to appear behind the needle. Once blood is observed, advance the needle about ٠,٥ to ١ cm.

15. Withdraw the needle slightly so that the tip is within the catheter. Slide the catheter into the vein until only the end of the infusion device can be seen.
16. Release the tourniquet.
17. Apply pressure over the internal tip of the catheter.
18. Remove the protective cap covering the end of the IV tubing and insert it into the end of the venipuncture device. Release the roller clamp and begin infusing solution slowly.
19. Remove gloves when there is no longer a potential for direct contact with blood.
20. Place a small amount of antiseptic ointment onto the site or dressing. Secure the catheter by criss-crossing a piece of tape from beneath the tubing. Cover with a piece of transparent tape. Cover the entire site with additional strips of tape, taking care to loop and secure the tubing.
21. Write the date, time, gauge of the catheter, and your initials on the outer piece of tape.
22. Tighten or release the roller clamp to regulate the rate of fluid infusion.

### **Complications:**

- Infiltration (escape of IV fluid into the tissue)
- Phlebitis (inflammation of a vein)
- Thrombus formation (stationary blood clot)
- Pulmonary embolus (blood clot that travels to the lung)
- Infection (growth of microorganisms at the site or within the blood stream)
- Air embolism (bubble of air traveling within the vascular system)

# Checklist for Venipuncture

1. Mentions hand washing
2. Assembles correct equipment in the tray
3. Introduces oneself to the patient and checks patient's name
4. Explains procedure to the patient and gets verbal consent
5. Applies a tourniquet in the correct location
6. Wears gloves
7. Selects a suitable vein
8. Uses alcohol swab to clean skin
9. Applies topical anesthetic agent
10. Inserts cannula at approx 30° angle to skin
11. Warns patient just before inserting the needle
12. Gets a flashback of blood
13. Withdraws the needle slightly so that the tip is within the catheter
14. Releases the tourniquet
15. Slides the catheter into the vein until only the end of the infusion device can be seen
16. Applies pressure over the internal tip of the catheter
17. Removes the protective cap covering the end of the IV tubing and insert it into the end of the venipuncture device.
18. Releases the roller clamp and begins infusing solution slowly
19. Removes gloves
20. Secures the catheter by criss-crossing a piece of tape from beneath the tubing
21. Thanks and listens to the patient's questions