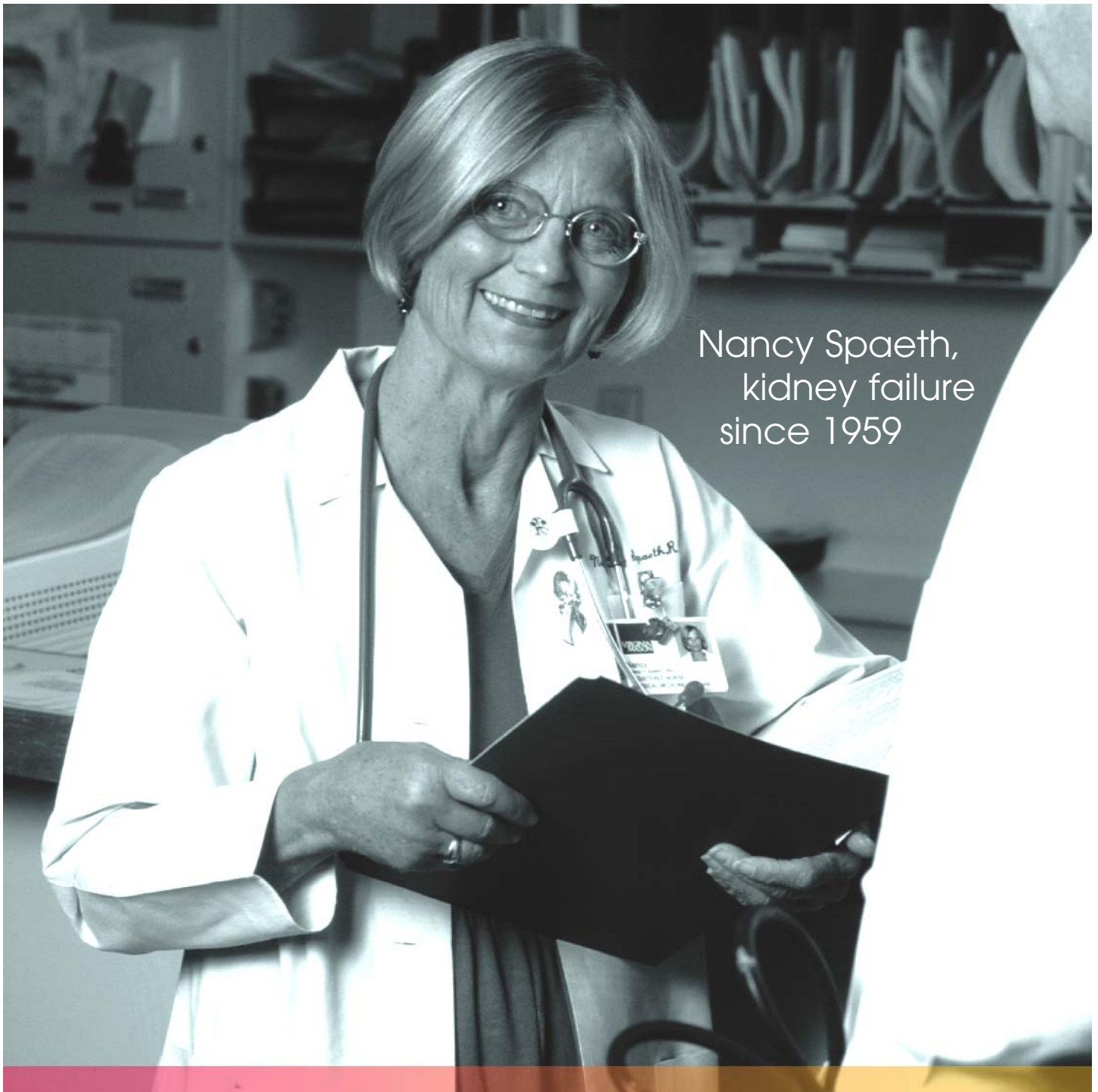




Module Eight:

Vascular Access—A Lifeline for Dialysis



Nancy Spaeth,
kidney failure
since 1959

About Kidney School

Welcome to the print version of Kidney School! Kidney School will help you learn to take an active role in your healthcare decision making. Research suggests that kidney patients who become active partners in their care are more likely to live long and live well.

Kidney School is an on-line learning program designed to help people understand kidney disease and its treatment, adjust to kidney disease, make good medical choices, and live as fully as possible. You decide which modules to read and when—so what you learn is entirely up to you.

Kidney School was developed to:

- Offer free, up-to-date, research-based information, at your own pace.
- Help you learn what to expect and what questions to ask.
- Provide the tools you need to self-manage your care so you can stay healthier and keep doing the activities you enjoy.

Kidney School is a project of the **Life Options Rehabilitation Program**. Sponsored by Amgen Inc. and administered by the non-profit Medical Education Institute, Life Options is a program of research and research-based educational materials to help people with kidney disease live long and live well.

All Life Options programs, including Kidney School, are guided by the Life Options Rehabilitation Advisory Council (LORAC), a national expert panel of patients, doctors, nurses, researchers, social workers, dietitians, physical therapists, and administrators.

All content for the Life Options program and for Kidney School is developed by Life Options staff and reviewed by members of the multidisciplinary LORAC and by additional patients and kidney professionals. Life Options and Kidney School content is entirely independent of and not influenced by its corporate sponsor(s).

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A special thank you is extended to members of the Dialysis Support mail list at www.yahoogroups.com, who allowed themselves to be quoted, took the time to review Kidney School, and who provide constant inspiration through their compassion, willingness to share, and ability to live fully with kidney disease.

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(Revised October, 2003)



Module 8— Vascular Access: A Lifeline for Dialysis

Imagine, for a moment, that you are a firefighter, putting out a fire in an office building. Your best chance of success would depend on one crucial thing. Can you think of what it is? If you thought it was the hose that carries water to put out the fire, you're right! This hose would be your lifeline. Without it, your life would be in danger. How secure would you feel walking into raging flames with a garden hose? Not very.

When your kidneys no longer work, one treatment choice is hemodialysis (HD). HD filters wastes and removes excess fluid from your body. Your lifeline in HD is a *vascular access*—a special passageway to your bloodstream, created by a minor surgery, so dialysis can keep you healthy.

A good access is a little like a fire hose. It will have a strong blood flow so you can get the full benefit of dialysis. And *that* means you can feel as well as possible and have a better life. It's up to you to keep your access as healthy as possible. Taking good care of your access can help you have a better life on HD.

Our goal with this module of Kidney School is to share what's most important about vascular access. We want to help you learn about accesses and how to take good care of them by the time you finish this module.

If you have an access now and you are on dialysis, you probably know which type of access you have. We'll help you learn about each type, and how to take good care of your access so it will last as long as possible. Having an access before you need dialysis is a *huge* plus! A new vascular access takes time to mature so it is ready to use, and, in this module, we will help you make sure it is ready when you need it.

If you have an access, but it has not been used for dialysis yet, you may be worried about the needles



and what dialysis will be like. This is very normal. In this module, we'll also hear from people who felt like this, and learn about medications to make the needles easier on you.

If you don't have an access yet, you may be concerned about the surgery to create an access, or curious about what it will look like when you have one. This concern is very normal! The unknown can be scary—we'll tell you what to expect, so it won't be unknown any more. In this module of Kidney School, you'll hear from other people who have had new vascular accesses, too. **If you know that you will be choosing hemodialysis, protect your non-dominant arm (the one you don't write with). Don't let anyone take your blood pressure, draw blood, or start an IV on that arm. These steps can improve your chances of having a good access.**

To help you keep your lifeline in top shape, we will use this module to help you learn:

- Types of vascular access
- How the access is used for dialysis
- How you can keep your access healthy

And, as always, we will give you a summary of all the main points at the end of the module to print out and use as reminders. So, let's get started!

Types of Vascular Access

The types of access we'll tell you about in this module have one thing in common. Their job is to make it easier to reach your blood vessels to filter and clean your blood with HD.

You have two kinds of blood vessels in your body: arteries and veins. Arteries are large, strong blood vessels that carry oxygen-rich blood from your heart and lungs to the rest of your body. Veins carry blood back to your heart and lungs to pick up more oxygen.

So, which type of blood vessel is used in dialysis? Both! Here's why: In hemodialysis, an artery takes your blood to the dialyzer (artificial kidney) to be cleaned. A vein brings your cleaned blood back to you. To make it easier for you and your care team, an access is usually created in an arm. But the veins in your arm are too small for dialysis. And the arteries in your arms are deep below your skin—too hard to reach with dialysis needles.

Needles? More Than One?!

Two dialysis needles are usually used for dialysis. The “arterial” needle takes your blood to the dialyzer. The “venous” needle returns the cleaned blood to your body. Many people who will need dialysis are worried about the needles. Medication can be used to numb the needle sites. We'll tell you more about them later in this module.

Some people choose to do peritoneal dialysis (PD) instead of hemodialysis because, instead of needles, a catheter in the abdomen is used. For more information about PD, read Module 2 of Kidney School: *Treatment Options for Kidney Failure*.

You need an access that will be easy to use and that will give you good dialysis. So a vascular (blood vessel) surgeon will connect an artery to a vein in a minor surgery.

Before we tell you about types of access, there is a very important thing you need to know: every person has only *a few possible sites* where an access can be created—in the arms, legs, neck, or chest. Sometimes people run out of access sites, and must use a catheter, have a kidney transplant, or switch to peritoneal dialysis to live. This is why you need to know how to take the best possible care of every access.

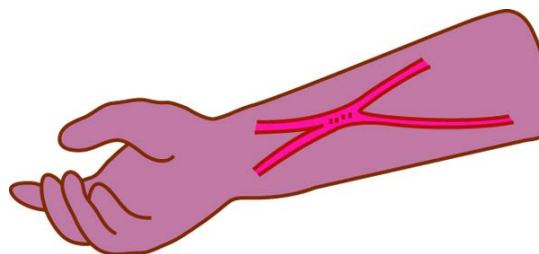
There are three types of vascular access we'll tell you about in this module:

- Fistula
- Graft
- Catheter

Let's start with the fistula.

Fistula

A **fistula** (see graphic below) is made by sewing an artery to a vein, usually in your arm. It is also called an *arteriovenous* (artery + vein) fistula, or “AV fistula.” When your artery is hooked up to your vein, strong blood flow from the artery makes the vein bigger and stronger. And since your veins are close to your skin's surface, the new access is easy to reach.



A fistula is the best type of access, for two reasons:

- ① Your veins and arteries are part of your body, so a fistula is less prone to infections or blood clots than other types of access.
- ② Your veins and arteries self-heal after each needle stick, so a fistula can last a long time.

With good care, a fistula can last for decades!

"I was 13 when I first went on dialysis, and had to have a second surgery to get a good fistula. I was told even back then to exercise the fistula arm by lifting light weights and squeezing a tennis ball three or four times a day. It worked so well for me that the fistula 'ripened' in half the time and is still working today, 30 years later! I have had to have four revisions to the fistula over the years, but the first revision was not needed for 12 years! Maybe my youth, good vascular genetics, or plain dumb luck helped, but if you can get a good fistula to work, it's the best long-term access, in most cases, for hemodialysis." —Bruce, 44 years old, began hemodialysis in 1971

Not everyone has blood vessels that will work for a fistula. Here are some things your doctor and surgeon will check to see what kind of access will be best for you:

- Will you still have enough blood circulation to your hand and arm?
- Are the veins in your arm healthy, straight, and long enough?
- Are your blood vessels poor, due to diabetes, heart disease, previous surgeries, or too many blood draws or intravenous lines?
- Have you ever had chest surgery or a pacemaker? (This can reduce blood flow to your arms.)

What Is Fistula Surgery Like?

Most of us are afraid of having surgery, even if it is "minor." But you can get through it. Some people ask for general anesthesia so they are unconscious for the surgery. Others choose local anesthesia, which numbs the surgery site only. Ask your doctor what your options are for anesthesia.

Here is what some people with kidney failure say about what their access surgery was like:

"For my first fistula, back in the late '80s, I was awake, but my arm was numb from the shoulder down, even though they were putting the fistula into the left forearm. The doctor even offered to set up a mirror so I could watch what he was doing (an offer I declined!). When they had to go to plan B because the first artery they looked at wasn't 'right' somehow, they put me out." —Lisa

"Other than a local anesthetic for my fistula surgery, I had no anesthetic or sedative whatsoever. I demanded it that way because I have quite a fear of anesthesia. I could not see a thing the surgeon did, for I was tented. My arm was strapped into place. My other arm was locked in place for blood pressure, heart rate, etc. The only pain was the initial sting of the lidocaine needle. After that, I felt absolutely nothing. I chatted with the anesthesiologist (there as a requirement to have one on hand, just in case) through the 45-minute procedure. After surgery, I was allowed to go home totally clear-headed one-half hour later. It was basically like a dental visit, except it took place in a scary operating room with seasick green walls. Pain was only moderate after the local wore off but I was given Vicodin®, which would wipe it out." —Bill, 45, began dialysis in 1999

- Is one arm bigger? (Blood flow may be less in a smaller arm.)
- Are your veins close to the surface of your skin for easy access?

A study of 5,507 dialysis patients in the medical journal *Kidney International* shows that having a fistula means a better chance of living longer—for people with and without diabetes. (Dhingra RK, Young EW, Hulbert-Shearon TE, Leavey SE, Port FK: Type of vascular access and mortality in U.S. hemodialysis patients. *Kidney Int* 60:1443-1451, 2001)

In Europe and Canada, more than 50% of people on hemodialysis have fistulas. But in the U.S., fewer than 30% have fistulas—even though fistulas are the best type of access. So, do Americans have worse blood vessels? Maybe—many more U.S. dialysis patients have diabetes, which can lead to poor blood vessels.

Many top U.S. doctors want to increase the number of Americans with fistulas. Evidence-based clinical practice guidelines called the *Kidney Disease Outcomes and Quality Initiative* (K/DOQI™) recommend fistulas for people whose blood vessels will support them. If you would like a fistula, ask your doctor if a fistula would work for you—even if you had a graft before. Here are some other ways you can improve your chance of having a fistula:

- Ask your doctor to suggest a vascular (blood vessel) surgeon who has done lots of fistulas and knows how key this lifeline is. This doctor may not be in your immediate area.
- Ask your surgeon if *venous mapping* would be helpful. This is a painless form of ultrasound that lets the doctor see your veins and arteries. Venous mapping can help your doctor plan an access that will work for you. It means fewer surprises during surgery.

Body Image and Fistulas

As you'll see below, some people choose to cover up their fistula all the time—even wearing long sleeves in the summer. Others are very upfront about their lifeline, and use it to help teach others about kidney disease. How you handle your fistula is up to you.

"I had my fistula put in at 14, I lied to everybody about what it was. I said that I cut myself and needed stitches as a result of a ski accident. I remember rehearsing the alleged ski accident in my mind over and over so that I could tell a credible lie. I was so self-conscious of that fistula, so afraid that it would be discovered that I wore long sleeves even in summer. I was afraid that I would be considered different, and therefore separate from my peers." —Mary

"I wore my first short sleeve shirt today—it got up to almost 72 degrees. It felt great, but I grossed out a lot of people who had never seen my exposed access with all its lumps and bulges on my upper left arm. I'm less embarrassed by it then when I first had it...but I don't like to gross people out either. Oh well. Hot weather usually wins, and then I just don't care. I prefer to be cool." —Nancy, 65, began dialysis in 1994

"I know it's hard to even conceive of this right now, but I think of my fistula as something that keeps me alive! Who cares what it looks like?! If you're feeling in a good mood, you could explain to people about dialysis. If you're not feeling in an educating mode, think of some wild story like, 'that's where a tiger bit me on my last safari to the deepest, dark jungles.'" — Robin, 47

- Ask your surgeon about a *venogram* (contrast X-ray of the blood vessels), another way to look at the blood vessels before doing surgery. This is recommended if you have had chest surgery or a pacemaker in the past, or if one arm is bigger than the other.

After surgery, it takes at least 1 month and ideally 3 to 4 months for a fistula to mature enough for dialysis. This means you and your doctor need to talk about your timetable. Your doctor may suggest exercises to help your fistula mature faster.



Making a fist, or squeezing a rubber ball or handgrip, may increase blood flow to your fistula, helping it to work better and mature faster. Try squeezing at every TV or radio commercial to remind yourself to do it!

A fistula can help you to live a long time on dialysis. A fistula is also noticeable and may cause people to be curious. If the look of the fistula bothers you, talk to some people who can help you deal with this and who can offer ideas and ways to make it less noticeable. Kidney disease is mostly hidden—people don't know you have it unless you tell them. But a fistula can be something that shows, and something you will have to get used to. It is normal to be sad about changes to your body, and okay to want to talk to someone about your feelings. Your dialysis social worker and other patients may be helpful to talk to.

When Should I Get a Dialysis Access?

If you know you will need dialysis, keep in touch with your kidney specialist. Guidelines for kidney disease say a fistula should be created within a year of needing dialysis. But it can be hard to tell how fast kidney disease will progress. So the guidelines recommend creating a fistula at certain blood test levels:

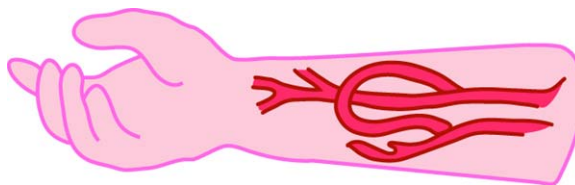
- When the serum creatinine level is greater than 4.0 mg/dL
- When the creatinine clearance level is less than 25 mL/min

If you are on dialysis or need to start soon, and you want an AV fistula, you will need to use a temporary form of access for a while. Using a fistula before it is mature may lead to poor dialysis or even loss of your access.

Graft

The second type of access we'll tell you about is the arteriovenous (AV) **graft**.

A graft (see graphic below) is like a fistula, because it hooks a vein and an artery together. The difference is that a graft uses an artificial vein to bridge the two. The most popular material used for grafts today is a form of Teflon®. The full name is *expanded polytetrafluoroethylene* or ePTFE for short. Gore-Tex® is another material that is used for grafts.



Grafts are the most-often-used access in the U.S.—but they are the second-best kind of access. Compared to a fistula, a graft is more likely to:

- Become infected and/or clotted, because the synthetic material is foreign to your body.
- Develop holes, because the synthetic material does not self-heal after needle punctures.

Body Image and Grafts

Whatever makes you most comfortable is okay—whether it's proudly showing off your access or covering it up.

“My upper left arm has a graft in it that I never even used...it's a mess. My lower left arm has my working graft I have had several revisions on, and there are a couple of areas where, after 6 years of use, it bulges. I look like Popeye. I could hide it all, I suppose, but when the weather gets hot I want a short sleeve shirt. And I still swim whenever I get the chance. I decided not to let my life be dictated by what others may think. I am enjoying this life, courtesy of the grace of God and this graft. I have used the opportunities presented to educate others about dialysis and organ donation. So instead of a negative...it turns into a big positive, you see. Just like my war wounds from having 3 kids—stretch marks and C-section incision. I wouldn't trade them in for anything....”

“I have a skin colored (loose) elastic sleeve I wear over my right forearm graft when I wear short sleeves. It goes from my wrist to my elbow. Although it is noticeable, it is nicer looking than my bumpy arm. But I mostly wear it to protect the bumps from getting nicked. I got it at a medical supply store. I think it's for burns. It is very comfortable and gives me some protection.”

For these reasons, most grafts will need tune-ups—like a car. How often? This depends on the graft and how well it is cared for. Guidelines for doctors say that at least 70% of new grafts should last 1 year, 60% should last 2 years, and 50% should last for 3 years. (If a graft fails, you may be able to have a fistula—ask your doctor.)

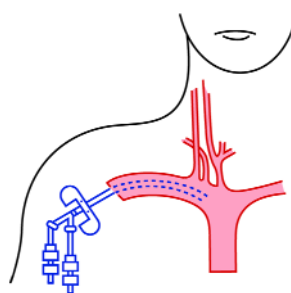
Surgery to create a graft is a lot like surgery to create a fistula. After surgery, it takes 3 to 6 weeks before the new graft can be used for dialysis.

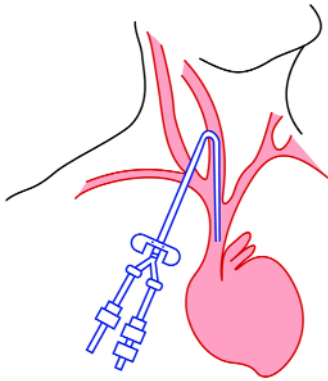
After surgery, your arm might be swollen for a few weeks if your body reacts to the foreign material. Once mature, a graft may not be as easily noticed as a fistula. But, since most grafts need to be fixed or replaced over time, it is likely that you will have more than one scar to deal with. Some people look at their accesses as badges of honor in the battle with kidney disease—without them, you wouldn't be here!

Catheter

The third type of vascular access is a **central venous catheter**. A catheter is a plastic tube that is surgically placed in the neck, chest, or groin, and connected to a “central” vein. The other end of the tubing is outside the skin and used for hooking up to the dialysis tubing.

Most catheters are temporary, used for weeks or months at most. They are mainly for short-term use until a graft or fistula is ready. Some patients, however, have a catheter as a permanent access. If a catheter must be used, the type can be important for your future access options.





The K/DOQI guidelines cover catheter use in dialysis. These guidelines say the **internal jugular (IJ)** catheter (above) is the preferred type. Here's why: When a central venous catheter is used, it can reduce blood flow to the arm on that side of the body.

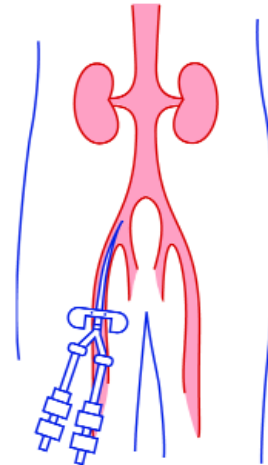
Catheters: For Women Only

If you are a woman who will need to get a catheter for dialysis, here are a few tips that can make your life easier:

- Bring along your bra (or draw an outline of it on your chest with a marker). You can't wear your bra when the catheter is being placed. But having it handy will help the doctor avoid putting the catheter in an awkward spot.
- If the catheter will be tunneled under the skin, find out where the exit site will be. Ask the doctor not to place the catheter exit near your nipple, as this can be uncomfortable and hard to keep a dressing on.
- The weight of large breasts can pull a catheter out. Since you are lying down when the catheter is put in, if you have large breasts, remind the doctor so he or she will be extra careful with placement and taping.

This can make those arm vessels impossible to use later for dialysis. IJ catheters are less likely to harm blood vessels than another type of catheter, the subclavian. The internal jugular catheter can be placed so it comes out on the chest and can be hidden by shirts.

Sometimes, a **femoral** catheter (below) is used for temporary access. This catheter is placed into the femoral vein, in the groin. The femoral catheter is usually removed after each treatment and replaced for the next—an uncomfortable prospect. Plus, being so close to the groin, the femoral catheter is hard to keep germ-free. If your doctor suggests a femoral catheter for temporary vascular access, ask if there are other options that would work for you.



Of the three types of vascular access (fistula, graft, catheter), the catheter is the poorest option:

- It extends outside of the body, so it is the most prone to infection—and it is so close to the heart that infections can be serious.
- Blood flow rates are often poor, so it is hard to get enough dialysis to feel your best.
- Catheters are very likely to clot.

The biggest plus of a catheter is that it can be used the same day for dialysis. So most people who find out they need dialysis *right away*, will have a catheter. And any person on hemodialysis may need a catheter at some time if a fistula or graft needs repair. For some people, a catheter may be the only available access, and dialysis lifeline.

What Catheter Placement Feels Like

Here's what people with catheters say about having a catheter put in:

"The vascular surgeon gave me a permanent catheter—the one that hangs out at my chest, tunneled up and stitched in under my skin at my neck. It was done under Versed® and was mildly sore the first day, and after that it didn't bother me at all. It was easily hidden by my shirt and I could even sleep on my stomach with it. I eventually got a systemic infection from it and spent a week in the hospital."

"My Tessio™ catheter, which is a perma-cath put in the chest area, only required one incision and I was given some Versed®, which just puts you down a little bit and relaxes you. The sensation was not one of great discomfort, but like someone pressing repeatedly on the chest area as the catheter is moved toward the neck. This lasted several months and never gave me any problem."

A catheter can be inserted in an operating room, a radiology suite, or even a hospital bed. Some drugs may be given to relax you and reduce pain. Catheter placement usually takes about 15 to 30 minutes. Catheter position must be checked by an X-ray to

be sure the catheter is in the right blood vessel. Ask the doctor what signs to watch out for to be sure your catheter is placed correctly.

Once your catheter is in, be sure your care team teaches you how to care for it safely. You will need to know:

- How to take a shower without getting the catheter wet
- How to change the dressing if you need to
- How to clamp the catheter if it starts to bleed
- What to do if the catheter falls out or is accidentally pulled out
- Who to call if you have a catheter problem

We'll include this list at the end of the module to help you remember what to ask.

Rarely, some people need to use catheters for long-term dialysis access. This includes people who don't have good enough blood vessels, or whose hearts are not strong enough for a fistula or graft.

So-called permanent catheters are held in place with stitches and a special cuff that the skin grows into. Following your care team's instructions to keep a catheter clean and free of infection will help it last longer. If the catheter becomes infected or clogged, it can be replaced.

Try This Quick Review...

Now that we've told you about all three types of access, let's try a quick review of what we've covered so far. Match each access with its description, below:

- | | |
|--------------|---|
| ___ Fistula | 1 — Links a vein and artery with an artificial vein |
| ___ Graft | 2 — A plastic tube placed in a central vein |
| ___ Catheter | 3 — Connects a natural vein and artery together |

Correct answers: Fistula - 1, Catheter - 2

Using Your Vascular Access for Dialysis

Getting a vascular access is one step along the way to living with kidney failure. Using the access for dialysis is another step. Fistulas and grafts are similar in the way needles are used, so in this section we'll talk about them together. We'll also talk about dialysis with a catheter. Even though you have already had dialysis with your access, you may still learn something new in this section. So, let's walk through the next step.

The idea of someone putting needles into your new access for dialysis can be scary! But think about this: as of 2001, the most recent year for statistics, more than 264,000 Americans were on hemodialysis. This means that a lot of people were able to get used to the needles. You will be able to, too.

Once your access has been placed, the doctor or nurse will keep an eye on it and decide when it seems ready to use. After your fistula or graft surgery, be sure to tell the doctor right away if your hand or arm feels:

- Cold
- Numb
- Painful

This can mean that your hand is not getting enough blood—a rare complication that is more common in people with diabetes.

A fistula is, ideally, mature and ready to use after 3 to 4 months. A graft is usually mature and ready to use after 3 to 6 weeks.

Step 1: Hand washing

The first step in using an access is for the staff person to wash his or her hands. This is important

every, single time. Hand washing and gloves are required by the Occupational Safety and Health Administration (OSHA). They protect both you and your care team member.

Make sure that whoever puts needles in your access washes his/her hands and puts on fresh gloves. Your unit will teach you how to wash your access arm. Even if you have taken a shower before coming to the unit, you should wash your arm before your treatment.

Step 2: Look for infection

The second step in using a vascular access is to look at the access very closely. At each dialysis, your nurse or technician will look for signs of infection or damage to the access. These include:

- Redness
- Warmth
- Tenderness
- Pus or open sores
- Swelling
- Ballooning of the access (aneurysm)

Putting needles through infected tissue can be dangerous for you. Harmful bacteria could be pushed into your bloodstream by the needles.

Keep Your Access Visible at Dialysis!

When you are at dialysis, keep your access uncovered all the time so the staff can see it. This way, if a needle slips out, or a line comes apart, the staff will know right away. Even if you're cold, make sure your access can always be seen!

This can cause *sepsis*, or blood poisoning. If you think your access may be infected, do not allow the staff to insert the needles.

Sometimes people with kidney failure don't get redness or swelling even when they have an infection. So, if you notice a fever or feel run-down, be sure to tell your care team.

Over-the-counter Numbing Cream

PLEASE NOTE: Kidney School does not endorse any product.

"My husband tried Topicaine®, a 4% lidocaine cream for numbing stick sites, and was delighted! He had been using EMLA® for several months and it did numb the area but not as thoroughly as the Topicaine.

"To get Topicaine, we called ESBA Laboratories, the manufacturer, at (800) 677-9299, and a very friendly person answered all our questions. She said they ship via U.S. mail and we should have it in 1–3 days. We did receive it in 3 days (from California to Florida).

"It comes in three sizes [10, 30, and 113 grams.] My husband uses a small pea-size drop of the gel, so one jar should last him at least several months, making the cost not nearly so bad. No prescription is needed. Although it is over-the-counter, our pharmacist had not heard of it and could not get it through the pharmacy warehouse."

(NOTE: ESBA Laboratories has offered a 20% discount on Topicaine to any dialysis patient who mentions Kidney School. For more information, visit: www.topicaine.com or call 800-677-9299.)

Step 3: Listen for blood flow

If your access looks okay, the next step is to make sure that the blood flow through it is strong. The nurse or technician will place a stethoscope on top of your access to listen to the blood flow.

Step 4: Clean the access with germ-killer

The nurse or tech will clean off your access with a gauze pad and a germ-killing solution before the access is used for dialysis. The solution helps to keep germs that live on the skin from causing an infection.

Step 5: Insert the needles

Some people find that the needle sticks are no big deal—a pinprick that lasts a second. Others are worried about them—sometimes *a lot*. Each unit does things a little differently. In some units, one or more medications may be available. And, depending on your insurance, you may or may not have to pay for them.

Before or after your access is checked and cleaned, a medication can be used to numb the needle sites. The medication will make you less likely to feel the needles—and can help you a lot if you are afraid of needles or worried about pain. Five medications are often used for numbing dialysis needles:

- **Lidocaine** — A tiny needle can be used to inject a small amount of this drug into the skin over your access. Lidocaine stings for a moment, but people who use it say it's worth it. Some people believe that lidocaine may cause scarring over time that makes it harder to place the needles.
- **Liquid lidocaine** — This product is left on the skin for 5 to 10 minutes with a gauze pad over it instead of being injected. This saves two needle sticks per treatment.

- **Chloroethane spray** – This spray “freezes” the surface of the skin. If your access is deep, you may still feel some pain.
- **EMLA® cream** – EMLA cream must be put on in a thick layer an hour or two before dialysis. Then it needs to be covered with a plastic dressing. Before dialysis, it is wiped off. EMLA is costly, but it works very well. Insurance may not cover it—you may need to pay for it yourself.
- **Topicalaine®** – This clear gel must be applied in a thick layer 30 minutes to 1 hour before dialysis, and covered with a dressing. One study found that over-the-counter Topicalaine worked faster than EMLA®, ELA-Max®, and tetracaine ointment, and it is often cheaper.

Needles

If you are afraid of even the *idea* of needles, there may be some other steps you can take to help yourself feel better. Check the list below for the things you think you might be able to do:

- ☐ Ask your doctor if peritoneal dialysis is an option for you.
- ☐ Visit a dialysis unit to see what the treatment looks like.
- ☐ Ask your doctor about desensitization therapy.
- ☐ Talk to other patients about how they handled their fears.
- ☐ Look into the possibility of hypnosis to help overcome your fear.
- ☐ Learn how to insert your *own* needles, so you are in control.
- ☐ Other:

What Patients Say About Dialysis Needles

What is it really like to have dialysis needles put in? People who have been through it can tell you:

“I don’t use any medications. When I first began I had much the same fear as you. Let’s face it, I still do. What helped me was to visualize in my mind the upcoming procedure. Then I would tell myself the only part I didn’t really like was the actual stick. I figured this would only last about one-half second for each needle. What I was dreading would only last a total of one second. I figured I could handle the pain that long.”

“If you want to know about fear when it comes to being stuck, spend a few hours in my head for a while. Not only do I use EMLA®, but I use the injected lidocaine as well. I do NOT want to feel a thing when I am being put on! I am terrified of pain. I understand most people say that EMLA [cream] works after an hour, but I tend to leave it on longer and it works better for me at about 2–3 hours. Unfortunately, that means I need to get up at about 5:00 a.m. each dialysis morning to put it on, but hey, the price for comfort, I guess! The cream is placed in a spot less than the size of a dime in the spot where the needle will go and then covered with something to seal it on and let it soak into the skin.”

“My experience is that the lidocaine needles sting for a few seconds (sometimes I don’t even feel them anymore). On the other hand, the times I have felt the dialysis needles go in, it really did hurt, although not as bad as I would have thought. However, the pain lasted for several minutes, for me. I would rather have the lidocaine and I’m glad I have the choice.”

Putting in your *own* needles? People do that?! They do! And people who put in their own needles find that it hurts less and makes them feel safer. This is probably not something you'll want to try right away, but it can be done—and putting in your own needles is the best way to have your dialysis lifeline last as long as possible.

After your needle sites are numbed, if you have a fistula, a tourniquet (tight rubber band) will be put around your arm or leg to make sure the blood vessels stand up. This makes them easier to find. A tourniquet should *always* be used on a fistula (but not on a graft). After the blood vessels are found, one needle at a time is guided through the skin into the access, taped down, and hooked up to the dialysis tubing. If all goes well, you're ready for your dialysis treatment. During your treatment, the needles should not hurt. If they do, tell your care team.

Sometimes the first few uses of a new access can be hard. Your access is new and not yet known to your care team. It may also still be a little swollen, and the blood vessels may not be as large as they will be later. All of this can make it hard to get the needles placed correctly. It may take more than one try.

Or, at any time, your access can be *infiltrated*. This means a needle goes in one side of your access and out the other. Blood leaks out under your skin causing swelling and bruising. An infiltration can damage your access. At the least, you will need to have a new needle placed, and the bruises can be painful.

Putting needles into a new or hard-to-stick access is something that some staff people are really good at. You can ask that a certain staff member or someone with good cannulation skills place your needles.

When each treatment is over, the needles will be untaped and removed. As soon as the needles are all the way out, you will need to put pressure on

What Patients Have to Say About Putting in Their Own Needles

Here is what three people who put in their own needles say about it:

"I am a home hemo patient, and I made a deal with my wife that if she would help me with dialysis, I would do my own needles. It was about a year and a half before I felt comfortable inserting my own needles. I began to realize that no one knows my fistula as well as I do. Now, whenever I dialyze in-center, I still insert my own needles. You never know the qualifications of the person inserting the needles and you know your own."

"I put in my own needles for the first time today. This is interesting because I am legally blind (although I do have some vision) and I hadn't previously thought I would be able to do this."

"You may want to think about inserting your own needles. Many have and you can't imagine the sense of independence and relief that comes with doing this self-care task. It takes patience and a good 'sticker' to teach you—but it makes all the difference, after you've learned how! While it's not for everyone, my own experience is that it is worth an honest try, once your fistula has matured to the point where the nephrologist and experienced nurse or tech consider it appropriate." —John

the needle sites. **NEVER let anyone press on your access while the needles are being removed: this can hurt your access.**

Holding your sites for about 15 minutes after the treatment will stop the bleeding. Your care team will teach you how to put enough—but not too much—pressure so you don't hurt your access.

Flipping the Needles

Some staff are taught that after the dialysis needle is placed in the access, it should be flipped over before it is taped down. When this is done, the sharp edge of the needle can scoop away some of the lining on the inside of the access. This can make the access weaker or cause excessive bleeding. Flipping the needles could mean that your access needs to be surgically repaired. Ask your care team not to flip your needles.

It is best not to use clamps to hold the sites—they can cause clotting. Not holding your sites long enough can make the bulges worse on your arm. (You may still be bleeding under the skin.)

Dialysis with a Catheter

To give you a dialysis treatment with a *catheter*, the staff person must wash his or her hands and put on clean gloves and a mask or face shield. You need to put on a mask, too. If there is a dressing over your catheter, it will be taken off. (Be sure scissors are never used! They could cut the tubing and cause bleeding or let air into your bloodstream.)

The nurse or technician will look at the skin before each treatment for signs of infection:

- Redness and/or warmth
- Tenderness
- Pus
- Fever

What People Say About Dialysis with a Catheter

People who have used catheters for dialysis can tell you what it's like:

"Catheters are very temperamental—you can't move around much during treatment or alarms go off. Also, they have to be flushed every day, and you can't shower. I was told I could shower with my permanent catheter after a certain amount of time, but it seemed that every time I showered, that's when I'd get an infection and end up in the hospital for a week. I am really much happier with my graft, even though I have to have the needle sticks."

"I blew the fistula in my arm 2 years ago, and I said the catheter won't be so bad—no needles in my arm. That isn't the case. We were only able to get a blood flow of 200 from the neck catheter; when normally it's 400—higher blood flows allow for better clearances. I couldn't wait to get that catheter out of my neck."

"I have had my perma-cath in the same shoulder for almost a year and a half. I feel no pain with it now, nor did I when it was put in. My arms are free during dialysis, and having the catheter makes dialysis tolerable. I am able to turn around when I'm uncomfortable, and my machine runs at 450, which is generally unheard of with a perma-cath. I count my blessings since I never had a problem with it."
—Anita, 50, began dialysis in 1983

"I was hospitalized twice for catheter infections—it wasn't fun. I ran very high fevers and had to be on IV antibiotics for 10 days. Since the catheter leaves an opening into a blood vessel, you need to be very careful to avoid any source of infection. If you have to change dressings between runs, have a nurse teach you dressing change technique and give you a spare set of supplies." —Ruth, 54, began dialysis in 1996

Then, the staff person will feel along the length of the catheter to be sure it is still where it belongs under your skin.

If the catheter is okay, the end of each tube (called a “port”) will be cleaned off and soaked with a germ-killing solution for a few minutes, and then dried. Then, the dialysis tubing will be connected to the catheter ends for dialysis. Sounds pretty easy, right? And, with catheters, no needles are used.

But in the long term, a catheter is not a good choice for dialysis access, if there is any way to avoid it. With a catheter, you are more likely to get an infection or a blood clot that will put you in the hospital for a week or more at a time. In contrast, a fistula, or even a graft has fewer medical problems and is likely to last longer. Needles might be a small price to pay for a good life!

How to Keep Your Access Healthy

In a perfect world, creating a vascular access would be like adding a new room onto your home. Once done, it would be sturdy, strong, and hold up under all but the most extreme conditions. But not all home remodeling is perfect, and not all vascular accesses are, either. Because accesses are not perfect, they tend to run into some common challenges that we’ll tell you about in this section. But the good news is, there is a lot you and your care team can do to help keep your lifeline healthy.

Infection: A common problem

Let’s start with infection—a common challenge for *all* kinds of accesses.

What is “Steal Syndrome?”

When a surgeon creates a fistula—or a graft—he must balance your need for dialysis with the function of your access arm. Steal syndrome means the access “steals” too much blood from your arm during dialysis. It leaves your hand cold and numb.

If you have steal syndrome, tell your access surgeon right away. Your access may need repair. Meanwhile, wear a glove during treatment or change the position of your arm. These steps may help your hand feel better.

Bacteria are everywhere—on your skin (and on the skin of your care team), in your nose, on surfaces—so too often, bacteria can find their way into your access. If they do, they can cause a bad infection.

If enough bacteria get into your access, they can grow and spread through your whole body, causing blood poisoning, or *sepsis*. Sepsis can be deadly. In fact, bacterial infections are the second leading cause of death for people on hemodialysis! Your best weapon against bacteria is keeping your access clean and protected. Your care team knows how important it is to avoid harmful bacteria. This is why they must wash their hands and put on clean gloves before they touch your access.

You also have a major part in preventing infection. If you have a fistula or graft, wash your arm (or leg) with antibacterial soap *and* iodine or alcohol before each dialysis session.

If you have a catheter, carefully follow the instructions you are given about getting it wet and keeping it clean and dry. And make sure the care team never leaves the catheter ends open to the air. Each end should have a cap or syringe

Fixing Stenosis

If you or your care team think you might have stenosis in your fistula or graft, tests can be done to be sure. X-rays using dye or ultrasound can check the blood flow. If there is a problem, several treatments can be tried:

- A tiny balloon can be inserted into the vessel and then inflated.
- Some centers recommend placing a metal expander called a stent into the vessel.
- Surgery can be done to revise the access.

on at all times if it isn't in use for dialysis. This will reduce your risk of infection. If you notice signs of infection—redness, warmth, tenderness, pus, or a fever—tell your dialysis team right away.

Treating an early infection may be as simple as taking antibiotic pills. Treating a late infection may mean intravenous antibiotics in the hospital. Or it may mean surgery to clean and flush out the

infection. It may also mean loss of your access. Grafts and catheters are more likely to become infected than fistulas because both are foreign material. Catheters are *most* likely to be infected, because they are both inside and outside the body. They act like an open doorway to let infection in.

Stenosis: Narrowing of blood vessels

A second, common access challenge is narrowing of the blood vessels, called *stenosis*. Stenosis slows the flow of blood through your access. And this means not getting good enough dialysis to keep you healthy. The chart below will tell you the most common causes of stenosis and what you can do about them.

Stenosis usually happens slowly—and this means that whatever the cause, there is often time to fix it *before* it causes loss of your access. There are early warning signs of stenosis in a fistula or graft:

- A change in the *thrill*, or pulse in your fistula or graft. Learn what your access usually feels like, and check it every day. Call the doctor if it is different.

Cause of Stenosis	What You Can Do
Scarring where the artery and vein are sewn together in a fistula, or where the artery or vein connect with an artificial vein in a graft	Nothing
Use of a central venous catheter (usually a subclavian)	Ask your doctor if you can have an internal jugular (IJ) catheter, not a subclavian catheter
Scar tissue from blood draws, blood pressure readings, intravenous lines, or too many needle sticks (in a graft)	• Don't let anyone draw blood or start an IV in your access limb (if you must have one there, the back of your hand is the safest place) • Be sure that needle stick sites are rotated in your fistula or graft • Don't let anyone take blood pressure readings in your access arm

- A change in the *bruit* (broo-ee'), or sound of a fistula or graft. Learn what your access *usually* sounds like, and listen to it every day. If the “whoosh-whoosh” of your access gets higher in pitch, like a tea kettle, call the doctor right away.
- Swelling, high venous pressures, and prolonged bleeding after dialysis are also signs of stenosis.

Stenosis can be a challenge for people with catheters, too. A central venous catheter can cause *central venous stenosis*. This permanently reduces blood flow to the catheter-side arm. With central venous stenosis, there is enough blood flow for your arm—but not enough extra left for dialysis. This is how stenosis can ruin other possible access sites.

If you have stenosis from a catheter, you are likely to know it. Here are some signs:

- Your hand on the catheter side may be cold and painful.
- Your arm may swell up so much that it can be hard to move it.
- Your neck, face, and chest or breast on the catheter side may swell.
- New veins may grow on your upper arm or chest.

Medical Identification (ID) Bracelets

If you ever can't speak for yourself in a health situation, a medical ID bracelet or necklace can speak for you. When you have a dialysis access, an ID bracelet can tell emergency health workers to avoid drawing blood on your access arm or leg. Ask your pharmacist, social worker, or other patients about good medical ID companies. A bracelet, for example, will cost from \$20 and up.

If you see any signs of possible central venous stenosis, tell your care team as soon as possible.

Thrombosis: Blood clots

Another common access challenge is blood clotting, also called *thrombosis*.

In your blood are clotting cells called platelets. Platelets stick together to seal off damaged blood vessels, like a cork seals up a bottle. Forming clots is their job. The problem is, platelets also stick to scar tissue and damaged blood vessel walls in a fistula or graft. And, of course, every needle puncture causes a little bit of damage.

Everyone on hemodialysis gets needle sticks, but not everyone gets a clotted access. Why not? Usually, because damage to the blood vessel isn't enough. To form a blood clot, blood must also be moving *slowly* through your access. And this is something you can help prevent. The chart on the next page will tell you how.

Find stenosis as early as you can, by noting any changes in your thrill or bruit

If a clot is not treated, it can seal off a fistula or graft so no blood can go through it. The fistula or graft will need to be repaired before it can be used. Sometimes repair is not possible and replacement is needed.

Grafts are much more likely to clot than fistulas. Your own blood vessels have smooth linings that resist clots. No graft material now exists that can stop clots as well as your own blood vessels.

Stenosis—narrowing of your blood vessels—happens slowly. But clotting can happen very quickly. So it's important for you to know the major warning sign: your thrill slows or stops. If you notice no thrill, tell your doctor or nurse *right away*.

If it is not a dialysis day, call the after-hours number for your dialysis center. Thrombosis can often be treated with injected medication to dissolve the clot. It may also be treated with radiology or surgery.

Clotting is often a problem with catheters, too. Anti-clotting medication is left in a catheter after it is used. But even so, clots can block the tubing—like a clogged faucet.

To fix this, medication is used to dissolve the clot, or the catheter may have to be replaced. Make sure the dialysis staff injects the medication

Watch Out for Traveling Blood Clots!

A blood clot in your access may not stay put. Blood clots can break loose and travel through your body. If you recently had a blood clot and you have back pain or trouble breathing, seek emergency care.

quickly and in the right amount. Ask how much your catheter holds. The venous side will hold a little more than the arterial side.

Cause of Blood Clotting	What You Can Do
Stenosis	Find stenosis as early as you can, by noting any changes in your thrill or bruit
Low blood pressure	Tell your care team right away if you have low blood pressure during dialysis. This might include feeling lightheaded, dizzy, or nauseous.
Taking off too much fluid at dialysis	• Avoid gaining too much fluid weight between treatments • Know your fluid removal goal • Check the dialysis machine to be sure your fluid goal is set correctly • If you gain real weight (not fluid weight), tell your care team so your fluid goal can be adjusted
Putting too much pressure on the access or taking blood pressure readings in the access arm	• Don't sleep on your access arm • Don't carry heavy weights across your access • Don't wear a tight watch, bracelet, or elastic on your access arm • Learn how to hold your sites safely after dialysis (no clamps) • Don't let anyone take blood pressure readings in your access arm
Wrong dose of anti-clotting medication (heparin or coumadin)	Know your medication dose and check to be sure that you are given the right dose



Graft with “One-site-itis”

The last challenge we’ll talk about in this module is for fistulas and grafts only. When a fistula or a graft is stuck too often in the same place, the vessel walls can weaken. Over time, the weakened walls balloon out. In a fistula, this is called an *aneurysm*. In a graft, it is called a *pseudoaneurysm*—(fake aneurysm). There is a risk of rupture and repair is needed if the skin over an aneurysm or pseudoaneurysm won’t heal or if few needle sites are left.

Both of these challenges can be avoided in the same way: by placing new needles at least 1/4 inch away from the last sites used. In this way, no one site is overused. In a fistula, needle holes heal themselves. Grafts don’t heal themselves. Each dialysis needle leaves a hole. If the needle is inserted in the same place over and over, the hole will get bigger. Over time, this tears the graft. This condition is referred to as “one-site-itis,” and means the graft must be replaced.

What Is the “Buttonhole Technique?”

Some people who have fistulas don’t rotate their needle sites at all. Instead, they use the same two (or sometimes four) spots over and over. In time, the needle channels through the skin heal over, like a pierced ear hole. The holes look just like what you’d see for a button, so this is called the “buttonhole technique.”

There is not enough scientific evidence to say that anyone with a fistula should use the buttonhole technique. But people who do say that it is nearly painless, and the channels guide the needles into the access at just the right angle.

Try to keep track of where your next site should be. Draw a picture of your access (or ask your surgeon to draw one for you). Make copies of the picture and use it to mark the needle sites each time you have dialysis.

It is *your* job to know where your next needle sites are and to tell your dialysis team member. It is *your* access and *your* health that is at stake. Keep track of your needle rotations!

Finally, don’t be afraid to ask questions. And with something as important as keeping your access healthy, there are plenty of questions. Check off the questions you don’t know the answers to, and add your own:

- ☐ Who should you contact after hours if you need to? How?
- ☐ What types of exercises should you do to help your access mature? How often?
- ☐ Can you lift weights? Get your arms dirty gardening? Which usual activities are okay, and which should you avoid? Why?
- ☐ What precautions should you take for bathing, showers, swimming, etc.?
- ☐ What dressings should you use to protect your access?
- ☐ Can you change the dressings at home?
- ☐ How should you clean your access?
- ☐ What other things should you do to protect your access?
- ☐ Add questions you want to ask here:

Conclusion

As we said at the start of this module, the goal of good access care is to keep your lifeline healthy so you can get good dialysis. Your chances of keeping your access healthy are best when you are an active partner with your care team. And the job of Kidney School is to help you gain the tools you need to manage your own health—and your access. This wraps up our module on vascular access. We have everything we've just discussed summarized in a Personal Plan for you to use. Refer to it often as a reminder.

Kidney School is committed to providing creative learning that is accurate, interesting, and useful to your life. We want to help you learn to keep a positive attitude, get answers, and take action to get the best possible care.

We hope this module has been helpful to you and your loved ones, and invite you to learn from the many other Kidney School modules we offer.

Educating yourself about kidney disease is one way to help yourself or a loved one live long and live well with kidney disease.

We hope you'll come back and use other modules of Kidney School.

For more information on the topics in this module, please check out the resources listing in at the end of this module.

Personal Plan for _____

Vascular Access: A Lifeline for Dialysis

My lifeline in HD is a *vascular access*—a special passageway to my bloodstream, created by a minor surgery, so dialysis can keep me healthy.

There are three types of vascular access:

- **Fistula** — Connects my own artery to my own vein. It has the fewest complications, and can last for decades.
- **Graft** — Connects my artery and vein with a piece of artificial vein. Grafts are more prone to infection and clotting than fistulas.
- **Catheter** — Plastic tube placed in a major vein in the neck, chest, or groin. Catheters are prone to infection and clotting, and often don't have enough blood flow for good dialysis.

Here are some ways I can improve my chance of having a fistula:

- Ask my doctor if I can have a fistula.
- Ask my doctor to recommend a vascular (blood vessel) surgeon who has done lots of fistulas.
- Ask my surgeon if *venous mapping*—a form of ultrasound that allows the doctor to see the veins and arteries under my skin—would be helpful.
- If venous mapping is not available, ask my surgeon if a *venogram* (contrast X-ray of the blood vessels) would be helpful for me.

Some people don't mind the needle sticks. If I do, some centers may offer one or more of these medications to numb dialysis needle sites:

- **Lidocaine** — A tiny needle can be used to inject a small amount of this medicine over my access.
- **Liquid lidocaine** — This produce is left on the skin for 5 to 10 minutes instead of being injected.
- **Chloroethane spray** — It “freezes” the surface of my skin. If my access is deep, I may still feel some pain.
- **EMLA® cream** — I need to put on EMLA cream in a thick layer an hour or two before dialysis and cover it with a dressing. EMLA is costly and my insurance may not cover it.
- **Topicaine®** — I need to apply a thick layer 30 minutes to 1 hour before dialysis and cover it with a dressing.

If I must have a catheter:

- Evidence-based clinical practice guidelines called the *Kidney Disease Outcomes and Quality Initiative* (K/DOQI™) cover catheter use in dialysis. These guidelines say the *internal jugular* (IJ) catheter is the preferred type.
- When I get a catheter, I will ask my care team:
 - How to take a shower without getting the catheter wet
 - How to change the dressing if I need to
 - How to clamp the catheter if it starts to bleed
 - What to do if the catheter falls out or is pulled out
 - Who to call if I have a catheter problem

Personal Plan for _____

(continued)

I can help avoid infection in my access by:

- Washing my hands before touching my access
- Washing my fistula or graft arm with antibacterial soap and then with a germ-killing solution before each dialysis session
- Making sure my care team member washes his or her hands and puts on clean gloves before touching my access, and does not touch the needle site
- Following my care team's instructions for keeping my access clean
- Checking my access daily and telling my care team if I have a fever, or if my access is:
 - Warm
 - Red
 - Swollen
 - Painful or tender
 - Has pus or drainage

I can help avoid stenosis (narrowing of the blood vessels) in my access by:

- Asking my doctor if I can have an internal jugular (IJ)catheter, not a subclavian catheter
- Not letting anyone draw blood or start an IV in my access limb (if I must have one there, the back of my hand is the safest place)
- Making sure that needle stick sites are rotated in my fistula or graft
- Not letting anyone take blood pressure readings in my access arm

I can help avoid blood clots in my access by:

- Finding stenosis as early as I can, by noting any changes in my thrill or bruit
- Telling my care team right away if I have low blood pressure during dialysis. This might include feeling lightheaded, dizzy, or nauseous.
- Avoiding gaining too much fluid weight between treatments
- Knowing my fluid removal goal
- Checking the dialysis machine to be sure my fluid goal is set correctly
- If I gain real weight (not fluid weight), telling my care team so my fluid goal can be adjusted
- Not sleeping on my access arm
- Not carrying heavy weights across my access
- Not wearing a tight watch, bracelet, or elastic on my access arm
- Learning how to hold my sites safely after dialysis (no clamps)
- Not letting anyone take blood pressure readings in my access arm
- Knowing my medication dose and checking to be sure that I am given the right dose

Take the Kidney Quiz!

You'll see how much you're learning if you take our quick kidney quiz. It's just 10 questions. How about it?

1. A vascular access is:

- a) A birth defect that can cause kidney failure
- b) An unusual pattern of blood vessels on the skin
- c) A passage to the blood created for hemodialysis
- d) A hole in the blood vessel

2. Vascular access is called the *dialysis lifeline* because:

- a) You use it to lower yourself into the dialysis chair
- b) You use it to get dialysis and have only a few possible sites
- c) You get all your food and drugs through it
- d) You need it to go swimming when you are on dialysis

3. Why is a fistula the best type of access?

- a) It can last longest and is least likely to get infected or clotted
- b) It looks the best and allows you to wear short sleeves
- c) It can be used for dialysis the same day it is created
- d) It can easily be moved from one arm to the other

4. The biggest problem with a graft for dialysis is:

- a) A graft can fall out if it becomes infected
- b) A graft is hard to put dialysis needles into
- c) A graft gets bigger and bigger over time
- d) A graft is prone to infection and clotting

5. A catheter is the last choice for permanent access, because:

- a) It dissolves in water, and is very inconvenient
- b) It has poor blood flow, and is easily infected and clotted
- c) It must be placed under special conditions that are hard to find
- d) It can only be used by specially-trained staff

6. Which type of dialysis catheter is recommended for kidney patients?

- a) A femoral catheter, because it is the most convenient
- b) A subclavian catheter, because it is the easiest to use
- c) An internal jugular catheter, because it is the easiest on the blood vessels
- d) An external jugular catheter, because it is the most comfortable

7. Which of the following are signs of possible access infection?

- a) Warmth, redness, tenderness, swelling
- b) Sneezing, sniffing, coughing, sore throat
- c) Cramps, nausea, vomiting, diarrhea
- d) Headaches, blurred vision, shortness of breath

8. You can check your *bruit* each day by monitoring its _____:

- a) Color
- b) Smell
- c) Sound
- d) Feel

9. You can check your *thrill* each day by monitoring its _____:

- a) Color
- b) Smell
- c) Sound
- d) Feel

10. Why should you *never* compress a fistula or graft with a tight watch or bracelet, or by sleeping on your access arm?

- a) Because the chaffing can increase the risk of an infection
- b) Because the buzzing will damage your jewelry
- c) Because your sleep will be disturbed,
- d) Because squeezing the access slows blood flow and makes clots more likely

There, you've finished the test! We'll show you the correct answers so you can see how you did:

- | | | | |
|------------|---|-------------|---|
| 1.) | c | 6.) | c |
| 2.) | b | 7.) | a |
| 3.) | a | 8.) | c |
| 4.) | d | 9.) | d |
| 5.) | b | 10.) | d |

Thank you for completing Module 8 of Kidney School! Learning about kidney disease is one way to help yourself or a loved one live long and live well with kidney disease. We hope this module was helpful to you and we invite you to look at other Kidney School modules:

Module 1—Kidneys: How They Work, How They Fail, What You Can Do

Module 2—Treatment Options for Kidney Disease

Module 3—Working with Your Healthcare Team

Module 4—Following Your Treatment Plan

Module 5—Coping with Kidney Disease

Module 6—Anemia and Kidney Disease

Module 7—Understanding Kidney Lab Tests

Module 8—Vascular Access: A Lifeline for Dialysis

Module 9—Nutrition and Fluids for People on Dialysis

Module 10—Getting Adequate Dialysis

Module 11—Sexuality and Fertility

Module 12—Staying Active with Kidney Disease

Module 13—Heart Health, Blood Pressure, and Fluids

Module 14—Patient Responsibilities and Rights

Module 15—Alternative Remedies

Module 16—Long-term Effects of Kidney Disease

Additional Resources

In addition to the free Life Options materials you can find at www.lifeoptions.org/combined/materials/indexpa.shtml, the resources below may help you learn more about the topics in this module of Kidney School.

PLEASE NOTE: Life Options does not endorse these materials. Rather, we believe you are the best person to choose what will meet your needs from these or other resources you find.

Resources:

- ❶ *Care of Your Hemodialysis Access*, by William J. Plaus, MD, FACS, c/o the American Association of Kidney Patients (AAKP). If you would like more information, please call (800) 749-2257, write to the AAKP, 100 S. Ashley Dr., Ste. 280, Tampa, FL 33602, or e-mail AAKPnat@aol.com.
- ❷ *Constant Site (Buttonhole) Method of Needle Insertion for Hemodialysis*, by Zbylut Twardowski, MD, PhD, FACP, c/o the American Association of Kidney Patients (AAKP). If you would like more information, please call (800) 749-2257, write to the AAKP, 100 S. Ashley Dr., Ste. 280, Tampa, FL 33602, or e-mail AAKPnat@aol.com.
- ❸ *Vascular Access for Hemodialysis*, by the National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC). If you would like more information, please call (800) 891-5390, e-mail nkudic@info.niddk.nih.gov, or visit their website at www.niddk.nih.gov.
- ❹ *What You Need to Know About Your Access*, by the National Kidney Foundation (NKF). If you would like more information, or to obtain this item, please call the NKF at (800) 622-9010, or visit their website at www.kidney.org/general/atoz/.
- ❺ *Your Dialysis Access: What Is It and How to Take Care of It*, by ESRD Network #4. Available at www.esrdnetworks.org/networks/net4/access.htm#permtypes.

Audiovisual items:

- *Buttonhole Method of Needle Insertion Into A/V Fistulas* (video), by George Harper. If you would like more information, write to Dialysis Clinics, Inc., Attn: Julie Helgersen, 3300 LeMone Industrial Blvd., Columbia, MO 65202.

If you know of additional resources that would make a good addition to this list, please e-mail lifeoptions@MEIresearch.org.