



# Lower Extremity Arterial Disease

*What you should know*

**This handout explains lower extremity arterial disease and its treatments. It explains:**

- Arterial circulation
- How the disease affects arteries in the legs
- Risk factors for developing arterial problems
- Diagnostic tests
- Treatment options
- Surgery
- Self-care after discharge from the hospital

*Lower extremity vascular disease* affects the blood vessels in your legs. It is also known as:

- *Atherosclerosis*
- *Peripheral vascular disease*
- *Peripheral arterial disease (PAD)*
- Hardening of the arteries

## About the Circulatory System

The circulatory system (also called the *cardiovascular* system) is made up of:

- The heart
- Large blood vessels called *arteries* and *veins*
- Tiny blood vessels called *capillaries*

When the heart beats, it pumps oxygen-rich blood through the arteries to all parts of the body. The arteries branch out into smaller capillaries, which carry the blood into body tissues and deliver oxygen to the cells.

Other capillaries then drain the “used” blood from the cells and into veins. The veins carry this used blood to the lungs, where it receives new oxygen from the air you inhale. The oxygen-rich blood is then carried to the heart, and the cycle begins again.

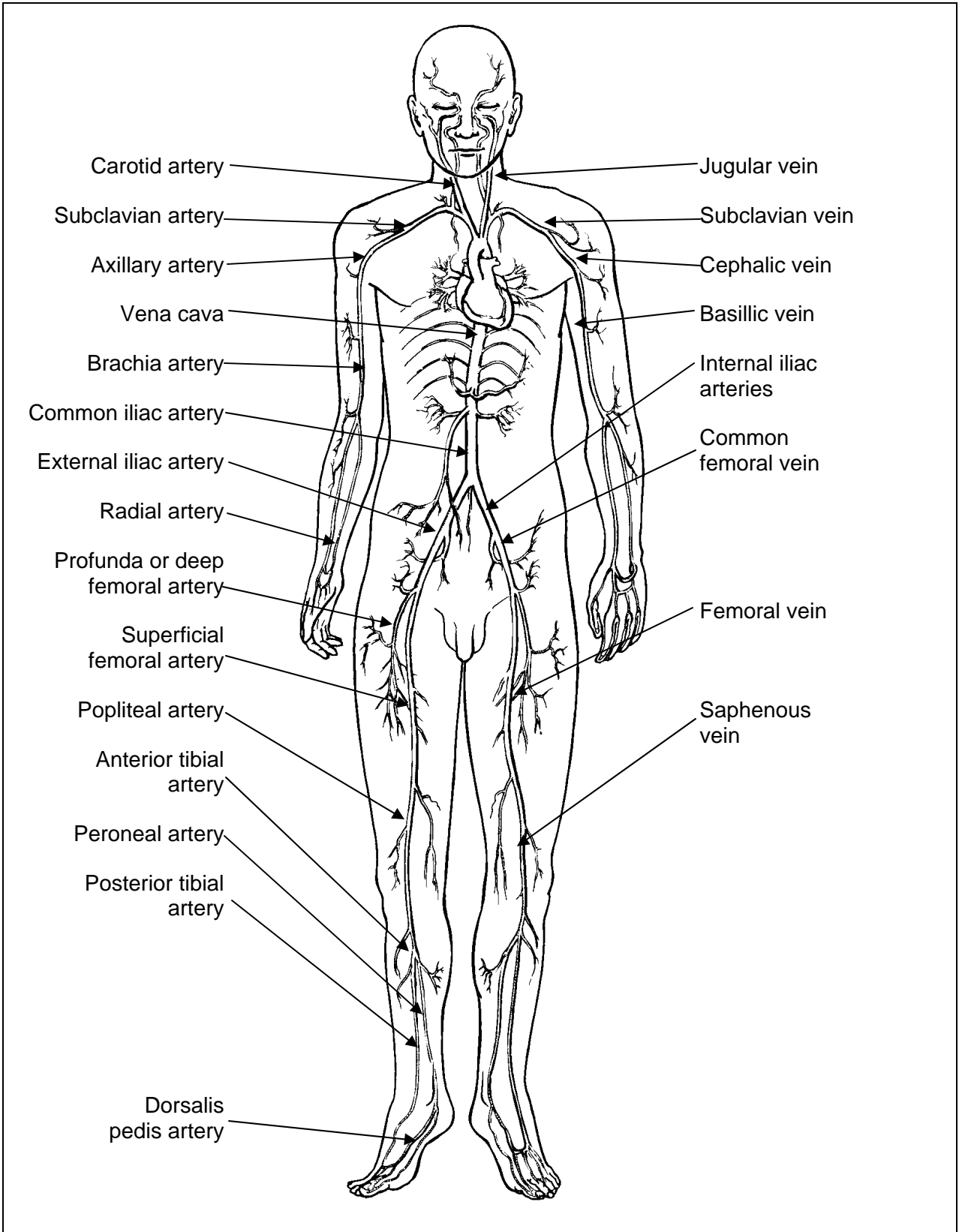
The illustration on page 2 shows the major arteries and veins in the body.

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The major arteries and veins in the body

## What is lower extremity arterial disease?

Normally, the lining of an artery is smooth, and blood flows easily through it. In lower extremity arterial disease, the lining of the arteries to the legs become rough and thickened by a buildup of fats called *cholesterol* and *plaque*. When this happens, the arteries become narrowed and blood flow is lessened or blocked.

If the blockage happens slowly, smaller arteries will form over time. These new arteries will allow some blood to flow around the area that is blocked. This is called *collateral circulation*, and the new arteries are called *collateral blood vessels*.

## What are the symptoms of the disease?

When you walk, you may feel pain or cramps in your hips, thighs, or calves, depending on where the blocked arteries are. After walking a short distance, you may find that resting eases the pain. This is called *intermittent claudication*.

The symptoms occur when you walk because the leg muscles need more oxygen-rich blood when you exercise, but they cannot get the oxygen they need because of the arterial narrowing.

As the disease progresses, you may feel pain in your toes or your feet. This is called *rest pain*. It occurs because your body cannot deliver enough blood to your feet when you are resting.

Rest pain is usually worse when your legs are elevated, and you may feel less pain when you lower your legs. If the blockage gets very bad, and your legs cannot get the blood they need for growth and repair, the tissue can die. This is called *gangrene*.

### ***Other Signs and Symptoms***

Some signs of advanced lower extremity arterial disease are:

- Decreased hair growth on your legs
- Pale, blue, or red skin color on your leg or foot when it is hanging down
- Lack of pulses in your foot
- Numbness, tingling, or pain in your foot, toes, or leg
- Decreased ability to spread your toes and move your foot
- Cool temperature of your foot and leg
- A sore on your foot that does not heal

Sometimes, a piece of plaque breaks off inside an artery and travels down the leg until it lodges and blocks blood flow beyond that point. When a blockage occurs suddenly, symptoms come on quickly and are severe because there is not enough time for collateral blood vessels to form.

## **Who might get this disease?**

These health conditions increase your risk for getting lower extremity arterial disease:

- Smoking
- High levels of blood cholesterol
- High blood pressure
- Diabetes
- Heart disease
- Family history of arterial disease
- Being overweight

## **Your Health Care Team**

Many health care providers will be involved in diagnosing and treating your disease. They include doctors, nurses, and vascular technologists. They will assess the condition of your blood vessels, explain test results and your surgery options, and help plan your treatment.

**You** are also an important member of your health care team. You play a key role in controlling your disease. To do this, be sure to:

- Visit your doctor regularly.
- Change your lifestyle and certain habits to reduce your risk of more problems in your arteries.

## **Can the disease be controlled or prevented?**

We cannot totally cure or prevent this disease, but you can control certain risk factors by changing your habits and lifestyle.

### ***Avoid Tobacco***

Do not use tobacco in any form. This includes all types of cigarettes, pipes, cigars, and chewing tobacco. Even smoking 1 or 2 cigarettes a day is harmful.

The nicotine in tobacco products increases your risk of arteriosclerosis. Nicotine causes your blood vessels to *constrict* (narrow), which prevents the normal amount of blood from reaching your organs and *extremities* (arms and legs). Smoking also decreases the amount of oxygen in your blood and can cause your blood to clot more easily.

**Being tobacco-free is the single most important way to help yourself stay healthy.** If you smoke, quit. If you do not smoke, never start.

### ***Change Your Diet***

Avoid foods that are high in *cholesterol* and *saturated fats* to help reduce your risk of atherosclerosis.

Cholesterol is found in:

- Organ and red meats
- Shellfish
- Foods that contain whole milk, butter, or cream

Saturated fats tend to raise blood cholesterol levels. These fats include:

- Animal fats
- Coconut oil
- Palm oil
- Cocoa butter (the fat in chocolate)

*Polyunsaturated* fats, such as corn and safflower oils, and *monounsaturated* fats, such as olive and canola oils, are better for your health. Check nutrition labels and choose foods with these fats.

Your doctor may also advise you to limit the salt in your diet to help control high blood pressure or fluid retention. Or, if you are overweight, your doctor may suggest a weight-reduction diet. A dietitian can help you plan a diet that will work for you.

### ***Treat High Blood Pressure***

Untreated high blood pressure (*hypertension*) makes the heart work harder and puts more stress on the arteries. Have your blood pressure checked regularly, since hypertension often does not have any symptoms. If you have high blood pressure, take your medicines as prescribed by your doctor.

Medicine can control high blood pressure, but it does not cure it. You must take your blood pressure medicine for as long as your doctor prescribes it, even if you are feeling good.

If your high blood pressure is linked to stress in your life, your doctor or nurse may advise you to take a stress-management class or suggest other ways to help lower your stress.

### ***Manage Your Diabetes***

If you have diabetes, you are more likely to get atherosclerosis. Follow the advice of your diabetes care provider about diet, treatment, and medicines. The effects of diabetes are better controlled if they are treated early and your symptoms are watched closely.

### ***Exercise***

Daily exercise helps control atherosclerosis. It does not have to be strenuous. Mild exercise such as walking is helpful and safe for most people with atherosclerosis. But, you must do it regularly to lower the risks of atherosclerosis.

If you begin a walking program:

- Start with short distances, and slowly increase how far you walk.
- Walk until your leg pain starts, then stop and rest.
- When your leg pain goes away, begin walking again.

If you want to do more strenuous exercise, talk with your doctor before you start.

### ***Watch Your Iron Intake***

Studies show that there may be a link between high levels of iron in the body and a higher risk of atherosclerosis, especially in the arteries that supply blood to the heart. It may be that high levels of iron change how *low-density lipoproteins* (LDLs) move across the arterial wall, which leads to the fatty streaks that form on the inside the artery.

### ***Lower Your Homocysteine Levels***

Your body produces *homocysteine* when you digest protein. High levels of homocysteine in the blood can be toxic to the inside of arteries, and this can cause atherosclerosis to develop more rapidly.

To lower the levels of homocysteine in your blood, eat foods and take supplements that contain folic acid, vitamin B6, and vitamin B12.

### ***Take Care of Your Feet***

When blood flow to your legs is decreased, small injuries to your feet or toes can result in serious infections, sores, or tissue death (gangrene). Here are some tips for taking good care of your feet:

- **Avoid any situation that might cause foot injury:**
  - Do not expose your feet to very hot or very cold temperatures.
  - Do not expose your feet to strong chemicals or disinfectants.
  - Wash your feet thoroughly, but do not soak them. Soaking will remove the natural oils and dry your skin.
  - Dry your feet well after washing, especially between your toes.
- **Wear shoes that support your feet.**
  - Do not go barefoot, even around the house.
  - Wear new shoes for only short periods until they are broken in.
  - Check your shoes before putting them on. Make sure there are no hidden objects inside that might injure your feet.

- **Check your feet every day for any injuries or sores.** This is even more important if you have diabetes or have reduced feeling in your feet. Use a mirror or ask someone for help if you have trouble seeing your feet and toes. Check for:
  - Areas of redness
  - Swelling
  - Sores
  - Drainage
  - Areas that are warm to the touch
- **Use good foot hygiene.**
  - Cut your toenails straight across, no shorter than the length of your toe.
  - Do not treat corns, calluses, and bunions at home. They should be treated by your doctor or nurse.
  - Check out special shoes or inserts. They can help keep calluses from forming and make your feet more comfortable. Ask your doctor or nurse to recommend special shoe stores.

## How is the disease diagnosed?

To diagnose lower extremity arterial disease, your doctor will:

- Ask you questions
- Examine you
- Order special tests, which may be noninvasive or invasive

## Noninvasive Tests

Your doctor may send you to the *noninvasive vascular laboratory* to check the blood flow to your legs. Noninvasive tests:

- Do not use needles, dyes, or X-rays
- Are painless
- Have no known risks or side effects
- Do not require you to prepare or to receive special care afterward
- Are done on an outpatient basis, which means you will not need to stay overnight in the hospital

These are some of the noninvasive tests your doctor may want you to have:

### *Arterial Blood Pressures, Waveforms, and Exercise Tests*

These tests use a *Doppler* (an ultrasound stethoscope) to record the blood flow at different points along your legs. The vascular technologist will place blood pressure cuffs around your arms and

legs, and then compare the pressure readings from each place. You may be asked to walk on a treadmill, after which your blood pressure will be read and compared again. These tests will show where you have atherosclerosis, and how severe it is.

### ***Duplex Scanning***

This test takes an ultrasound picture of your artery or vein and displays it on a screen. This will show the size of the blood vessel and how well the blood is flowing through it.

You will need to lie very still during this test. The vascular technologist will apply gel on your skin over the artery or vein that is being studied. The technician will then place a probe on your skin. The probe emits very short pulses of very high frequency sound, much higher than the ear can hear. The pulses of sound bounce back from your body tissues and are picked up by the probe. Blood moving in your artery or vein creates small echoes, and these show how fast the blood is moving through your blood vessels.

### **Invasive Tests**

Your doctor may also ask you to have some *invasive* tests. These tests involve some risks, and you may need to stay overnight in the hospital. Here are some of the invasive tests you may have:

#### ***Arteriogram***

An arteriogram is an X-ray of your arteries. For this test, dye will be injected into your artery, either through a needle or a small *catheter* (a thin, flexible tube). The X-ray image gives your doctor a “road map” of any blockages in the arteries of your legs. This test may be done on an outpatient basis, or you may need to stay overnight in the hospital. Your doctor will tell you what to expect.

An arteriogram is usually done in Radiology. You will be asked to sign a consent form before the procedure is done. You will be awake during the test, but you may be given a medicine to help you relax. You may feel a short warm sensation when the dye is injected.

After the test, you will be asked to lie flat in bed for several hours. During this time:

- Pressure will be applied over your catheter site.
- The nurse will check your pulses and blood pressure many times.
- Your doctor will review your test results and talk with you about your treatment options.



### ***Computed Tomography Angiography (CTA)***

CTA is done to diagnose problems with blood flow. Dye is injected through an IV, and special X-rays of your blood vessels are taken. These X-ray images appear on a screen in the exam room. CTA may be done before an arteriogram.

### **Treatment**

Your doctor will recommend treatment for your lower extremity arterial disease based on:

- Your general health
- Your signs and symptoms
- The results of your diagnostic tests

#### ***Mild Atherosclerosis***

If you have a mild form of the disease, your doctor may advise that you:

- Stop smoking, if you smoke
- Start an exercise program to help collateral circulation develop
- Take medicine to help keep the disease from getting worse
- Eat a low-fat diet

#### ***Severe or Progressive Atherosclerosis***

If your atherosclerosis is severe or progressive (getting worse), your doctor may recommend one or more of these treatments:

- **Balloon Angioplasty:** This procedure may be used when there is only a short section of blood vessel that is narrowed or blocked. During an angioplasty, a small catheter with a balloon on one end is placed in your artery where the narrowing is. The balloon is inflated, which flattens on the inner wall of the artery. This makes more room for the blood to flow. The balloon is then deflated, and the catheter is removed. Dye is then injected into the artery to determine if the artery has opened enough. The procedure may be repeated if more opening is needed.
- **Stents or Stent Graft Therapy:** This procedure is often done in the blood vessels of your legs, in addition to balloon angioplasty.
  - A *stent* is a small wire mesh tube that is placed in a partly blocked artery. It is inflated with a balloon, and holds your artery walls open. This allows blood to flow more freely.
  - A *stent graft* is a small wire mesh tube that is woven into a synthetic (man-made) bypass graft material. A stent graft is placed into arteries in your thigh or groin.

- **Thrombolytic Therapy:** In this procedure, special medicine is given through a catheter in your artery. This medicine breaks up or dissolves blood clots in the blocked blood vessel. This procedure is done only if acute blockage is found within 2 weeks of a blood clot forming.

### *After Treatment for Severe Atherosclerosis*

You will be in the hospital for a short stay after receiving one of the treatments for severe or progressive atherosclerosis. While you are in the hospital:

- You will need to lie still. Avoid bending your leg at the hip where the catheters were placed.
- After the catheter is removed, your nurse will hold pressure over the incision site for 15 to 20 minutes to prevent bleeding.
- Your blood pressure will be checked often. Your incision site will also be checked to make sure that you are not bleeding.
- You will receive *intravenous* (IV) fluids for several hours.

When you go home after your procedure:

- Increase your intake of fluids. This will help your kidneys remove the dye from your body tissues.
- **Call your doctor right away if you:**
  - Have swelling or bleeding from your incision site
  - Feel lightheaded or dizzy
  - Have numbness or pain in your leg
  - Have redness or pain at your incision site

## **Surgery**

Surgery is one of the treatments for lower extremity vascular disease. Surgery is not a cure, but it may improve symptoms and help you be more independent.

If you have severe lower extremity arterial disease, your doctor may advise surgery on certain arteries in your legs. This surgery will help:

- Improve your circulation
- Increase how far you can walk
- Relieve rest pain
- Heal foot ulcers
- Prevent amputation

Your operation will involve either removing the plaque or blood clot from the blocked artery or bypassing the diseased artery. Your doctor will talk with you about your surgery options.

### ***Bypass Surgery***

This operation uses synthetic (man-made) grafts, or one of your own veins, to create a detour around the area where your artery is blocked or narrowed. During the surgery, your doctor will make incisions at certain places on your leg. The two ends of the bypass graft will be sewn to your artery above and below the blockage. Your blood will then flow through the artery, into the bypass graft, then back into the artery and out to the rest of your leg.

## **Preparing for Your Operation**

### ***Things to Remember***

- **Hospital stay:** You will be in the hospital for 4 to 10 days after your operation.
- **Going home:** You will need to arrange for someone to drive you home when you are ready to leave the hospital. You may also need someone to help you prepare meals and do other household chores for 1 to 2 weeks.

### ***1 Week Before Surgery***

- **Aspirin and other medicines:** Do **not** take aspirin or other products that affect blood clotting for 1 week before your operation. Two of these are ibuprofen (Advil, Motrin) and naproxen (Aleve, Naprosyn).

### ***48 Hours Before Surgery***

- **Shaving:** Do **not** shave any part of your body that you do not already shave every day. If you normally shave near your surgical site, do **not** shave that area for 2 days (48 hours) before your surgery.

### ***24 Hours Before Surgery***

- **Take 2 showers:** Take 1 shower the night before and a second shower the morning of your operation. Use the antibacterial soap your nurse gave you to wash your body.

Do **not** use the antibacterial soap on your face and hair. (See directions that came with the soap.) Use your own soap and shampoo on your face and hair. Use clean towels to dry off, and put on clean clothing.

- **Arrival time:** The pre-surgery nurse will call you by 5 p.m. the night before your operation. If you are having surgery on a Monday, the nurse will call you the Friday before. If you do not hear from the pre-surgery nurse by 5 p.m., please call 206-598-6334.

The pre-surgery nurse will tell you when to come to the hospital and will remind you:

- Not to eat or drink after a certain time
- Which of your regular medicines to take or not take
- To sip only enough water to swallow your pills

### *At the Hospital*

- **Heating blanket:** To reduce your risk of infection, you will be covered with a heating blanket to warm your body while you wait to go into the operating room. Ask for a heating blanket if you do not receive one.

## **Recovering in the Hospital**

### *Waking Up*

When you wake up after your operation, you will either be in the recovery room or in the intensive care unit (ICU).

### *Monitoring Your Vital Signs*

Your nurses will check your blood pressure, heart rate, breathing rates, and the pulses in your feet. This will happen many times a day.

### *Coughing and Deep Breathing*

Your nurse will teach you coughing and deep-breathing exercises. These are important to do after surgery to help prevent pneumonia.

### *Diet*

Your doctor will talk with you about what you may eat and drink.

### *Activity*

You should be able to increase your activity every day. Some activities will be limited if you have:

- **A foot ulcer.** Until healing begins, you may need to spend more time in bed or in a chair.
- **A bypass graft across a joint.** You may not be able to kneel or do other activities that require you to bend your knee or hip joint at a sharp angle.

### ***Pain***

The discomfort around your incision will be greatest for 2 to 3 days after surgery. After that, the discomfort should slowly ease.

### ***Sutures or Staples***

You may have sutures or staples to close your incision. These may be removed before you leave the hospital or at your first follow-up visit.

## **Self-care at Home**

### ***Precautions***

Medicine given during and after your operation will affect you. For 24 hours after your surgery do **not**:

- Drive
- Travel alone
- Use machinery
- Drink alcohol
- Sign any legal papers or be responsible for the care of another person

### ***Incision Care and Showering***

- Avoid using creams or lotions on your incision right after surgery, unless your doctor tells you otherwise.

*If your sutures or staples were removed before you left the hospital:*

- You may shower when you get home. Gently clean your incisions with soap and water, and pat your skin dry.

*If your sutures or staples are still in place:*

- Do not get your sutures or staples wet.
- When your sutures or staples are removed at your follow-up visit, small pieces of tape called Steri-Strips may be placed along your incision. Steri-Strips help support the incision for a few days while it heals. They will usually start to peel away after 5 to 7 days, and can then be pulled off.
- You may shower with the Steri-Strips in place.

### ***Swelling***

You will have some swelling in your leg for a while after your surgery. To help lessen the swelling:

- Prop up your legs above the level of your chest when you are sitting or resting.

- Wear the special compression stockings or elastic bandages if your doctor prescribed them.

### ***Activity***

You may feel a little weaker and more tired when you get home. This is normal. It may take several weeks for you to feel like yourself again. As you start to resume your usual activities, be sure to give yourself time to rest. Do not try to do too much.

### ***Driving***

Do not drive if you are taking narcotic pain medicine, and for 24 hours after you stop taking it. Your ability to respond quickly may be impaired. Wait to start driving until your doctor tells you it is OK.

### ***Foot Care***

Your blood flow will improve with surgery, but you must still take good care of your feet and toes:

- Check your feet every day for areas of irritation. Check the skin between your toes for cracking or sores.
- Do not soak your feet. Soaking removes natural oils and dries your skin. This may cause your skin to crack.
- When you wash your feet, use a mild soap and lukewarm water. Dry them well.
- Apply lanolin cream or lotion to the dry skin on your legs and feet.
- Trim your toenails to be even with the ends of your toes. File any rough nail edges smooth.
  - If your vision is impaired, or you cannot reach your feet, ask a family member or friend to help trim your toenails.
  - If you have diabetes, do not trim your toenails yourself. Ask your diabetes care provider for help.

### ***Smoking***

Do **not** smoke or use tobacco in any form. Smoking constricts your blood vessels and increases the risk of blood clots.

### ***Diet***

For best healing, your diet must include enough protein, vitamins, and minerals. Your doctor, nurse, or dietitian will talk with you about dietary changes before you leave the hospital.

## Questions?

Your questions are important. Call your doctor or health care provider if you have questions or concerns. UWMC clinic staff are also available to help.

Weekdays from 8 a.m. to 4 p.m., call the Surgical Specialties Nurse Advice Line at 206-598-4549.

After hours and on weekends and holidays, call 206-598-6190 and ask for the resident on call for Surgery to be paged.

Or, ask for your surgeon to be paged:

Dr. \_\_\_\_\_

### *Synthetic Grafts*

If you had a bypass and a synthetic graft material was used, you may need to take antibiotics before having any other surgery, dental work, or invasive procedure in the future. The antibiotics will help prevent infection.

Talk with your dentist about whether you will need antibiotics when you have dental work done. Be sure to tell any new doctors or dentists that you have a synthetic bypass graft.

### **Call the Nurse Advice Line or Your Doctor If You Have:**

- Bleeding or drainage that soaks your dressing
- A fever higher than 100.5°F (38°C)
- Shaking and chills
- Any sign of infection in your incision:
  - Redness
  - Increasing pain
  - Swelling
  - Tenderness
  - Foul-smelling drainage
  - A change in the type or amount of drainage
- Nausea and/or vomiting
- Increased pain in your leg
- A change in the color or temperature of the leg that was operated on
- Concerns that cannot wait until your follow-up visit

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