UW Medicine
UNIVERSITY OF WASHINGTON MEDICAL CENTER

Hemodialysis

A treatment option for kidney disease

Class Goals

1. **Understand the purpose and care of blood access.**
2. **Understand the purpose and basic principles of hemodialysis.**
3. **Understand home, daily, and in-center hemodialysis.**

Overview

Hemodialysis uses an artificial kidney to clean your blood of wastes and excess fluids. This process can be done at home or in a dialysis center. Studies show that daily hemodialysis can improve quality of life. Your doctor will prescribe the right length of time for your treatments and how often you need them.

Fistulas, grafts, and catheters are the options for ways to access your veins (*blood access*) for hemodialysis. Fistulas are usually the best option. They are described on pages 7 and 8 of this chapter.

Blood access must be well-maintained and cared for to help prevent infection and clotting.

Treatment Options for Kidney Disease

When your kidneys stop working, your 3 treatment options are:

- Dialysis
- Transplantation
- No treatment

Dialysis and transplant help you feel better and live longer. But, they do not cure kidney disease. Talk with your doctor about which treatment option will work best for you.

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Types of Dialysis

Dialysis is a process that removes wastes and extra fluid from the blood. The 2 major types of dialysis are *hemodialysis* (HD) and *peritoneal dialysis* (PD).

- In hemodialysis, blood is cleaned using a special filter called an *artificial kidney* or *dialyzer* and a rinsing fluid called *dialysate*. HD clears toxins and fluid much like a working kidney.
- In peritoneal dialysis, the blood is filtered using your *peritoneum* as a filter and dialysate. PD is described in Chapter 4 of this notebook.

Hemodialysis (HD)

In hemodialysis, blood is pumped from your body through a machine that contains an artificial kidney (*dialyzer*) that filters your blood. The exchange of substances between blood and rinsing fluid (dialysate) takes place in this special filter. (See Figure 4.) Waste products and extra fluid pass from your blood into the dialysate and down to the drain. Some things your system is low on, such as calcium and bicarbonate, can be added to the blood from the dialysate.

During hemodialysis, your blood runs through special tubes into the dialysis machine. It is returned to your body after wastes and extra fluids have been removed. Most times, this process takes 3 to 5 hours and needs to be done 3 times a week. Your doctor will prescribe the right length of time for your treatments and how often you need them.

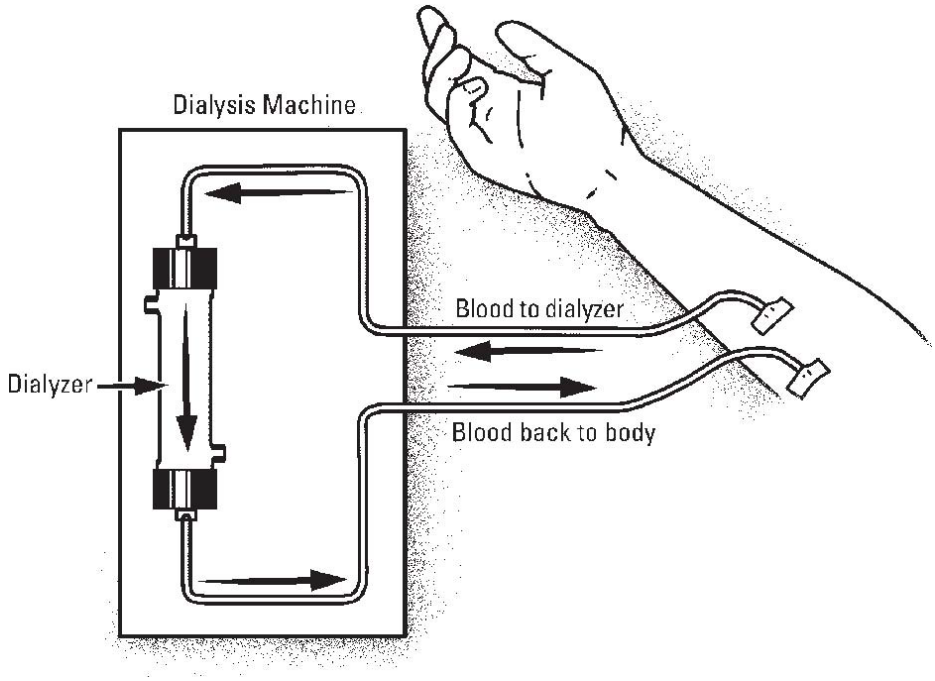

Figure 4: What happens during dialysis

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Home Hemodialysis

The home methods of dialysis are gentler on your body, involve fewer limits on fluids and foods, and can provide you with more energy and strength.

There are 2 types of home hemodialysis:

- **Short daily dialysis** is done usually 5 to 7 days a week for 2 to 3 hours each day.
- **Nocturnal dialysis** is done overnight while you are sleeping, 4 to 6 times a week for 6 to 8 hours.

How does it feel to be on hemodialysis?

It usually takes a few months for your body to get used to hemodialysis. It is normal to feel a bit tired after HD. You may need to take a short nap after your treatment.

Other side effects include feeling sick to your stomach and having dizziness and muscle cramps. These things are usually caused by the rapid changes in your body's fluids and chemical balance during the dialysis treatment.

You can avoid many of these side effects by eating right, limiting fluids, and taking your medicines as prescribed. Be sure to always report side effects to your nurse and doctor. Side effects can often be treated easily and quickly.

What happens during hemodialysis?

During hemodialysis:

- A dialysis nurse inserts 2 needles in the *blood access* created in your arm, and monitors the treatment. (More information on blood access is on page 7 of this chapter.)
- A small amount of blood (about 1 cup) travels outside your body, through your blood access site, and to the hemodialysis machine. It is cleaned through a filter, and is returned to your body.

What happens inside the dialyzer?

- **Blood** from your body enters the machine and flows past 1 side of a **membrane**. The membrane is a barrier that keeps blood and dialysate from mixing, but lets waste through.
- **Dialysate** is a special fluid that pulls waste from blood. It flows past the other side of the membrane.
- **Waste, extra fluid, and chemicals** move through the membrane into the dialysate.
- **Clean, filtered blood** goes back to your body.

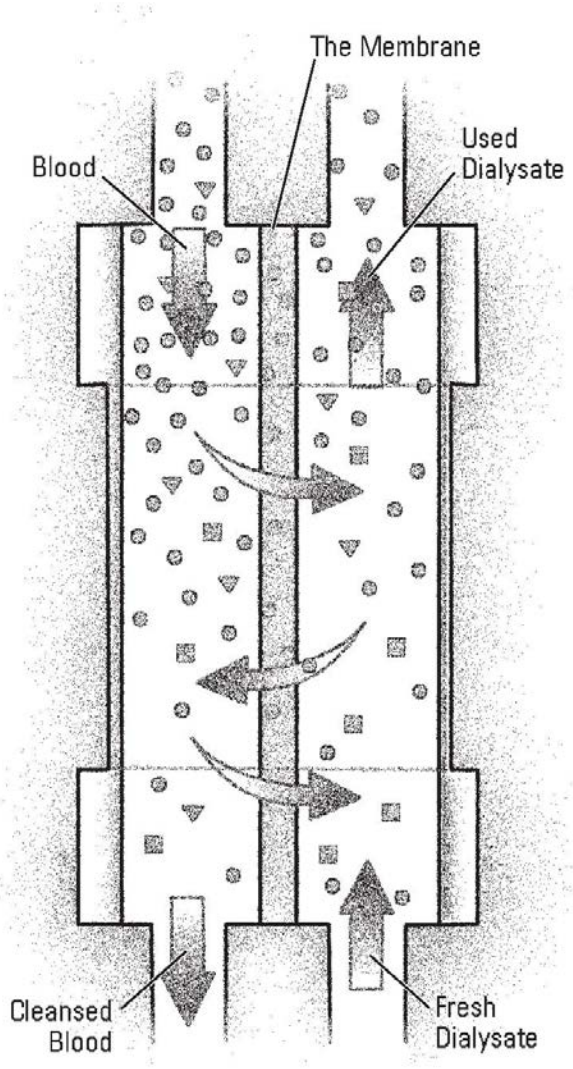

Figure 5: Inside the dialyzer

Who does HD treatments? Where are they done?

Hemodialysis can be done at home or at a dialysis center. At home, you can do hemodialysis with the help of a hired helper, friend, or family member. At a dialysis center, nurses or trained technicians do the treatment.

If you decide to do home dialysis, you, your helper, or both of you will get special training. Pros and cons for choosing the location for dialysis are listed on the next page.

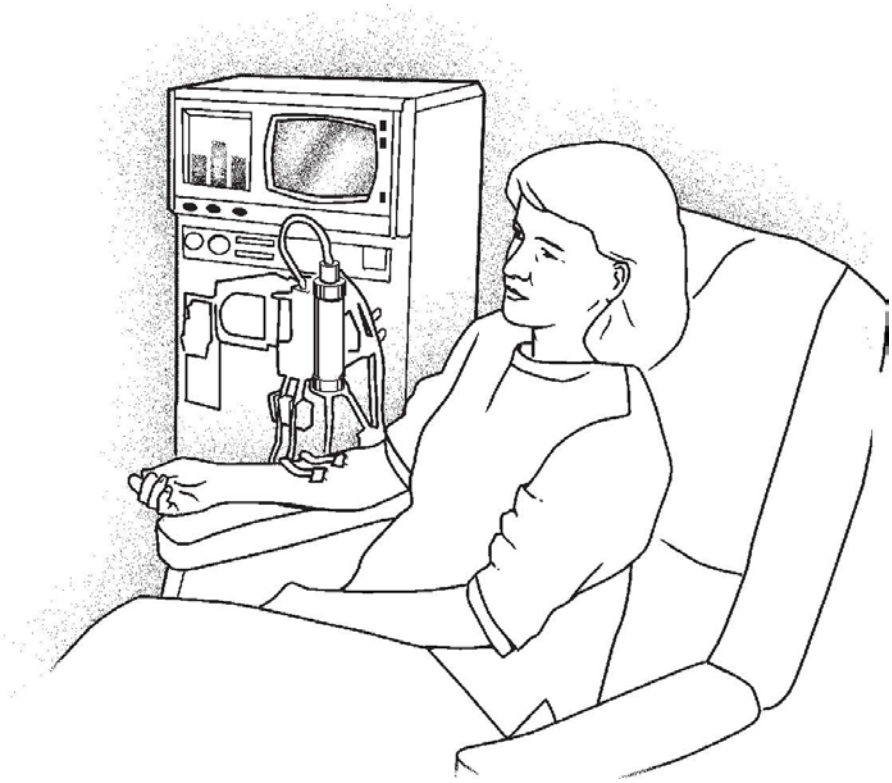

Figure 6: A dialysis treatment

Pros and Cons of Hemodialysis

(In-Center, Home Short Daily, and Home Nocturnal Dialysis)

In-Center Hemodialysis

PROS	CONS
• You have trained professionals with you at all times. • You can get to know other people on dialysis. • You do not need to have dialysis machines or supplies in your home.	• Treatment times are set by the dialysis center. • You have a less flexible schedule. • You must travel to the dialysis or treatment center for your treatment. This takes time and money. • You may feel dependent on the staff in the dialysis center. • You are exposed to other patients who may have a contagious illness. • You will have more limits on your fluids and foods because you will spend less time on dialysis.

Home Short Daily Hemodialysis

PROS	CONS
• You can do your dialysis at the time you choose each day. • You don't have to travel to the dialysis center for your treatment. • You gain a sense of independence and control over your treatment. • You are at home where you are comfortable and with your family. • You have fewer limits on fluids and foods. • You may need fewer medicines. • Your fistula may last longer. • The equipment is portable, so you can take the machine with you when you travel.	• You need space to store the machine and supplies at home. • You will need special training and may need a helper. • You will not have professionals at your bedside. • Treatment at home may add stress to you and your family.

Home Nocturnal Dialysis

PROS	CONS
• You don't have to travel to the dialysis center for your treatment. • You gain a sense of independence and control over your treatment. • You are at home where you are comfortable and with your family. • You have fewer limits on fluids and foods. • You may need fewer medicines. • Your fistula may last longer. • The equipment is portable, so you can take the machine with you. • This method gives you the most time on dialysis, which can lead to a longer life and better outcomes.	• You need space to store the machine and supplies at home. • You will need special training and may need a helper. • You will not have professionals there to help. • Treatment at home may add stress to you and your family. • Your sleep may be disturbed.

What You Need to Do While You Are on HD

You will need to follow 6 important instructions to take care of yourself when you are on dialysis. If you carefully do all of these things, you will feel better and have fewer problems.

- **Stick to your treatment schedule:**
  - Have each treatment you are supposed to have.
  - Stay on the machine for the full length of your treatment.
- **Follow the limits on fluids and foods.**
- **Take your medicines as your doctor prescribed.**
- **Take care of and protect your blood access.**
- **Talk with your health care team about problems, concerns, and questions.**
- **Help make your treatment choices.**

Blood Access

In a hemodialysis treatment, your blood passes through the artificial kidney or dialyzer many times. This means that blood must move quickly out of your system to the dialysis machine, and then return to your body just as quickly.

Since a large volume of your blood must be cleaned, the blood used for dialysis cannot be taken from your natural veins (where blood is drawn for lab tests). Instead, we must create a new, reliable way to access your blood supply. This is called a *vascular access* or "blood access."

During dialysis, special needles will be inserted into your blood access. Your blood is then pumped through the needles and tubing to the dialysis machine.

The first step in getting you ready for dialysis is the surgery to create your blood access. The access surgery should be done 3 to 6 months before you plan to start dialysis. This gives the access site time to heal and strengthen.

The most common types of blood access are *fistulas* and *grafts*.

Fistulas

A fistula is created during surgery by joining a vein and an artery. (See Figure 7 on page 8.) Arteries carry out blood at high speed and pressure and have strong walls to handle the blood flow. When an artery is joined to a vein, the fast blood flow from the artery enters the vein.

When the flow of the blood increases in the vein, the vein walls begin to enlarge and strengthen to handle the faster flow. In 2 to 3 months, the vein becomes strong like an artery and can be used for hemodialysis.

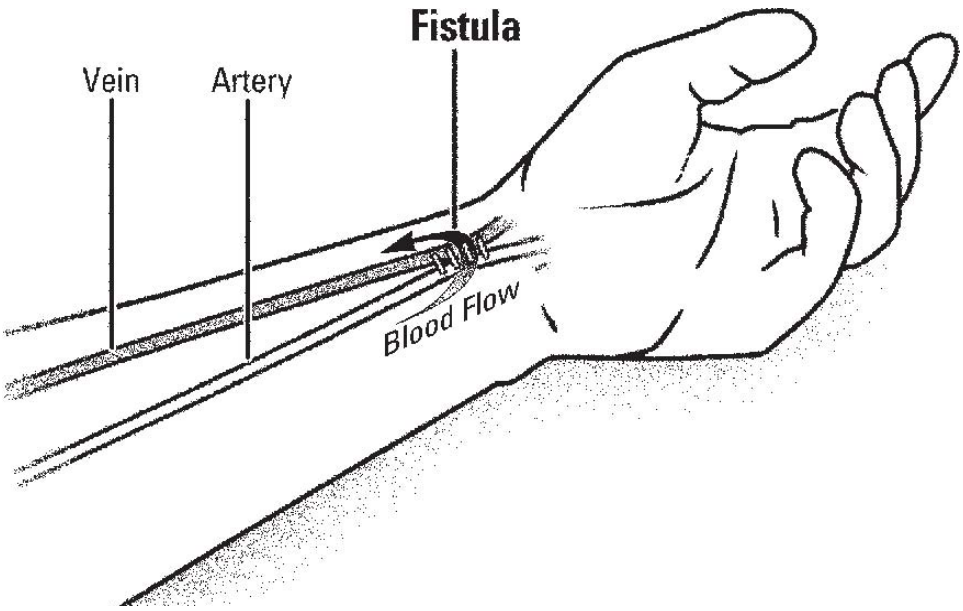

Figure 7: A fistula "access"

Pros and Cons of Fistulas

PROS	CONS
• It is your own blood vessel. It heals over inside your body. It will last longer than a graft (see page 9). • There is less chance of blood clots forming. • There is less chance of infection.	• You will have to wait 6 to 8 weeks to be able to use it. • Daily exercise is suggested for the fistula to develop well. This helps prevent problems with needle punctures and blood flow during dialysis. • It doesn't work well if your blood vessels are weak or small. A good fistula won't form and you may need to have a graft access instead.

Grafts

A second type of blood access is called a *graft*. The graft is most often a soft man-made tube that is connected on one end to an artery and on the other end to a vein. A graft is a good choice if the surgeon cannot make a working fistula from your own blood vessels.

A graft can be placed in the arm or in the thigh under the skin connecting an artery to a vein. Your own blood runs through it. The graft has a rough outside that heals into your own tissue. (See Figure 8 on page 9.)

Graft sections are already the size and strength they need to be, so they can be used very soon after they are placed, usually within 2 weeks.

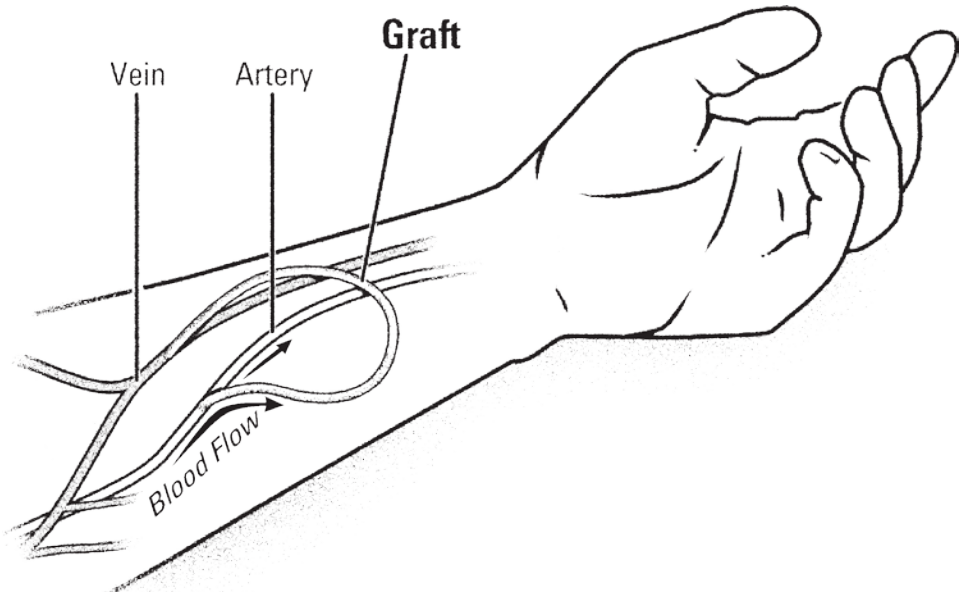

Figure 8: A graft "access"

Pros and Cons of Grafts

PROS	CONS
• Most times, grafts can be used 1 to 2 weeks after surgery. • No special exercises are needed to help grafts develop.	• There is more chance for blood clots to form and infection to develop because the graft is artificial and foreign to your body. • The graft material retains the holes from the needles, even though the skin above it heals over. Most grafts will need to be replaced within 2 to 3 years.

Caring for Your Fistula or Graft

Some swelling and soreness is normal for a few days after surgery. To help, keep your arm raised on pillows, or rest it above the level of your heart whenever you can. Your surgeon may also give you pain medicine.

Once your incision site heals, keep your access arm clean to help prevent infection. Wash your arm daily with soap and water.

- Use lotions to soften your skin and lessen itching.
- Do **not** scratch your fistula or graft.
- Your fistula or graft incision will heal in about 1 to 2 weeks.
- If you have a fistula, **start daily exercises as soon as your fistula is healed**. Ask your doctor when you can begin these exercises. The easiest fistula exercise is:
  - Squeeze a ball (such as a tennis ball), hand grips, or silly putty.
  - Start with as many squeezes as you can. Increase a little each day until you are doing 50 squeezes each time. Do this 2 to 3 times a day.

  (You do not have to do these exercises if you have a graft.)

Checking Your Fistula or Graft

You need to check your access every day to make sure it is working well. If you have a stethoscope, you can listen for a buzzing sound called a *bruit* (pronounced "brew-ee"). To do this, place a stethoscope over your fistula or graft. If you do not have a stethoscope, you can still listen by holding your fistula or graft to your ear.

The pulsing or buzzing feeling you will notice on your fistula or graft is called the "thrill." When you place 2 fingers over your fistula or graft and press down gently, you should be able to feel the thrill pulsing and buzzing.

Make it a habit to check how your access is working at the same time each day. Call your doctor or nurse if you notice any change.

When to Call Your Doctor or Nurse

Call your doctor or nurse **right away** if:

- Your bruit is lower than usual or you cannot hear it. It may mean there is less blood flow or there is a clot in your fistula or graft. It may even be blocked off completely.

  Your surgeon or an *interventional radiologist* may be able to clear out the clot and get your access working again. An interventional radiologist uses imaging, not surgery, to diagnose and repair internal problems.
- You have any of these signs of infection:
  - New redness or swelling of your fistula or graft
  - New pain at the fistula or graft site
  - Fever higher than 99.5°F (37.5°C)
  - Pus or unusual drainage from your incision or needle exit sites

What to Keep in Mind About Your Fistula or Graft

- Your fistula or graft is your "life line." It must be treated with great care! Only trained professionals should be allowed to place needles in your fistula or graft.
- Tell all your healthcare providers that you have a fistula or graft in your arm. Tell them not to use this arm for needle punctures or a blood pressure cuff.
- Do not do anything that would decrease or cut off the blood flow to your fistula or graft:
  - Avoid wearing tight clothing.
  - Do not apply too much pressure to the fistula or graft.
  - Do not allow your blood pressure to be taken on your access arm.
  - Never carry heavy objects by resting them on the fistula or graft. This includes holding a child. Instead, hold objects close to your body in your hands or let them rest against your other arm.

Please be careful with my veins!

To all nurses or phlebotomists who are about to start an IV or draw blood from me:

Someday, I may need hemodialysis. That is best done through an A-V (artery-vein) fistula. The fistula lasts longer than the other types of blood access and has a lower incidence of infection and clotting. But, it takes months to mature.

If I develop phlebitis or scars in my veins, the surgeons may never be able to create a successful fistula on me. Please follow these guidelines when you are caring for me:

- If you need to take a blood sample, or need to start an IV, please use the back of my hand. If you must stick me several times, please rotate the sites.
- Please stay away from the cephalic vein of my non-dominant hand – the entire hand, especially my wrist-radial cephalic. (I usually wear my wristwatch on my non-dominant hand).
- Try to minimize needle sticks:
  - If you need blood and an IV infusion, get both at the same time.
  - If you must draw blood or give me injections, please use a #23 needle.

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- If your fistula or graft is cut or punctured, quickly place strong, direct pressure to the bleeding site. Get medical help right away.
- Remember to **save your vein** for your dialysis fistula. Print copies of the "Please be careful with my veins!" instructions in the box below and give them to your healthcare providers.

Temporary Access – Dialysis Catheter

If a person needs hemodialysis right away, a short-term blood access, called a *catheter*, will be used. The catheter can be placed in a large central blood vessel, usually in the neck.

These tubes are usually used short-term because of the risk of infection and clotting. Sometimes a catheter is used for dialysis access while you are waiting for your fistula or graft to heal and grow and be ready to use.

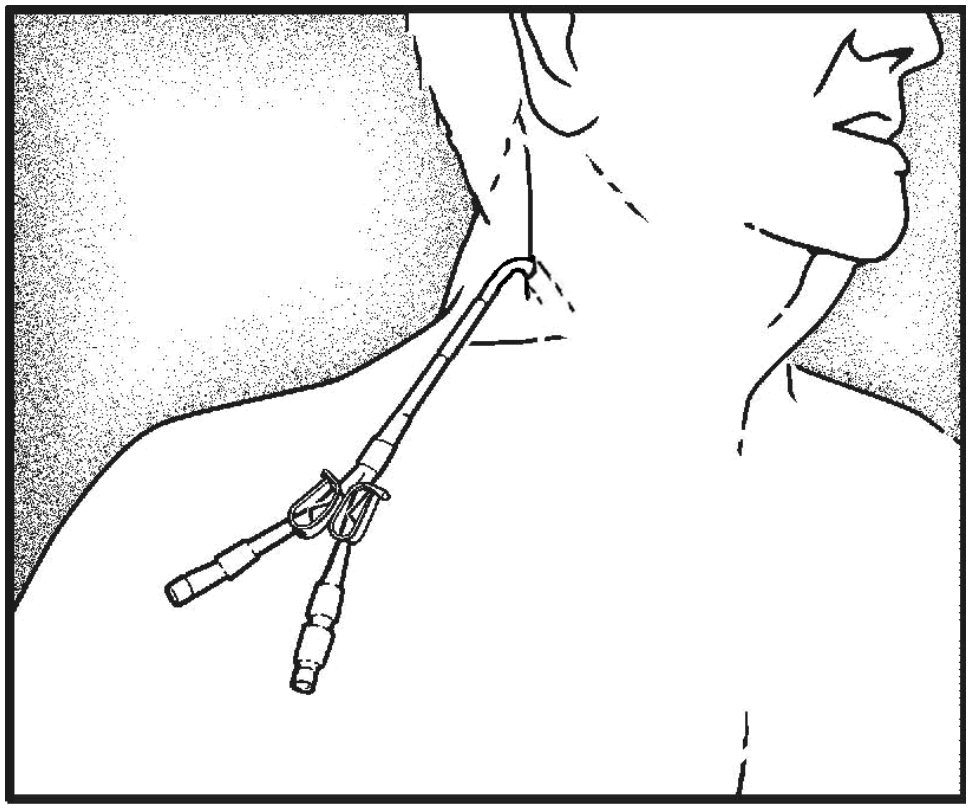

Figure 9: A temporary catheter for use in hemodialysis

Questions?

Your questions are important. Call your doctor or healthcare provider if you have questions or concerns.

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