Vascular
Access Procedures
What Are Vascular Access Procedures?

A vascular access procedure is designed for patients who need intravenous (IV) access for a considerable time, longer than seven to 10 days. A simple IV set-up is effective in the short term but is far from ideal when, for instance, a patient needs a course of chemotherapy, several weeks of IV antibiotic treatment, or long-term IV feeding. A vascular access catheter is a long, thin tube that is placed in a branch vein in the arm, in the neck, just beneath the collarbone, or in the femoral vein. The tube then is threaded into a major vein in the chest. In many conditions, having this type of tube inserted provides a simple and painless means of drawing blood or delivering drugs, nutrients or both. In this way the patient is spared the discomfort and stress of repeated needle sticks. These central catheters can remain in place for several weeks, months or years.

What Are Some Common Uses Of The Procedure?

- A central catheter permits infusion of solutions containing medication or nutritional substances.

- A type of access called a subcutaneous (beneath the skin) implantable port is ideal for patients who require chemotherapy or other medications intermittently. The device does not interfere with daily activities and requires minimal maintenance measures.

- A variety of medications, and intravenous fluids, may be infused through a central venous access catheter.

- A central line may be used to provide nutritional support and supplements such as vitamins and minerals. Patients who are expected to require IV nutrition or frequent blood draws for a prolonged time can benefit from having a tunneled catheter, a more permanent type of device that causes scar tissue to form, anchoring the catheter to patient tissues.

- A vascular access catheter may also be used for hemodialysis. In this case, the catheter contains two separate passages (lumens): one that takes venous blood from the body to be cleansed in the dialysis machine, the other that returns this blood to the body through the arterial system. A catheter also is useful if kidney disease progresses rapidly and there is no time to install permanent vascular access before starting hemodialysis.

An access catheter may serve to deliver blood transfusions.
How Should I Prepare For The Procedure?

You will receive instructions from hospital staff at least one day before the procedure. You will have blood drawn for pre-procedure testing at either the hospital or a local clinic. Staff will advise you if changes in your regular medication schedule are necessary. You may have to avoid eating or drinking anything for several hours before the procedure. Make sure that someone will be available to drive you home afterwards.

What Does The Equipment Look Like?

In contrast to a standard IV, a vascular access catheter is more durable. The tunneled catheter has a cuff that stimulates inflammation and scarring, so that scar tissue will grow into the cuff and hold it in place. Small, specially designed instruments are used to insert these catheters. The Interventional Radiologist will perform fluoroscopy and/or ultrasound imaging to guide catheter insertion and to make sure that the catheter is in the exact desired position. Fluoroscopy done during the procedure can confirm that the catheter is positioned correctly, and a post-procedure chest x-ray serves the same purpose.

How Does The Procedure Work?

Several types of vascular access devices are available, differing in the particular conditions for which they are used, their longevity, convenience and many other factors. The major types are:

- The **peripherally inserted central catheter (PICC)** is introduced through an arm vein but its tip lies in a large central vein. It provides central IV access for as long as four to eight weeks. A PICC may remain in place for three to six months in certain cases, as long as it continues to work well and is not infected. This is considered to be a temporary catheter. A trained caregiver can place a PICC at the bedside as long as the superficial veins are in good shape. Imaging guidance—by fluoroscopy or ultrasound is necessary about half the time. In these instances the PICC will be placed by a physician in the Interventional Radiology department. Because a PICC can be well cared for at home, its use often makes early hospital discharge practical. Any trained health care worker can easily pull the line out when it is no longer needed.

- The **tunneled catheter**, also known as a **Hickman, Broviac or Groshong catheter**, is a permanent catheter that is fixed in place when scar tissue forms in response to a cuff placed beneath the skin. Typically it is inserted into the subclavian vein just below the collarbone or into the internal jugular vein in the neck, then tunneled from the puncture site down onto the chest wall, emerging from the skin about six inches
from where it entered the vein. The tip of the catheter lies in the large vein that returns blood to the heart. The cuff, made of a material called Dacron, is on the tunneled part of the catheter. This type of catheter is the best choice when a patient is likely to need one for longer than three months and when the line will be used many times each day. It is secure and easy to access.

- The **subcutaneous port** is a permanent vascular access device consisting of a catheter attached to a small reservoir implanted beneath the skin. The entire device is inside—nothing is visible on the outside of the skin except for a small bulge where the reservoir is located. The catheter itself, which passes from an access site in a vein of the arm, shoulder or neck, ends in a large central vein in the chest. The reservoir has a silicone covering that can be punctured with a special needle. The port is used mainly when IV access is needed only intermittently over a long period, as in patients who require chemotherapy. Its only disadvantage is the need for a needle stick whenever treatment is given—and to flush it every six weeks when not in use. Discomfort is not marked and it tends to decrease over time.

**How Is The Procedure Performed?**

Apart from a PICC line, which may be inserted at the bedside, vascular access devices are inserted in an operating room, Interventional Radiology suite, or a special room for procedures. If imaging guidance is not used during placement, a chest x-ray is taken afterwards to confirm that the device is correctly located. At the outset, a sedative medication may be given through a conventional IV line to help you relax. You will feel sleepy but will remain awake for most or all of the procedure. After an area of the upper chest, neck or arm is swabbed with an antiseptic and covered with sterile drapes, a local anesthetic is injected to numb the venous puncture site. Using ultrasound or fluoroscopy to identify the vein, the Interventional Radiologist passes a small needle into the subclavian vein, neck vein, arm vein or femoral vein. Through this a small, thin wire called a guidewire is passed into the superior vena cava. The catheter itself is placed over the guidewire, which is then removed.

For a tunneled catheter, the physician will make two incisions about one inch long: one over the vein where the catheter is inserted and the other where the catheter emerges from the skin. The catheter is placed beneath the skin between the two incisions. Finally, the Interventional Radiologist will place two small stitches, one at each end of the tunnel, which remain in place for about one week and help keep the catheter firmly in place. A small bandage is placed over the sites and the catheter soon is ready for use. Implanting a port also requires two incisions (except in the arm where a single incision may suffice). The port reservoir is placed under the
skin close to the lower incision. A small, elevated area remains on the
body at the site of the reservoir; you will be able to feel it. The incisions
are held together by stitches, surgical glue or a special tape.

What Will I Experience During The Procedure?

You will lie on your back during the procedure. The local anesthetic may
burn for a short time before it takes effect. You may feel some pressure or
brief discomfort when the needle is placed into the vein. The same is the
case when a tunnel is created. You will have to lay flat and hold your arm
still for about 30 to 45 minutes during catheter placement.

You will be in a recovery room for about 1 hour after a vascular access
procedure. When discharged, you should rest at home for the remainder of
the day and may resume your usual activities the following day. Avoid
lifting heavy objects for 2 days. After having a tunneled catheter or
subcutaneous port placed, you should expect some bruising, swelling and
tenderness in the chest, neck or shoulder, but these symptoms resolve
over about five days. Pain medicine may help during this time. The
incisions will heal in seven to 10 days, and the stitches may be removed
after that time according to your physician's instructions. For the first
week, it is especially important to keep the catheter site clean and dry.
Some, but not all, physicians will recommend sponge bathing around the
catheter site, then cleaning the area with water and bandaging the area. It
is important to closely follow the instructions on how to care for the
incision and the device. You may be told that it is all right to shower after
a week, using a piece of plastic wrap over the catheter insertion site, but
not to swim. Flushing the catheter at a stated interval with a heparin
solution may help keep blood clots from forming and obstructing the
catheter. However, instructions will vary according to the type of device
used. Your health care team will make sure that you know what to do.

It is a good idea to call the Interventional Radiology Department
(780-1722) or nurse if you have any questions about your vascular access
device. You must notify them if problems develop with your catheter.
Problems calling for medical attention include malfunction of the device,
bleeding at the insertion site, or signs of infection. Infection may be present
if you develop fever or notice redness, increased swelling or tenderness,
warmth at the catheter insertion site, or fluid drainage from the site.

Who Interprets The Results And How Do I Get Them?

To confirm correct positioning, a fluoroscopy or a chest x-ray will be taken
immediately after catheter placement. How well the catheter functions
may be determined by the Interventional Radiologist, using a needle and
syringe to inject fluid through the catheter.
What Are The Benefits vs. Risks?

Benefits

- The vascular access device is an extremely useful solution for patients who—for any reason—require repeated entry into the venous circulation over a long period. A number of different designs are available that prove suitable in different circumstances.

- Placement of a vascular access device is beneficial for those requiring prolonged treatment such as chemotherapy. They will not need to have an IV line placed for each treatment, and their arm veins will not become badly scarred.

- A PICC is very helpful when irritating medicines or fluids are needed. A wide range of products may be given by this route, including antibiotics and blood products, and the catheter also may be used for IV feeding and frequent blood sampling.

- A vascular access device may be used immediately after insertion. Some types will continue functioning well for a year or longer. The devices are easily removed when no longer needed.

- A catheter sometimes is the only way of getting access to the circulatory system for hemodialysis in patients with serious, rapidly progressing kidney disease.

Risks

Two types of risk are associated with vascular access devices: those occurring during or shortly after placement, and delayed risks that occur simply because the device is in your body.

Risks associated with placement of a vascular access device

- **Bleeding** - Any surgical procedure carries a risk of bleeding. The risk can be minimized through a blood test in advance to be sure that your blood clots normally. If it does not, the procedure may be postponed or you may receive medication to improve blood clotting.

- **Infection** - An infection may develop at an incision site shortly after catheter placement. The risk is less if you carefully follow instructions about caring for the incisions as they heal.

- **Pneumothorax** - About one in 100 patients develops a condition called pneumothorax, a collection of air in the chest that may cause one of the lungs to collapse. This may occur during placement of a catheter or port using a vein in the chest or neck, but not when an arm vein is used. The risk is lessened when catheter placement is guided by ultrasound or fluoroscopy. If your physician is concerned that pneumothorax may have occurred, taking a chest x-ray just after catheter placement will rule out this problem.
**Abnormal heart rhythm** - The normal heart rhythm may be disturbed while the catheter is inserted, but this is usually only temporary. The problem is easily recognized during the procedure and eliminated by adjusting the catheter position.

**Arterial puncture** - Rarely, the catheter will enter an artery rather than a vein. If this happens, the catheter will have to be removed. Most often the artery then heals by itself, but occasionally it has to be surgically repaired.

**Delayed Risks**

**Delayed infection** - Two types of delayed infection may develop: skin infection at the catheter or port insertion site or bloodstream infection. Infections are least common after placing a port. The risk of delayed infection can be minimized if you and anyone else who will be handling the device wash hands before flushing it or cleaning the insertion site. The site should be carefully inspected each time the dressing is changed.

**Catheter fracture** - A hole or break in the catheter may lead to leakage of fluid. This problem may be seen with use of a PICC or tunneled catheter. Breaks may be avoided by not always clamping the catheter in the same spot and by never using too much force when flushing it. Two important first aid measures: 1) clamp the catheter between the damaged part and the skin insertion site; 2) tape a sterile gauze pad to the skin to cover the break. Catheters rarely break inside the body. A chest x-ray will show a fracture and allow removal of the broken fragment without surgery.

**Accidental dislodgment of the catheter** - This also may occur with a PICC or tunneled catheter. If the catheter is not looped and taped firmly to the skin at all times, it may come out. If this happens, you should apply pressure to the incision site using a sterile dressing and call your physician immediately.

**Air in the catheter** - This is an emergency that may cause chest pain or shortness of breath. You should clamp the catheter right away; lie (or place the patient) on the left side; and call 9-1-1 or your nearest emergency facility. This problem can be avoided by always clamping the catheter before and after inserting a syringe, and by making sure that the catheter cap is screwed on tightly.

**Catheter occlusion (closing)** - Any type of vascular access catheter may become obstructed by clotted blood. You can minimize the risk by carefully following instructions about flushing the catheter. Once a catheter occludes, it sometimes can be cleared by injecting medication, but at other times must be removed.
**Vein occlusion** - If the vein in which the catheter lies becomes occluded, the arm or head may swell up. Should this occur, call your physician immediately. The clot may be treated by a blood thinning medication, but occasionally will have to be removed.

**What Are The Limitations Of Vascular Access Procedures?**

Although some types of central venous catheter may remain in place for months or even up to a year they may eventually need to be replaced if the need still exists. The procedure of inserting a vascular access device is invasive because incisions are necessary, and the risk of infection must always be kept in mind. The implanted port has a lifetime of about 1,000 punctures, and so may not be suitable for patients who require IV access on a daily basis.

**What Is An Interventional Radiologist?**

Interventional Radiologists are physicians who specialize in minimally invasive, targeted treatments performed using imaging guidance. They use their expertise in reading X-rays, ultrasound, MRI and other diagnostic imaging equipment to guide tiny instruments such as catheters, through blood vessels or through the skin to treat diseases without surgery. Interventional Radiologists are board-certified and fellowship trained in nonsurgical invasive interventions using imaging guidance. The American Board of Medical Specialties certifies their specialized training. Your Interventional Radiologist will work closely with your primary caregiver or other physicians to be sure you receive the best possible care.
Your (test/procedure)________________________________________________

is scheduled on (date)_______________________________________________

at (time)____________________ , (location) __________________________

Helpful tips:

- Wear comfortable clothes.
- Bring someone with you to drive you home after the procedure if you are not going to be admitted to the hospital.
- Leave all items such as cash, jewelry, credit cards and other valuables at home.
- Bring all your medications.
- Bring all necessary insurance information.

Notes: __________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

If unable to keep this appointment, kindly give 24 hours notice by calling 701-780-5800.