

Sometimes a patient just needs fluids, and at other times the patient may need additives, total parenteral nutrition (TPN), or blood. The three main types of fluids or solutions are as follows:

1. **Dextrose:** A dextrose solution is a sugar and water solution. Dextrose 2.5% in water (D2.5W), 5% in water (D5W), and 10% in water (D10W) are the most popular. Dextrose can also come in combinations of 20% to 70%, but these are for patients with extremely low blood glucose levels, such as diabetic patients, infants, and severely malnourished patients, and are given only under very controlled circumstances, usually in an emergency room or intensive care unit.
2. **Saline:** If sugar is not needed, a saline, or sodium chloride (salt), solution may be prescribed. Sodium is a vital electrolyte for the body because it helps cells function normally along with other electrolytes such as potassium and magnesium. The usual solution, 0.9% sodium chloride (NaCl), is called normal saline solution (NSS). Also available is 1/2 NSS, which is 0.45% NaCl. NSSs can be added to dextrose solutions, such as D5NS, or D10/0.45 NaCl.
3. **Lactated Ringer's:** Lactated Ringer's solution was created by Sidney Ringer, an English physiologist who mixed dextrose, potassium chloride, sodium, lactate, and calcium to form an especially healthful mixture for patients. Other names for these mixtures include Ringer's lactate (RL) and dextrose 5% in lactated Ringer's (D5LR).

These three solutions are examples of crystalloids, which are simple solutions used to increase fluid volume when a patient is dehydrated or possibly in shock from bleeding. All these solutions are usually stored in dark cabinets because they can deteriorate if exposed to light for long periods of time. IV solutions look similar, so it is important to check the label against the order three times, as for any other medication.

Drugs administered by the IV route are given in one of three ways: infusion, piggyback line, or IV push. Infusion is slow IV administration of a large volume of fluid. The solution can contain additives such as medications, electrolytes, or minerals. IV fluid is usually packaged in a 250- to 1,000-mL bag or bottle. The health professional hangs the bag on a pole that is raised higher than the patient's heart. The fluid then flows into the vein by gravity or via an infusion pump. Some pumps strictly monitor the infusion rate, whereas others push the fluid into the patient's vein while regulating the infusion rate and the pressure it takes to infuse the fluid. Patient-controlled analgesia (PCA) pumps allow patients to push a button and receive medication, usually pain medication (such as morphine or Demerol), on demand within parameters ordered by the physician. Typically, licensed health professionals program these pumps and then lock them.

The possible complications of IV therapy are many, and as a health professional, you should be comfortable recognizing a problem, even if you are not responsible for implementing and administering the IV therapy. In some states and some facilities, health professionals can insert IV lines, hang IV fluids, disconnect IV lines, or flush indwelling ports. In other facilities and localities, these tasks are considered solely nursing functions. Become familiar with your state and facility parameters for your role so that you do not practice out of your permitted area. However, it is helpful to understand IV therapy, and you should be prepared to assess patients for signs and symptoms of infection and other problems associated with their IV lines.

A CLOSER LOOK 10.2: Dialysis: Not for Veins

An IV solution treatment option for patients who have kidney problems is dialysis. If you work at a dialysis clinic, you need to understand the process. Dialysis refers to the passage of small particles through membranes. Electrolytes and drugs move from areas of high concentration to areas of lower concentration (osmosis). During this process, waste products are removed from the blood and then from the body. Normally, the kidneys perform this function, but when they are not working correctly, a machine must be used.

Dialysis solutions are never put directly into patients' veins, but they can be placed in a dialysis machine or across a membrane such as the peritoneum. If the patient lacks the electrolyte needed, it crosses from the solution into the blood. If the patient has too much of an electrolyte, it crosses from the blood into the dialysis solution.