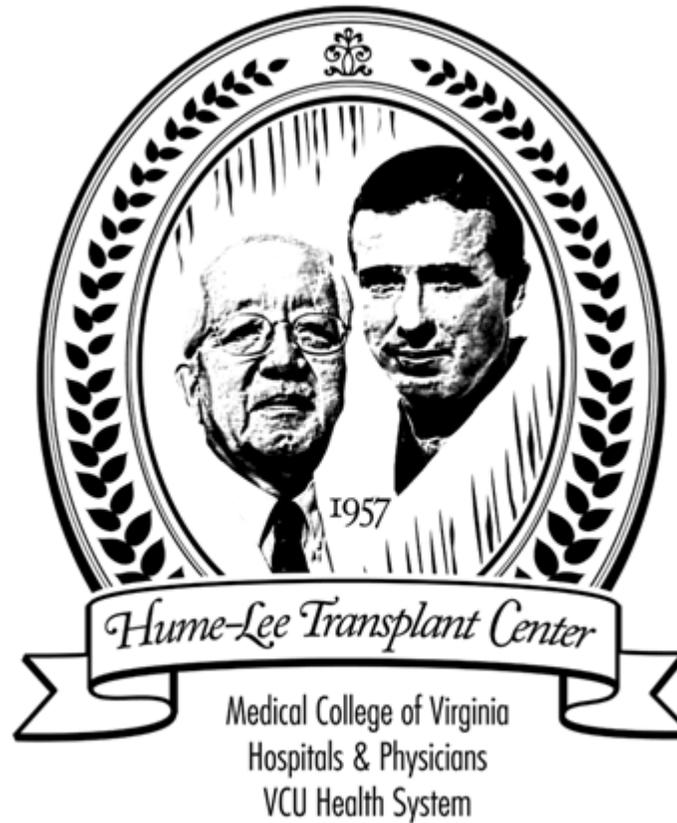


Vascular Access Unit Patient Education Book



VCU | Hume-Lee
Transplant Center
Virginia Commonwealth University Medical Center

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Introduction

The Hume-Lee Vascular Access Program is the first of its kind in the state. It was established to address the quality of care for dialysis patients' vascular access needs. We are a multidisciplinary center involving nephrologists, a surgeon and a vascular radiologist to provide complete dialysis access patient care in the most efficient, economic and high quality manner.



Did you know that 25% of all hospitalizations for End Stage Renal Disease (ESRD) are due to vascular access complications?

Our goal is to provide expedient placement and management for patients requiring dialysis, to identify and prepare patients sooner, and to increase the use of fistulas. Placement of native AV Fistulas maximize access life and minimize complications. Our goal is to reduce hospitalization time for our patients.

What is Vascular Access Surgery?

Vascular Access Surgery is a surgery that is used to gain access to your circulation so that the blood can be pumped and cleansed through the artificial kidney. The veins in your arm are not practical as an access because they are small and fragile. Since repeated puncture is very hard on these veins and arteries, it is necessary to create another way to access your blood supply. and some patients may need dialysis multiple times a week. Vascular access surgery provides a way for you to have dialysis as many times as you need it without damaging your veins.

Our team at the Hume-Lee Transplant Center will help you with all of your access needs.

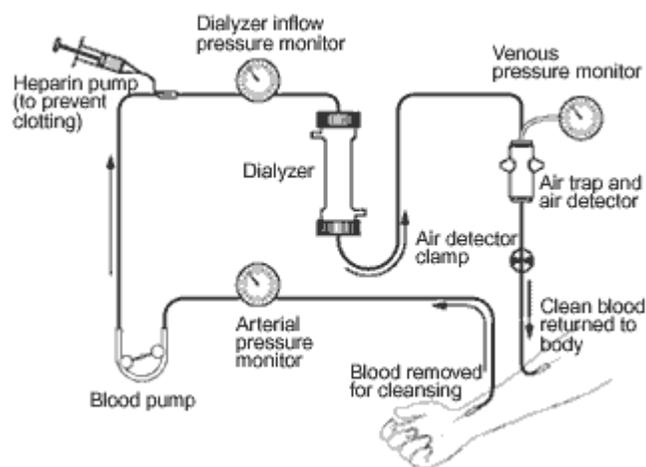
Team members will provide:

- ❑ Patient evaluation prior to access placement
- ❑ Monitoring and maintenance of access status
- ❑ Coordinate management of complications
- ❑ Utilize optimal approaches and advanced techniques for treating complications
- ❑ Tracking of vascular access (database)



Types of Dialysis– Hemodialysis

The second type of dialysis offered at VCU Medical Center is *Hemodialysis*. Hemodialysis is the most commonly used treatment that we offer here. This involves cleansing the blood, usually three times a week for 3-4 hours each time. The blood is filtered through an artificial kidney called a Dialyzer. This filter performs many of the functions of the kidney, such as removing fluid in the blood that may accumulate between treatments and impurities that accumulate in the blood that the kidney would normally filter out. These impurities, such as creatinine, potassium, and urea are removed by filtering the blood over and over again for the 3-4 hour time period. The Hemodialysis is performed by inserting two needles into the patient's access points. Most patients have an uncomplicated treatment with few side effects, but most are tired after their treatment. Our on site nephrology fellows oversee the dialysis treatments at all times, and our staff consists entirely of Registered Nurses instead of technicians, so you will receive exceptional care.



Types of Dialysis– Peritoneal Dialysis

There are two types of dialysis that are practiced for patients with kidney failure. We do offer both options at VCU Medical Center, and your doctor can tell you which treatment option is the best for you.

The first type of dialysis option is *peritoneal dialysis* also known as PD. This type of dialysis is done through a soft catheter in the abdomen. This catheter allows a cleansing liquid called dialysis solution to be introduced regularly into the abdomen. The solution contains dextrose, a type of sugar that will pull wastes and extra fluids into the abdominal cavity to be drained with the dialysis fluid. The dwell time, the time the fluid is left in the abdomen, usually lasts 4-6 hours. The draining of excess fluids and then filling the abdomen with dialysis fluids again is called an exchange. Typically, the dialysis schedule requires four exchanges a day, but different types of PD have different schedules of exchanges.

There are two types of peritoneal dialysis. The first, *Continuous Ambulatory Peritoneal Dialysis* (CAPD), does not require a machine, so you can walk around with the dialysis solution in your abdomen. You will drain a fresh bag of dialysis solution into your abdomen, wait the 4-6 hour dwell time, then drain the solution, which now contains wastes, into the bag. Gravity helps to fill and empty your abdomen, so there is no need for machines.

The second type of PD is *Continuous Cycler-Assisted Peritoneal Dialysis* (CCPD) uses an automated cycler to perform three to five exchanges throughout the night while you are asleep. In the morning, you begin one exchange with a dwell time that lasts the whole day.

Types of Access

Because there are different types of dialysis that you may receive, there are also different types of access that you may need.

Fistula

A fistula is created at the wrist for a long term dialysis patients. It is formed by sewing the side of an artery to the side of a vein. This allows high pressure flow from the artery directly into the vein, resulting in a stronger, larger vein that is more capable of handling dialysis after 4-6 weeks. The fistula can last for several years and is preferred over other types of access.

Graft

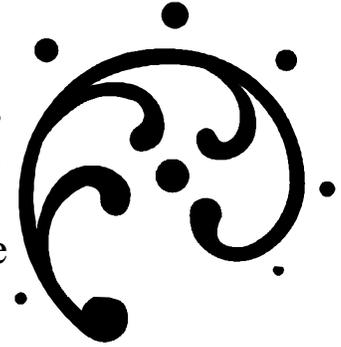
A graft is an artificial blood vessel that can be placed in the forearm, upper arm, or upper thigh. One end of the graft is sewn to an artery, while the other is sewn to the vein. The entire graft is placed beneath the skin. Many grafts that are used for vascular access are made of Teflon®, a porous material that allows the body's tissue to grow into the tiny pores of the graft. After the puncture by the dialysis needles, the hole in the graft is sealed by body tissue, and can therefore be used again.

Catheter

A catheter is sometimes used as a temporary access that is inserted in the neck or groin area. This type of catheter is typically used if a patient needs immediate dialysis or only needs the dialysis for a short time. This can be done at the patient's bedside using local anesthesia. A catheter for peritoneal dialysis is surgically inserted into the abdomen and is a more permanent type of access.

Types of Access– Catheter

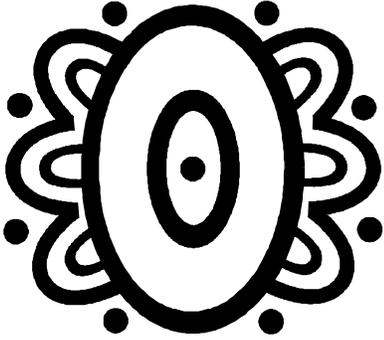
Hemodialysis catheters, or tunneled HD catheters, have two different tubes that deliver blood from the patient to the dialysis filter and then returns blood to the patient. The catheters are typically placed in the neck or groin area, and are sutured into place. Hemodialysis catheters are typically a temporary access and it is encouraged that preparation be made to obtain a more permanent type of access in the future.



This type of catheter is typically used if a patient needs immediate dialysis or only needs the dialysis for a short time. This can be done at the patient's bedside using local anesthesia.

The ease of placement of a tunneled HD catheter is an advantage to this type of access. It also costs less to place the access, and there are no needles involved in this type of access. There is, however, a higher risk of infection and complications in patients who have received a Hemodialysis catheter when compared to those patients who have received other types of access.

Types of Access– Graft



The third type of access is an *arteriovenous graft* (AVG), is an artificial blood vessel that can be placed in the forearm, upper arm, or upper thigh.

One end of the graft is sewn to an incision in the artery, while the other is attached to the vein. The entire graft is placed beneath the skin. Many grafts that are used for vascular access are made of Teflon®, a porous material that allows the body's tissue to grow into the tiny pores of the graft. After the puncture by the dialysis needles, the hole in the graft is sealed by body tissue, and can therefore be used again.

An AVG is considered a permanent HD access, but is associated with more risks of infection, does not last as long, and is more costly than a fistula access is. The AVG is should be considered if the fistula access is not an option. This is performed in patients whose veins are already too damaged to handle the dialysis themselves, or patients who are older.

Types of Access– Fistula



The second type of access, a *arteriovenous fistula* (AVF), is a long-term access for patients who require ongoing dialysis. It is formed by sewing the side of an artery to the side of a vein allowing high pressure flow from the artery directly into the vein, resulting in a stronger, larger vein that is more capable of handling dialysis after 4-6 weeks. The procedure requires that a small cut be made in your wrist so that the surgeon can bring the vein and the artery together to be sewn. This is the only type of access that can be created using the patient's native blood vessels.

The fistula is the preferred method of access for dialysis patients because it has lower associated costs, higher survival rates, the lowest numbers of infections and hospitalizations associated with the procedure. It is also the longest lasting access type that is available to patients.

Comparing Types of Access

Advantages and disadvantages of the various Hemodialysis access.

Criteria	TDC	AVG	AVF
Ease of Placement	+++	++	+
No. of Infections	+++	++	+
No. of Hospitalizations	+++	++	+
Morbidity & Mortality	+++	++	+
No. of Interventions/year	+++	++	+
Long-term patency	+	+	+++
Access Survival	+	++	+++
Associated Costs	+++	+++	+
Best access for diabetics	+	+	+++
Best access overall	+	+	+++

TDC= tunneled Hemodialysis catheter, AVG= arteriovenous graft, AVF= arteriovenous fistula
(+++ highest, (+) lowest



Chart from "Hemodialysis Access: A Guide for Caregivers and Patients," written by Donna Merrill, RN, CCRC; Deborah Bower, RN, CNN; Patricia Briones, RN, ARNP

The Operation

Your doctor will give you specific orders to prepare for the surgery. Right-handed patients will generally have the left arm chosen for surgery and the right arm is generally chosen for left-handed patients. If you are told to have a blood test before surgery, be sure to ask that the blood be drawn from the arm that will *not* be operated on.

The operation is done with local anesthesia only, your arm will be swabbed with an antiseptic solution and numbed with a few small shots so that there will be no discomfort. There may be additional medication that you receive to make you more relaxed and a bit drowsy. You will be given antibiotics to lessen your chances of infection. The procedure should take about 90 minutes from start to finish.

With an arteriovenous fistula, a small incision will be made in your wrist that will be just big enough to bring the artery and vein together to sew them together.

For an arteriovenous graft, two small incisions are made. One of them is made over the artery and one is made over the vein. Tunnels are made underneath the skin to help the placement of the graft. One end of the graft is sewn to the artery, and the other is sewn to the vein so that blood can flow rapidly from the artery through the graft and into the vein.

Caring for your AV Fistula

Newly created fistulas need time to mature and develop. Normally dialysis cannot occur for 4-6 weeks. The affected limb should be used for dialysis purposes only and by trained dialysis staff. This is your LIFELINE.

Following your surgery you should:

- Inspect the condition and color of the skin of the affected extremity.
- In the beginning, there will be some swelling. Keep the affected limb elevated on pillows at night to minimize swelling. Wear your sling during the time you are up and going out.
- The dressing may be removed after 48 hours of surgery.
- Feel the temperature and color of the skin. Compare this to the opposite limb.
- If you have any drainage or redness, contact the Vascular Access Coordinators.
- If you have any pain in your affected hand or fingers including paleness, coolness, numbness, tingling, weakness, inability to move your fingers or any other concerns call us.

Protect your arm by:

- Don't allow anyone to take blood pressure in the affected limb.
- Don't allow anyone to stick or take blood from the affected limb.
- Avoid sleeping on the affected limb.
- Avoid tight straps, watchbands, jewelry or clothes that will restrict the limb.
- Don't carry any heavy objects or lift heavy objects greater than 5 pounds with the affected limb.

Watch for signs of clotting:

- Feel your fistulas every day for a vibration. If you are unable to feel the thrill, call your Vascular Access Coordinators or the Transplant Resident.

Caring for your AV Graft

Your AV Graft may be placed in your arm or your leg, but the affected limb should be used for dialysis purposes only and by trained dialysis staff. This is your LIFELINE.

Following your surgery you should:

- Inspect the condition and color of the affected extremity.
- In the beginning, there will be some swelling. Keep the affected limb elevated on pillows at night to minimize swelling. Wear your sling during the time you are up and going out.
- The dressing may be removed after 48 hours of surgery.
- Feel the temperature and color of the skin. Compare this to the opposite limb.
- If you have any drainage or redness contact your Vascular Access Coordinators.
- If you have any pain in your affected hand or fingers including paleness, coolness, numbness, tingling, weakness, inability to move your fingers or any other concerns, call us.

Protect your arm by:

- Don't allow anyone to take blood pressure in the affected limb.
- Don't allow anyone to stick or take blood from the affected limb.
- Avoid sleeping on the affected limb.
- Avoid tight straps, watchbands, jewelry or clothes that will restrict the limb.
- Don't carry any heavy objects or lift heavy objects greater than 5 pounds with the affected limb.

Watch for signs of clotting:

- Feel your graft every day for a vibration. If you are unable to feel the thrill, call your vascular access coordinators.

Evaluating your AV Graft

After surgically implanting the vascular graft, your doctor may wait several weeks before allowing it to be punctured. Within the weeks following the procedure, there should be sufficient growth of tissue into the outer wall to have stabilized the graft. Some doctors may suggest that you undergo dialysis before the graft has adequately healed.

Once your graft has healed, you and your nurse should inspect the access site at every dialysis session. Infections, hematomas, and pseudoaneurysms can be present problems, that make puncturing the graft difficult or even dangerous. Detecting these problems early on and speedily getting to your doctor could save your graft and possibly even your life.

Signs of infection include swelling of the area around the graft, redness, pain, and pus drainage. If you should have any of these symptoms, you should notify your physician immediately. A needle should never be inserted into an infected area. This could cause bacteria to enter the bloodstream.

Pseudoaneurysm is the result of repeated puncturing of the graft in the same spot. This creates a large hole in the wall of the graft and can lead to loss of an area of puncture. The chance of infection and clotting will also be greater. **The importance of rotating puncture sites is crucial and cannot be overstated.**

A hematoma is the result of unchecked bleeding from a graft puncture site. Because blood spreads between the tissue and the graft wall, it can result in swelling and discoloration. A needle should not be inserted into the hematoma as it can cause a clot, and require multiple punctures. You should see your doctor immediately for removal or correction of the hematoma.

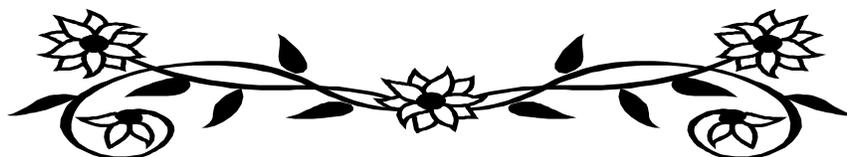
Checking the Flow in Your Graft

You should check regularly that the flow is adequate through the graft. An inadequate supply of blood through the graft can cause difficulty in blood removal and could lead to graft occlusion. To ensure that your graft is getting adequate blood flow, feel the entire length of your arm for a strong “thrill.” A thrill is a consistent vibration under the skin and should be distinguished from the pulse. A pulse can be present in a clotted graft, but a thrill indicates sufficient blood flow.

If you cannot feel a thrill, listen with a stethoscope for the sound that the blood makes when it rushes through the graft.

Knowing the direction of blood flow in the graft is also important. The needle should be placed in the direction of the blood flow. It will prevent recirculation and assist in the normal pattern of venous return. A surgeon should supply you with a diagram that indicates the location of the graft and the direction of the blood flow. If a diagram is not available, you can apply monetary pressure to the middle of the graft with your finger. The side of the graft that has the strongest pulsation is the direction from which blood enters the graft.

The chart that maps the position and date of the puncture sites helps you keep track of graft sites used and helps to avoid puncturing the same site repeatedly. The puncture sites should be approximately 2 inches apart along the straight portion of the graft.



Caring for your Peritoneal Catheter

Your catheter is your lifeline. If you take care of it properly from the beginning, it is more likely that you will heal quickly and you will have a smooth transition into your life on peritoneal dialysis.

1. You will have a bandage on after surgery. You should talk to your nurse before you leave to schedule an appointment to change your bandage.
2. **DO NOT CHANGE THE BANDAGE YOURSELF!** Your nurse will teach you the right way to care for your catheter. If the bandage is soaked through or becomes loose, you should call the Vascular Access Unit.
3. **DO NOT TAKE A SHOWER!** If you shower before the skin around the catheter heals, it can lead to an infection. Your nurse will tell you when it is safe to take a shower.
4. You will have some soreness and discomfort for the first few days, and your surgeon will probably prescribe a pain medication for you.
5. Constipation can be a problem after surgery. If your bowels don't move within 72 hours, you should call the Vascular Access Unit. Do not take over the counter laxatives unless you have been instructed to do so.
6. **DO NOT LIFT ANY HEAVY OBJECTS!** Your activities for the first few weeks after surgery should be light. You should not pull on the catheter.
7. You may resume driving in 3 to 4 days if you feel comfortable with it, as long as you have stopped taking your pain medication.
8. Your incision will be closed with sutures, which will need to be removed. If there are no problems, the nurse should be able to remove your sutures.
9. The usual waiting time to begin training for peritoneal dialysis is two weeks, during which you may be treated with Hemodialysis. If you receive Hemodialysis, your nurse will contact you to set up a schedule.

List of Reminders

Never:

- Never touch the area that the needle enters after skin disinfection and during dialysis.
- Never wear watches, belts, tight sleeves or bracelets over your graft or fistula.
- Never carry heavy loads across or on the graft or fistula (ex. purses or shopping bags).
- Never sleep on your graft or fistula or have blood taken in the same arm.
- Never use your graft or fistula for routine blood tests or intravenous drug treatments.

Always:

- Always make sure your arm is washed and clean before each dialysis session.
- Always follow your doctor's recommended diet, take your prescription medicines and exercise regularly.
- Always apply light pressure to stop bleeding after the dialysis needles have been removed. Have the nurse check to make sure your bleeding has stopped before you leave the dialysis center.
- Always vary needle puncture sites. Follow a "puncture plan" for advancing needle punctures along the length of the graft before going back to a site that's already been used.

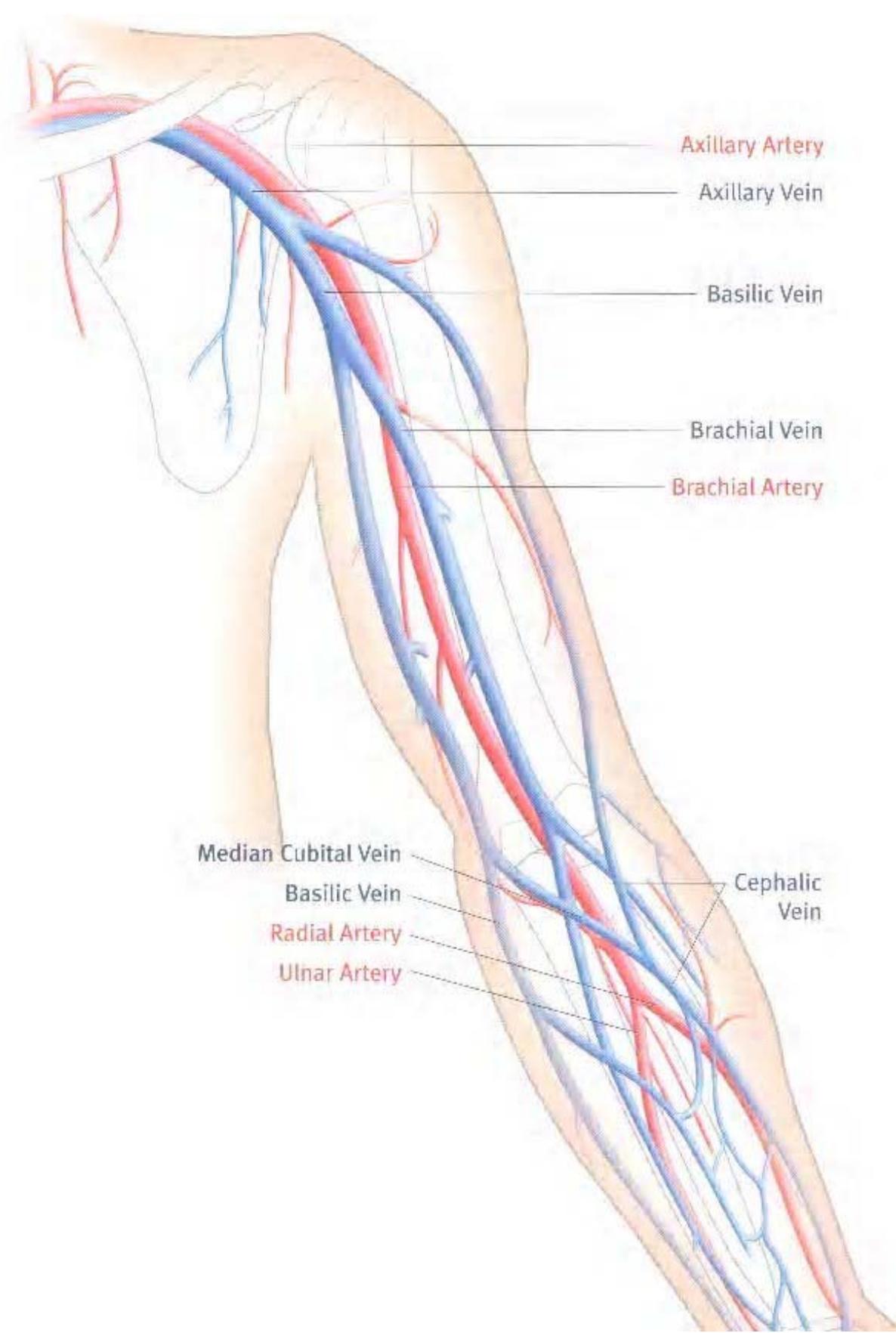
Signs that you may need to visit your doctor:

- Swelling, redness, pus drainage or fever may indicate infection.
- A spreading bruise after a dialysis session could indicate graft bleeding under the skin.
- A pulsating hard knot felt under the skin could be an indicator of graft damage because of repeated needle puncturing the same place.
- Coldness, numbness, aching or weakness of the hand may indicate that not enough blood is getting to the hand.
- No vibration over the graft or fistula may mean that blood has stopped flowing through it.



Vascular Access Event Form

PATIENT'S NAME:		DATE OF EVENT:																																		
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Axillary Artery

Axillary Vein

Basilic Vein

Brachial Vein

Brachial Artery

Median Cubital Vein

Basilic Vein

Radial Artery

Ulnar Artery

Cephalic Vein

Directions to the VCU Medical Center Campus

Arriving by I-64 West- coming from Virginia Beach, Williamsburg, etc.

1. Take Exit 190 for 5th Street and Downtown/Coliseum
2. Turn left at the 4th traffic light onto Marshall Street
3. Drive 6 blocks and turn left onto 11th Street
4. Drive one block and turn right onto Clay Street
5. Go one and one-half blocks to the Patient and Visitor Parking Decks E&S

Arriving by I-64 East- coming from Charlottesville, I-81, etc.

1. Follow I-64 East which merges with I-95 South
2. Remain on I-95 South to Exit 74C West Broad Street
3. Proceed West on Broad Street and follow directions given under “arrive by I-95 North.

Arriving by I-95 North- coming from Petersburg, North Carolina, etc.

1. Take Exit 74C West Broad Street
2. Proceed West on Broad Street for three blocks to 11th Street, take right
3. Drive two blocks to Clay Street and turn right
4. Proceed one and on-half blocks to the Patient and Visitor Parking Decks E&S.

Arriving by I-95 South- coming from Washington, Fredericksburg, etc.

1. Take Exit 74C to West Broad Street
2. Follow directions given under “arriving by I-95 North”

Arriving by U.S. Route 60 coming from Lexington, etc.

1. Follow U.S. Route 60 which merges with 9th Street
2. Remain on 9th Street and go one block past Broad Street to Marshall Street, turn right.
3. Drive two blocks and turn left onto 11th Street
4. Drive one block and turn right onto Clay Street
5. Go one and one-half blocks to the Patient and Visitor Parking Decks E&S

Parking at the VCU Medical Center Campus

Valet parking is available for \$4.00 at the entrances of the Gateway Building, ACC and North Hospital. Parking for the Children's Pavilion is available in the Pavilion's lower garage on 11th St. for \$4.00.

The VCU Medical Center has a Patient and Visitor Parking Deck located at 12th and Clay Streets. The Deck is open 24 hours daily. There is a charge for using this facility during the week.

Reduced parking rates (\$2.00 per visit) are available for patients and visitors that obtain parking validation at the Information Desks located on the first floor of Main Hospital, ACC, Nelson Clinic, the Children's Pavilion and the ground floor of the Gateway Building.

Lost parking tickets for the Patient and Visitor Parking Deck will be charged \$10.00 upon exit unless a \$2.00 validation is presented.



vp Valet Parking **P** General Parking

Comfort, Safety and Security at the VCU Medical Center Campus

Food and Vending

Cafeteria – Main Hospital, 1st Floor
Blimpie’s – Main Hospital, 1st Floor
Chick-fil-a – Main Hospital, 1st Floor
Alpine Bagels – Gateway Building, Ground Floor
McDonald’s – Gateway Building, Ground Floor
Espress Oasis Coffee – Main Hospital, 1st Floor
Vending Machines – Main Hospital, 1st Floor
Three Bears Gift Shop – Main Hospital, 1st Floor



Security

Security staff is available at all times. Immediately report any questionable situation to your health care provider. An escort service is available to any location on the downtown campus by calling 828-WALK. This service is provided free of charge, at any time of the day. Security can also assist visitors in obtaining help for car related problems by calling 828-6595.



Telephones

Visitors are invited to use pay telephones located throughout the medical center.

Cell Phone Usage

The use of cell phones is allowed in any area of the medical center, unless otherwise indicated.

Smoking Policy and Locations

Smoking is not allowed anywhere in the medical center and is also prohibited in and adjacent to all entrances. Smoking is restricted to designated outdoor smoking areas. Please check with your health care provider for the appropriate smoking locations.



Lodging Near VCU Medical Center

Hospitals Patient Representatives **804-628-0400**

This department is available for assistance for housing and travel arrangements. Certain area hotels also provide discounts if reservations are made through representatives.

Hospital Hospitality House **804-828-6901**

612 E. Marshall Street
Richmond, VA 23240

This facility provides temporary lodging arrangements for visiting families of VCU Health Systems, out-of-town patients, and patients requiring long-term treatment. Provides free shuttle to hospital.

Days Inn- Richmond Airport **804-222-2041**

5500 Williamsburg Road
Sandston, VA 23150

Holiday Inn- Central **804-559-0022**

3207 North Boulevard
Richmond, VA 23230

Holiday Inn Express **804-559-0022**

7441 Bell Creek Road
Mechanicsville, VA 23111

Omni Richmond Hotel **804-344-7000**

100 South 12th Street
Richmond, VA 23219

Radisson Hotel **804-644-9871**

301 West Franklin Street
Richmond, VA 23220

Residence Inn Richmond- West End **804-285-8200**

2121 Dickens Road
Richmond, VA 23230

Richmond Marriott **804-643-3400**

500 East Broad Street
Richmond, VA 23219
Provides free shuttle service to hospital

Ronald McDonald House **804-355-6517**

2330 Monument Avenue
Richmond, VA 23220

References

- ❑ Conti, S. (1996). A Handbook of Self-Care for the Dialysis Patient. Flagstaff, AZ. W.L. Gore and Associates.

- ❑ Briones, P., Brouwer, D., Merrill, D. (2005). Hemodialysis Access: A Guide for Caregivers and Patients. Dialysis and Transplantation,34, 200-205.

- ❑ Gore-Tex® Vascular Grafts for Hemodialysis: Techniques for the Care and Cannulation of A-V Grafts. (1997). Flagstaff, AZ. W. L. Gore and Associates.

Contact Information

Contacting Your Vascular Access Coordinators

Phone: (804) 828-9433

Hours: Monday through Friday, 8:00 AM-4:00 PM
Otherwise, call the Transplant Clinic: 804-828-4104
or the Transplant Floor: 804-828-5321 and ask for
the Transplant Resident.

Location: Gateway Building 7th Floor

Address: Transplant Clinic
MCV Hospital
Box 980274
Richmond, VA 23298-0274