CARDIOVASCULAR SURGERY

YOUR HEART: THE INSIDE STORY

hoag
Heart & Vascular
Institute

Cardiovascular Surgery

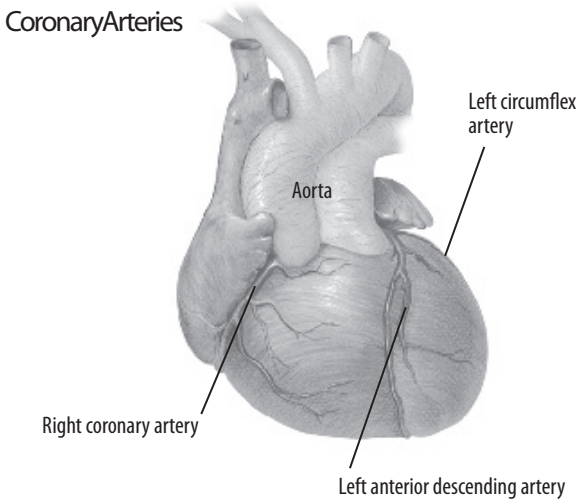
Your Heart: The Inside Story

How the Heart Works

The heart is located under the rib cage, to the left of the breastbone (sternum) and between the lungs. Shaped like an upside-down pear, about the size of a fist, the heart is an amazing hollow muscular pump capable of pumping 5-6 quarts of blood per minute. A large vessel called the aorta carries oxygen and nutrient-enriched blood away from your heart to the rest of your body. In order to do all this work, the heart muscle needs a continuous supply of oxygenated nutrient-enriched blood from its coronary arteries.

The Coronary Arteries: The Heart's Oxygen Supply

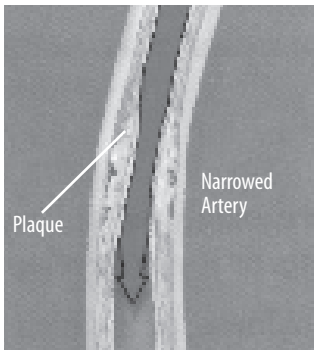
There are three main coronary arteries and each of these arteries has many smaller branches creating a network of circulation running over and through the heart muscle. These arteries provide oxygen and nutrients to every area of the heart tissue. Each coronary artery supplies blood to a certain area of the heart. The right and left main coronary arteries originate from the aorta. The right coronary artery supplies blood to the right half of the heart, the left anterior descending coronary artery supplies the front portion of the heart and the left circumflex coronary artery supplies blood to the left side and back/ underside of the heart.



Coronary Artery Disease

The inside walls of the coronary arteries are normally smooth and flexible, allowing blood to flow easily through them. When the blood flows easily, your heart muscle gets the oxygen it needs to do its job. During exercise, your heart beats faster and harder, therefore needing more oxygen. A healthy heart and disease-free coronary artery system can easily supply the extra blood needed for all levels of physical activity.

Blockages in the coronary arteries can occur. These blockages are generally caused by fat, cholesterol and mineral deposits within the coronary artery known as **plaque**. There are numerous risk factors that influence this process including smoking, cholesterol, high blood pressure, diabetes, male gender, heredity, age and other nontraditional risk factors. As plaque continues to build up, the internal diameter of the artery decreases and less blood is supplied to the heart muscle. The reduced blood flow can cause **angina**. Angina usually occurs when the heart needs more blood flow such as when exercising or during emotional distress. Fatigue, tightness in the chest or a more severe pain are common angina symptoms. Rest or Nitroglycerin will usually relieve these symptoms.



Coronary Artery Disease – Atherosclerosis

A **heart attack** (myocardial infarction) is different from angina. Heart attacks usually occur after plaque tears (ruptures) within the coronary artery. This rupture can cause a blood clot to form secondary to the body's attempt at repairing the damage. If the blood clot completely stops the blood flow through the coronary artery, a heart attack can occur. The heart muscle this coronary artery is supplying may have permanent damage. Prolonged chest pain is a medical emergency. Anyone experiencing unrelieved chest pain needs to seek immediate attention. Coronary artery disease can be deadly.

Coronary Artery Bypass Graft (CABG)

Based on your symptoms and the results of your cardiac catheterization, your physician(s) have recommended a **coronary artery bypass graft** (CABG, myocardial revascularization) surgery to treat the narrowed or blocked blood vessels to your heart. Coronary artery bypass surgery will improve the blood supply to your heart. The increase in oxygenated blood after the surgery should relieve your chest pain (angina), decrease the need for medication, reduce fatigue, allow you to be more active, restore your sense of well being, and may also add years to your life.

Transmyocardial Laser Revascularization (TMR)

During your surgery, your surgeon may want to do a laser procedure called **Transmyocardial Revascularization (TMR)**. This would be done in addition to coronary artery bypass surgery. It is performed in an effort to improve blood flow to the heart muscle. It would be done in an area of the heart that the surgeon feels may not be able to be adequately revascularized with bypass grafts. TMR has been shown to reduce angina and improve the quality of life in patients with advanced cardiovascular disease.

This procedure is performed using a high-energy laser to make 10-45 small "channels" or holes, directly into the wall of the heart. The outside of the heart muscle seals up immediately. It is uncommon to have any significant bleeding or other complications related to this procedure. It may add approximately 30 minutes to the length of your surgery.

Off-pump or Beating-heart Surgery

Due to recent advances in equipment and technique, the surgeon can work on the heart while beating, without the use of cardiopulmonary bypass. One of the greatest challenges for the cardiac surgeon is to stitch on a beating heart. The surgeon uses special equipment designed to hold portions of the heart in place while operating. **Beating-heart surgery** (off-pump, minimally invasive) has limitations and is not for all patients. For select operations, the surgeon may decide beating-heart surgery is an option. This type of surgery usually leads to a shorter hospital stay.

During Bypass Surgery

Coronary artery bypass graft surgery is performed at Hoag Hospital by a skilled and experienced professional heart surgery team. The surgeon and the team's expertise, combined with highly advanced technology, will ensure the safest possible environment and surgery for you. Your surgery will be done with general anesthesia administered by a cardiac anesthesiologist.

During traditional coronary artery bypass surgery, your surgeon will make an incision down the middle of your breastbone (sternum) to allow full exposure of your heart. You are connected to a **heart-lung bypass machine** which allows for circulation of oxygenated blood throughout the body during the operation. The heart is stopped temporarily while the surgeon performs the bypass procedure. After the bypass grafts are completed and the heart is restarted, the breastbone is closed utilizing special wires or cables and the chest is closed with internal stitches.

During bypass surgery, a blood vessel is removed or redirected from one area of the body and placed past the area of narrowing in the coronary artery and to the aorta.

This new vessel, called a **graft**, restores blood flow to the heart muscle. Coronary artery bypass grafting does not remove the obstructing blockages in the arteries. The procedure "reroutes" the blood flow by creating a detour pathway.

There are several types of conduits (grafts) which can be used for coronary artery bypass procedures. The surgeon decides which grafts to use based on the location of the blockage, the amount of blockage and the size of your coronary arteries. The arteries or veins which are chosen for the operation are expendable. Removing them does not significantly affect the blood flow from where they are taken.

The most commonly used graft for bypass is the **saphenous vein**. The saphenous vein lies just beneath the skin on the inside portion of the leg. Saphenous veins are removed from your leg and then stitched into the aorta and below the site of blockage on the coronary artery. Removing the vein requires an incision in your leg that can extend from the groin to the ankle. If possible, our surgical team attempts to remove this vein utilizing **endoscopic** technique. This is a new method of minimally invasive surgery which removes your saphenous vein using special instruments and small incisions. Removing the vein this way should not only reduce your discomfort and lower your risks for infection, but it also allows for less scarring and a quicker recovery.

The **internal mammary artery (IMA)** is another common bypass graft which has been shown to have good long term results. In most cases, this artery is removed from the inside of the chest wall, left intact at its origin, and sewn below the blockage on the coronary artery. The left IMA is commonly used and the right IMA or both are occasionally utilized based on your individual anatomy and disease.

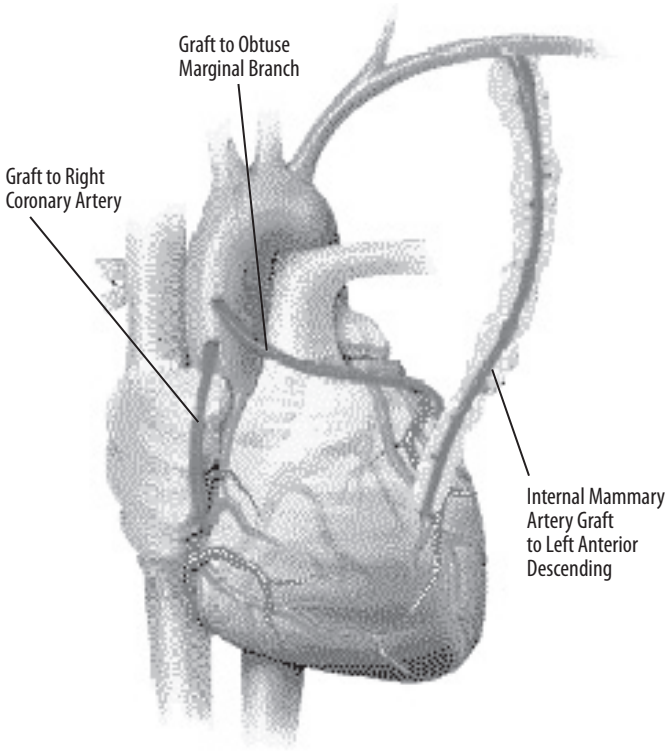
Another artery which is used as a bypass graft is the **radial artery**, one of two arteries in the arm. Most people receive their blood supply from the other one, the ulnar, and can have the radial artery removed without compromising the circulation to their hand. The radial artery incision is in your forearm, from about one inch above your wrist to two inches below your elbow. Occasionally, we are able to remove this artery utilizing endoscopic technique like the saphenous vein. After this type of graft, you will stay on a special medication (calcium channel blocker) for several months to assist in keeping the graft open.

Length of Surgery

The total time of surgery is variable depending on the procedure and the complexity of the operation. The time in surgery includes preparatory time along with anesthesia time for the necessary tubes and lines to be inserted. The usual length of surgery is 4-6 hours, however, this is only an estimate so do not be alarmed if the length of your surgery is different. During surgery, specific progress updates about your operation along with time estimations will be provided to your family members/significant others.

Risks of Surgery

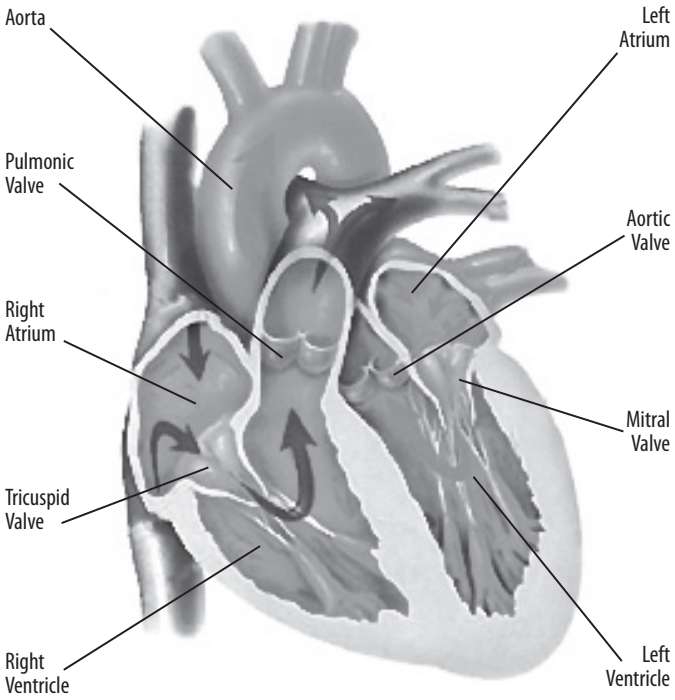
Coronary artery bypass surgery is considered a major operation and is associated with risks. Your surgeon will discuss your risks, benefits and alternatives to surgery prior to obtaining your consent for the procedure. Major risks include bleeding, stroke, infection, and death.



Valve Surgery

When is Valve Surgery Needed?

The heart is a four-chamber hollow pump. As blood is pumped through each of the four heart chambers, it passes through a valve. The four valves within the heart are the **pulmonic**, **aortic**, **mitral** and **tricuspid** valves. These valves are made up of valve leaflets which act as one-way doors to keep blood moving forward as your heart beats. Heart valve disease can occur at any time during an individual's lifetime. Some valve disease can be present at birth, some valve disease is acquired through rheumatic fever, bacterial infections, or coronary artery disease, and some heart valves may weaken or harden with aging.



A **stenotic valve** is a result of valve disease in which the tissues of the valve thicken or harden, narrowing the valve opening and blocking blood flow. Over time, stenosis can worsen. A regurgitant (incompetent, insufficient) valve is the opposite. A **regurgitant valve** has extra, loose, shortened tissues or the structures supporting the valve may have torn allowing blood to leak back through the valve even when it is closed. Any problem with a heart valve makes the heart work harder to get the blood moving in the right direction. The heart may enlarge to compensate for the extra work required from the defective valves. If no action is taken the heart muscle becomes too large and heart failure may follow because the heart muscle is permanently damaged.

Common symptoms of heart valve disease include shortness of breath (particularly with activity or when you lie down) dizziness, palpitations, chest pain, swollen ankles, or fatigue. Usually a heart murmur is heard during an examination. Based on your symptoms, along with your test results, your physician(s) have recommend heart valve surgery.

Surgical Options

Heart valve problems can be treated in many different ways depending on the extent and type of valve disease. There are two major options for surgery: valve repair or valve replacement. With **valve repair**, the surgeon tailors your own valve to function more effectively. With **valve replacement**, the surgeon actually removes your diseased valve and replaces it with a new valve. Many considerations are made regarding selecting the right procedure for you by your physician(s). Your surgeon will consider your age, occupation, lifestyle, extent of your valve disease, valve size, number of diseased valves, condition of your heart, heart rhythm, your ability and willingness to take blood thinning medication, along with your feelings and wishes. Your surgeon will discuss the specifics regarding your decision along with life expectancy of your new valve.

Valve Repair

During valve repair, the valve may be reconstructed by strengthening or shortening the leaflets or supporting structures. Often, to support your valve's own leaflets, a Dacron® ring can be implanted at the opening of the valve. The most commonly repaired valves are the mitral and tricuspid valves. No long-term **anticoagulation** therapy (blood thinner, Warfarin®, Coumadin®) is usually needed after valve repair unless you have another medical condition which requires this therapy (such as atrial fibrillation). A short-term, three-month course of anticoagulation therapy is generally initiated after valve repair surgery. Stenotic valves are rarely repaired, when they are, the stiffened leaflets are cut and separated to allow for greater blood flow through the valve.

Valve Replacement

Replacement of the valve is done with mechanical, bioprosthetic (tissue), homograft (human) or autograft (repositioning one's own valve). **Bioprosthetic** or tissue valves can be made from bovine (cow), porcine (pig) or from a homograft (another person). With both the bovine and porcine valves, due to their similarity to your natural heart valves, no long-term anticoagulation therapy is needed. A short-term, three-month course of anticoagulation therapy is generally initiated after surgery. This short-term therapy is recommended to help your body adjust to the new valve. The **homograft** is preserved with cryopreservation (freezing) and is directly implanted into a person's aorta for an aortic valve replacement or pulmonary valve replacement in a Ross Procedure. Homografts do not require anticoagulation therapy. As you would expect, there is a limited supply of homograft valves.

The **Ross Procedure** (autografting) is a type of specialized aortic valve surgery where a diseased aortic valve is replaced with your own pulmonary valve. The pulmonary valve in turn is replaced with a homograft valve. The advantages to this procedure are especially important for children or young adults because the valve lasts longer and there is no need of anticoagulation therapy after surgery. Some research supports the assertion that if in the aortic position, the pulmonary **autograft** has greater longevity than other tissue valves.

Mechanical valves are manufactured of man-made materials including durable metals, carbon, ceramics and plastics with a Dacron® ring to suture to a rim of tissue kept from original heart tissues. Historically, mechanical valves have a longer length of durability. However, since these valves are not made of a natural substance, clots will form on them and therefore require lifelong use of anticoagulation therapy.

Intraoperative Ablation

Atrial fibrillation is a very common **arrhythmia** (irregular heart rhythm). Your cardiovascular surgeon and cardiologist will decide if you might benefit from this procedure prior to your surgery and discuss the risks and alternatives as well. Ablation is most commonly done when patients undergo mitral valve repair or replacement, but it can be done as a stand alone procedure or simultaneously with any cardiac surgery. If performed during your surgery, your cardiovascular surgeon will treat these areas by creating lesions that block abnormal electrical impulses which cause atrial fibrillation and correct the arrhythmia (maze, modified maze, ablation). During the procedure your surgeon will remove the left atrial appendage (a pouch on the left side of your heart) which is often the source of blood clots in atrial fibrillation which can cause strokes. Surgical procedures for atrial fibrillation are evolving and improving all the time and your surgeon will provide you with more specifics. With this treatment, many patients leave the hospital with a normal sinus rhythm but up to 70% of patients experience temporary atrial fibrillation in the postoperative timeframe. It takes several months to determine success or not of atrial fibrillation procedures. Close follow-up with your cardiologist is imperative during the first year after any atrial fibrillation surgery. Important protocols and decisions regarding medications for arrhythmias, anticoagulation and cardioversion need to be addressed. More information will be provided at the time of hospitalization and discharge.

During Heart Valve Surgery

Heart valve surgery (replacement or repair) is performed at Hoag Hospital by an internationally recognized professional and a experienced professional heart surgery team. The surgeon and team's expertise combined with highly advanced technology will ensure the safest possible environment and surgery for you. Your surgery will be done with general anesthesia by a specialized cardiac anesthesiologist.

During heart valve surgery, your surgeon will make a partial or full incision down the middle of your breastbone (sternum) to allow full exposure of your heart. You will be connected to a heart-lung bypass machine which allows for circulation of oxygenated blood throughout the body during the operation. The heart is stopped temporarily while the surgeon performs the valve procedure. If the valve is to be replaced, the surgeon will remove the old valve and suture the new valve in place.

If the valve is to be repaired, then the surgeon will complete necessary repairs. After the valve procedure is completed and the heart is restarted, there will be careful examination of the valve using **transesophageal echocardiogram (TEE)**. TEE clearly shows how the valve is functioning with a beating heart. Occasionally, particularly with a valve repair, it is necessary to return to the heart-lung machine while further repair or replacement of the valve is completed. Once the surgeon is satisfied with the function of the valve, the breastbone is closed utilizing special wires or cables and the chest is closed with internal stitches.

Length of Surgery

The total time of surgery is variable depending on the procedure and the complexity of the operation. The time in surgery includes preparatory time along with anesthesia time for the necessary tubes and lines to be inserted. The usual range is 4-6 hours but this is only an estimate, so do not be alarmed if your times are different. During surgery, specific progress updates about your operation along with time estimations will be provided to your family members/significant others.

Risks of Surgery

Heart valve surgery is considered a major operation and is associated with risks. Your surgeon will discuss your risks, benefits and alternatives to surgery prior to obtaining your consent for the procedure. Major risks include bleeding, stroke, infection, and death. Valve surgery has a higher incidence of arrhythmias (irregular heartbeat) after surgery than other types of heart surgery and may require additional medications and occasionally a pacemaker implantation.

Endocarditis Precautions

If you have had any of your heart valves repaired or replaced, you are at an increased risk for an infection within your heart (**endocarditis**). There are certain precautions you must take to prevent this from occurring.

An infection anywhere in your body can travel through the blood stream and end up attacking your valves. The use of antibiotics is recommended prior to certain procedures. These procedures include:

- Dental cleaning or work
- Surgical operations involving intestinal or respiratory mucosa
- Most treatments and examinations involving a tube, catheter or object inserted into the body (colonoscopy, cystoscopy, bronchoscopy)

You will receive a card which states your need to receive antibiotics prior to invasive procedures. It is recommended that you carry it in your wallet

Dental care is important because bacteria can enter the bloodstream when your teeth or gums are in poor condition. Good dental hygiene can prevent this from occurring.

General Guidelines Include:

- If possible, delay dental work for three months following your heart surgery.
- Visit your dentist every 6 months. If you wear dentures, you should still visit your dentist regularly, as gum injury and infection can also occur.
- Floss your teeth daily.
- Avoid using anything which might force bacteria into your blood stream such as Water Piks, toothpicks, or stimulators.

Medications Given to Prevent Endocarditis

Current recommendations from the American Heart Association include:

Situation	Medications	Regimen
Standard	Amoxicillin	Adults: 2.0 gm orally 1 hour before procedure
Allergic to Penicillin	Clindamycin or Cephalexin or Cefadroxil	Adults: 600 mg orally 1 hour before procedure Adults: 2.0 gm orally 1 hour before procedure
	Azithromycin or Clarithromycin	Adults: 500 mg orally 1 hour before procedure

Please be aware these antibiotic recommendations can vary with different procedures. Advise all physicians of your need for endocarditis prophylaxis with any procedure.

Cardiovascular Surgery

Hospital Stay

Day of Surgery

Parking

Please use the visitor/Dolphin parking structure located at the main entrance of the hospital. Complimentary valet parking is available to provide convenient access.

Arrival

When you arrive at Hoag Hospital, use the Main Entrance of the hospital. Check in at the Registration and Information desk where you will be directed to the **Same Day Services Admitting Unit (SDS)**. In the SDS Unit, you will be placed in a patient gown and your admitting paperwork and surgical consents will be verified. Your family members or significant others can wait with you until you are transported to the Surgical Holding Area, outside of the operating room. One or two family members or significant others can usually accompany you there.

Surgical Holding Area

Final preparations for your surgery are completed in the holding area. Your **cardiac anesthesiologist** will review your chart, complete the physical examination and discuss any concerns you may have.

After speaking with your cardiac anesthesiologist, you will be given some sedation or relaxing medication and moved into the operating room. Your family members/significant others will be directed to the Surgical Waiting Area.

Operating Room

Once you are moved to the Operating Room, the anesthesiologist will manage your anesthesia to keep you asleep and pain-free during the surgery. Your anesthesiologist will insert a breathing tube through your mouth and down your windpipe after you are asleep. This tube will be connected to a **ventilator** (breathing machine) which will automatically breathe for you during surgery.

Updates and Waiting Areas

The cardiac surgery nurses will update your family members/ significant others periodically throughout the surgery. During your operation, family members/ significant others can choose to wait at home, at the hospital or elsewhere and still receive updates regarding your progress. It is important to let the surgical team know where they will be and how to contact them. If they decide to wait at the hospital, the **Surgical Waiting Area** is located at lobby level by the Courtyard Café. They must check-in with the volunteer at the desk when they arrive. If they leave, they should advise what time they will return or provide an alternative method of contact (i.e. cell phone), they would like utilized. During the updates, the nurses will have better information as to the length of surgery and will let them know when they will update them again. When the surgery is nearing completion, the nurse will escort your family members/significant others to the **Cardiovascular Intensive Care Unit (CVICU)** waiting room. When available after your surgery, the surgeon will speak to your family members/significant others to answer any questions about your condition or surgery.

Following Surgery

Cardiovascular Intensive Care Unit (CVICU)

Immediately after surgery, you will be taken to the Cardiovascular Intensive Care Unit (CVICU). You most likely will still be asleep and on a breathing machine when you return from surgery. After speaking to the surgeon and when the nurses have gotten you situated in the CVICU, your family members/significant others will be allowed to visit briefly (maximum of two at a time). They should be prepared to see you surrounded by tubes and machines. You may possibly look pale and puffy. After they have seen you, we encourage them to go home for the evening, as most patients are not even aware of visitors. Most families feel comfortable with leaving after they have seen you, the environment, and the professional staff caring for you.

It is important to have one family member designated as the **spokesperson**. The spokesperson can call the CVICU 949/764-5823 to receive updates on your condition and they can provide this information to the rest of your family. Only the spokesperson should be calling the CVICU. In this way, multiple phone calls and interruptions in your nursing care will be avoided.

You will wake up in the CVICU and initially you may feel groggy, confused, cold or thirsty. If your breathing tube is still in place, you will not be able to talk. Your nurses will help you to communicate, remind you about the surgery and what you need to do. The breathing tube will stay in place until you are awake, stable and able to breathe on your own. Multiple monitors will be in use. Flexible tubes will be in your chest to drain blood or fluid. There will be a tube in your bladder to drain urine. Multiple intravenous lines will also be in place for fluids and medications. All of these tubes/lines will be removed when you no longer need them. The lights are always on, so it is normal to lose track of time during your stay. As soon as you no longer need this type of intensive care, your physician will transfer you to the **Telemetry** (ambulatory monitoring) floor.

After your breathing tube is removed, and throughout your hospital stay, it is very important to perform breathing exercises to help you recover from the surgery. Deep breathing and coughing will keep your lungs clear, make your breathing muscles stronger and prevent complications such as pneumonia. The nurses and respiratory therapists will instruct you and encourage you to do these exercises after surgery. The **incentive spirometer** measures how much air you are taking into your lungs and helps to open the small air sacs in your lungs, preventing or correcting their collapse. You should be working on the spirometer every 1-2 hours while you are awake. You will receive a special pillow to "hug" when you cough to help support your breastbone and promote healing.

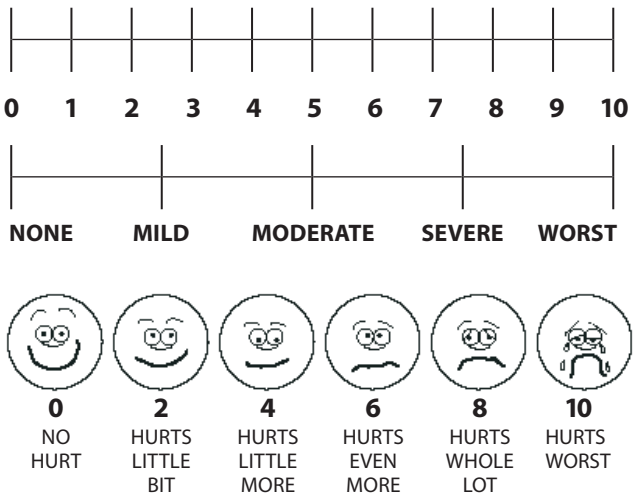
Visiting Hours

We understand the importance of visitors to our patient's emotional, mental and spiritual well being. Please be advised, visitors may be asked by staff to leave, especially if the patient needs rest. Any visitor with signs or symptoms of a communicable disease or illness should not visit the hospital. Visiting hours in the critical care units are 8 am to 7 pm and 8 pm to 7 am. Please call before entering critical care unit and remember visitors are limited to 2 at a time. You should decide who you do/do not want visiting you while you are in the critical care units and relate your wishes to your family and friends. The visiting hours in the telemetry unit are open but remember patients do need long rest periods.

Pain Control

Pain management is an important part of your recovery. Each individual experiences pain differently and has different pain thresholds. Once the breathing tube is removed, you will be asked to rate your pain on a scale of 0-10 (see below: **pain scale**). Our goal is to keep your pain at an acceptable level, as long as you are able to move and breathe. If your pain is uncontrolled or if you are over medicated, you will be unable to accomplish basic recovery requirements. We have a variety of pain medicines to match each individual's different needs. Pain medicine is not automatically given to you; therefore it is important to ask for pain medication before the pain is too intense. The nurses and doctors need your help to know how the medicine is working. Inform them if you have pain which is not relieved and/or in any location other than what you expected. Interestingly, the breastbone incision is not very painful and by the time of discharge, most patients are taking only a few pain pills a day.

Pain Scale



Cardiovascular Surgery

Heart Surgery Patient and Family Goals

Day of Surgery

- Wake up in Cardiovascular Intensive Care Unit (CVICU)
- Breathing tube removed
- Control pain with intravenous medications

Post-Operation: Day One (1)

- Control pain with medication by mouth
- Breathing exercises ten (10) times every two (2) hours while awake
- Walk in place for one (1) minute, two (2) times a day
- Sit up in chair and keep feet elevated while sitting
- Transfer to Telemetry Floor
- Walk 20 feet with assistance

Post-Operation: Day Two (2)

- Control pain with medication by mouth
- Breathing exercises ten (10) times every two (2) hours while awake
- Chest tubes, and possibly pacing wires, removed by member of cardiac surgery team
- Sit up in chair for all meals and keep feet elevated while sitting
- Central intravenous line discontinued
- Walk 260 feet or more three (3) times a day
- Consult with discharge planner/social worker for any special needs such as skilled nursing facility or visiting nurse at home

Post-Operation: Day Three (3)

- Control pain with medication by mouth
- Breathing exercises ten (10) times every two (2) hours while awake
- Pacing wires removed by cardiac surgery team (if not already out)
- Sit up in chair for all meals and keep feet elevated while sitting
- Walk 260 feet or more three (3) times a day
- Shower for wound care
- Watch discharge video with family
- If all goals are met: possibly discharged today

Post-Operation: Day Three (3) or Four (4)

Discharge, if the following goals are addressed:

- Understand discharge instructions including:
  - What danger signs to look for and when to call the physicians
  - Follow-up appointments
  - Wound care
  - Medications you are to take home and how to take them. A complete list of new, discontinued and usual medications
  - Pain management plan
  - Dietary recommendations and limitations
  - Activity and activity limitations
- Tolerating food and beverages
- Tolerating activity
- Make a list of any questions to ask before you go home

Recovery

Typically, you will stay in the CVICU for about a day. By the next morning, our plan is to have you sitting up in a chair and eating breakfast. In most cases, you will be transferred to the **Telemetry** (ambulatory monitoring) floor the day after your surgery. If you are delayed in leaving the CVICU, your hospital length of stay may remain the same, depending on the reason for the delay. During your hospital stay, your physicians, nurses and other hospital staff who care for you, will encourage your progress daily

according to specific goals. Our recovery goals are based on current research and national standards. By participating in your care and completing your daily goals, you aid in your recovery and help prevent complications. By discharge day, besides being medically stable, you will be walking several hundred feet, showering, eating, and using pain pills (rather than intravenous medication) for pain control.

Discharge from the Hospital

Discharge from the hospital occurs when you meet all of the necessary goals and no longer need continuous medical care. Ideally, **discharge occurs 3-4 days after surgery**. Prior to discharge, you and your family will receive instructions covering all necessary information for home care and necessary follow-up. You will receive a prescription for pain medication and any other new medications along with instruction on their use.

It is necessary to have someone to help you at home for several days when you are discharged from the hospital. You will also need someone to assist with any driving (such as going to your follow-up appointments) in the first few weeks. Generally, depending on your condition, you do not need someone at your side 24 hours-a-day, however you should have someone in close proximity during the day and present at night. This is an important time for family to come together to assist with your recovery. There may be home health services ordered, if there is a medical need, but these visits only cover a few hours a week.

For patients who do not have an acute care need but still might need some medical care, a skilled nursing facility is a short-term option upon discharge. Home health services, such as a visiting nurse, are also available if medically necessary. If you have concerns about your discharge care, the sooner you let us know, the better. A discharge planning nurse or social worker will meet with you and discuss your options.

Cardiovascular Surgery

At-Home Instructions

Leaving the Hospital

When you are discharged from the hospital, you are likely to have mixed feelings. Often there is a feeling of relief mixed with concern and uncertainty about leaving the security of the hospital. Your medical team works closely with you and each other to assure your readiness for continued recovery at home on discharge from the hospital. During the first few weeks after surgery, you will be regaining your energy and strength.

You will need a ride home on the day of your discharge. Please plan in advance so when your physicians have released you from the hospital, you will be able to go home. You can ride as a passenger in an automobile at any time after surgery, but cannot drive independently for three (3) weeks from the date of surgery.

Danger Signs: When to Call Your Physician

When you leave the hospital it is important to keep in contact with your physicians. You will be given a follow-up appointment with your surgeon. You need to arrange an appointment with your cardiologist. Your heart surgeon has corrected your anatomy, but your cardiologist will help you lower your risks for future cardiac events.

When at home:

- Weigh yourself everyday for two (2) weeks and notify your **cardiologist** if you notice a sudden gain in weight of 3-5 pounds.
- Take your temperature each morning for one (1) week and call your **surgeon**, if your temperature is greater than 101° F.
- Watch your incision for signs of infection. If symptoms such as increased warmth or redness, drainage, swelling, open incision or fever/chills occur call your **surgeon**.
- Call your **cardiologist** if you experience extreme fatigue or shortness of breath not relieved by rest.
- Call your **cardiologist** if you notice any significant worsening of ankle swelling or leg pain unrelated to your incision.
- Call your **surgeon** if you experience frequent clicking of the breastbone after two (2) weeks.
- Call your **cardiologist** if you experience palpitations or irregular heartbeat.

Activity

In general, light activity is allowed after discharge. Light activity includes basic hygiene such as showering, shaving, brushing teeth and hair. You can participate in light housework and activities but DO NOT vacuum, sweep, mop, use a hoe or rake, operate a lawn mower, climb a ladder or other strenuous activities for eight (8) weeks after your surgery. Avoid all activities which make the breastbone move or click.

Our cardiac rehabilitation program is on-site at Hoag Heart and Vascular Institute. A big part of a cardiac rehabilitation program is exercise. After 1-3 weeks, when you are able to walk for 20 minutes, you can discuss cardiac rehabilitation with your cardiologist. You will need a referral from your cardiologist prior to starting a formal program. Walking is the best activity to start with immediately after heart surgery.

Constipation

Constipation is a very common problem after surgery. This is usually due to pain medicine and inactivity, along with limited food and fluid intake. Try not to strain with your bowel movements. If you have problems when you are discharged home, try an over-the-counter laxative/softener. Once you have solved the initial problem, constipation can usually be avoided by eating plenty of high fiber foods such as fresh fruit (especially prunes), adequate activity and drinking 6-8 glasses of water per day.

Diet

You should eat a healthy diet to help you heal. There may be certain restrictions given to you by your physician. After surgery, it is common to have a poor appetite initially. If this is the case, try to eat smaller, more frequent meals. It is more important to eat and have sufficient calories for healing than to follow a regimented diet. Your appetite should return within a few weeks.

Occasionally, nausea can be a problem. Nausea is usually related to certain medications such as iron or pain medication. Taking these medications with meals or crackers will usually help. If severe nausea persists, call your physician.

Dressings

After discharge from the hospital, you will no longer need to wear dressings on your wounds, unless you are instructed otherwise.

If you have any dressings, remove them prior to a shower. Your wounds will be exposed to air, helping them to dry. Most of the stitches your surgeons placed during surgery are reabsorbed by your body except those which held the chest tubes in place. These stitches will be removed either on discharge from the hospital or during your office visit with your surgeon. If strips of tape were used on your wounds (steri-strips) they will usually fall off. If they do not, you may remove them after one (1) week.

Driving

Avoid driving a car for three (3) weeks after surgery. Your reaction time will be delayed due to weakness, fatigue, and/or medication. However, you can be a passenger wearing a seat belt at any time. When riding in a car for long distances, stop every 1-2 hours to stretch your legs.

Emotional Issues

It is very common to feel a little depressed or frustrated during your recovery. These feelings are common and related to the emotional letdown after a major surgery. You might feel energetic and cheerful one day, yet feel tired and cranky the next. You may not have an appetite or you may have problems sleeping. Concentration may be a problem. Remind yourself that all of this is temporary and will pass. Most people have good days and bad days, but do show a steady increase in strength and progression to recovery.

The best way to handle the depression initially is to talk with your family or friends and keep as physically active as possible. Other ways to help these feelings include getting dressed each day, resuming hobbies or other activities you enjoy, joining a cardiac rehabilitation program and getting a good night's sleep. These feelings should fade after a few weeks, but if they persist, notify your physician.

Healing

Your chest incision extends through your skin, tissue and bone. Soon after surgery, the healing process begins. By the time you are discharged from the hospital, your skin is well on the way to healing. Your breastbone, however, requires 6-8 weeks to mend. **It is very important not to lift, push or pull anything over 5-10 pounds until your breastbone is completely healed, a minimum of two (2) months**. If your breastbone does not heal during this time (which could happen, if these limitations are not closely followed) the treatment is **surgical re-wiring**. Your leg incisions, if you have any, will vary in amount and length, depending on your surgery.

Your incisions may be bruised, itchy, numb or tender at the time of discharge from the hospital. You may have some scab formation on your incisions – do not try to remove them, they will fall off. Your scar should gradually fade from purple to red to pink, returning to normal after several months.

To protect your scar and discourage formation of abnormal scar tissue or color, always protect yourself from the sun by wearing sunscreen along with protective clothing.

Diabetics should be particularly vigilant with controlling their blood sugars during this time to help prevent a wound infection. If you notice any signs or symptoms of infection (listed in "When to Call Your Physician") you should notify your physician immediately.

Leg Swelling

If your ankles are swelling, it is usually an indicator that you are overdoing it. When you first arrive home, it is preferred that you undertake short activities multiple times a day and rest in between, with your feet elevated. Keeping your feet elevated helps return blood to your heart and reduce the swelling. You can also stretch your calf muscle and assist with blood return by flexing your toes back and then pointing them forward. Do not sit with your legs crossed at the ankles or knees. Continue wearing your **knee-high support hose** during the day and remove them at night for two (2) weeks after surgery.

Sometimes leg swelling can indicate other problems. If you have weight gain or you have a new pain with walking or if the swelling does not decrease overnight, you should notify your physician.

Pain

By the time of your discharge, your pain will be managed with pain pills. Most patients require pain medicine for a few weeks after surgery. It is important to keep moving after you leave the hospital and these prescribed medications should assist with this. If pain is inhibiting your activity, try timing your pain medicine for 1/2 hour prior to anticipated activity. It is common for some individuals to experience muscle aches in their neck, shoulder or back after surgery. Pain after surgery is different than angina pain. If you are concerned about the levels or type of pain you are experiencing, call your physician.

Rest

Listen to your body. Fatigue is probably the number one patient complaint following heart surgery. To combat fatigue you should balance your activity with rest, eat well, and take your pain medicine if you have pain. Be sure to rest after you eat and before you begin activities. Avoid sleeping or sitting too much during the day. Initially, a rest period should be taken twice-a-day (once in the morning and once in the afternoon) then, at least once-a-day for a few weeks. Napping is not necessary, but resting is. Try to avoid situations which make you feel tense, rushed, angry or overtired. Give yourself time to heal by just taking things easy and resting when you feel tired.

Returning to Work

Everyone recovers differently from major surgery and some people feel better faster than others. Most people need a few weeks before they can go back to their normal daily routine. Most sedentary workers can go back to work at 4-6 weeks after surgery while those who perform heavy labor require 8 or more weeks before returning to work. If you have a job with flexibility, ease back into your work schedule. Start by going back to work for half of your usual workday and gradually increase to your normal routine. While you are healing, follow the instructions given to you by your healthcare professionals.

Sexual Relations

Information on resuming sexual activity is located in the “Cardiac Rehabilitation” section of the “Information for the Heart and Vascular Patient” guide.

Showering

Wash your incisions daily when you shower. Use any mild soap, but avoid soap with oil or perfume as they irritate your incision. Use warm water and do not leave water running over your incisions for long periods of time. Wash using your hand and to dry, pat your wounds with a clean towel. Do not apply lotions, powder, oils or ointments to your incision until it is well healed. Avoid taking baths or using hot tubs for two (2) months after surgery.

Sleep

Many people have trouble sleeping after heart surgery. There are many reasons for sleep disruption, but be assured most people return to their normal sleeping patterns within a few months. Some tips for sleeping include: do not try to catch up for lost sleep, take pain medicine 1/2 hour before bed, arrange pillows so you can maintain a comfortable position, avoid napping too much during the day, balance activity with rest, avoid caffeine in the evenings, and get into a bedtime routine.

Night sweats occur infrequently. If you experience night sweats be sure to take your temperature. We

are not sure why some people have these after heart surgery, but they usually disappear after a couple of weeks. Remember to call your physician if your temperature exceeds 101° F.

Stair Climbing

There are no restrictions on climbing stairs or steps once you go home. When using the handrail, do not pull yourself up with your arms, use your legs. You many need to rest part of the way up the stairs, should you become tired. Do not climb up and down the stairs several times during the day, particularly when you first arrive home. It is better to plan activities to go downstairs in the morning and back upstairs for a nap or when it is time for bed.

Walking Program

Once you are home, continue your walking routine. Walk at a comfortable pace on level ground. Gradually increase your walk by two (2) minutes every 2-3 days as tolerated, until you are comfortably walking for 30-40 minutes. Do not increase your time if you find it uncomfortable. This program is designed to help you increase your endurance level. If you were in good physical condition prior to surgery, you may also need to accelerate the time line.

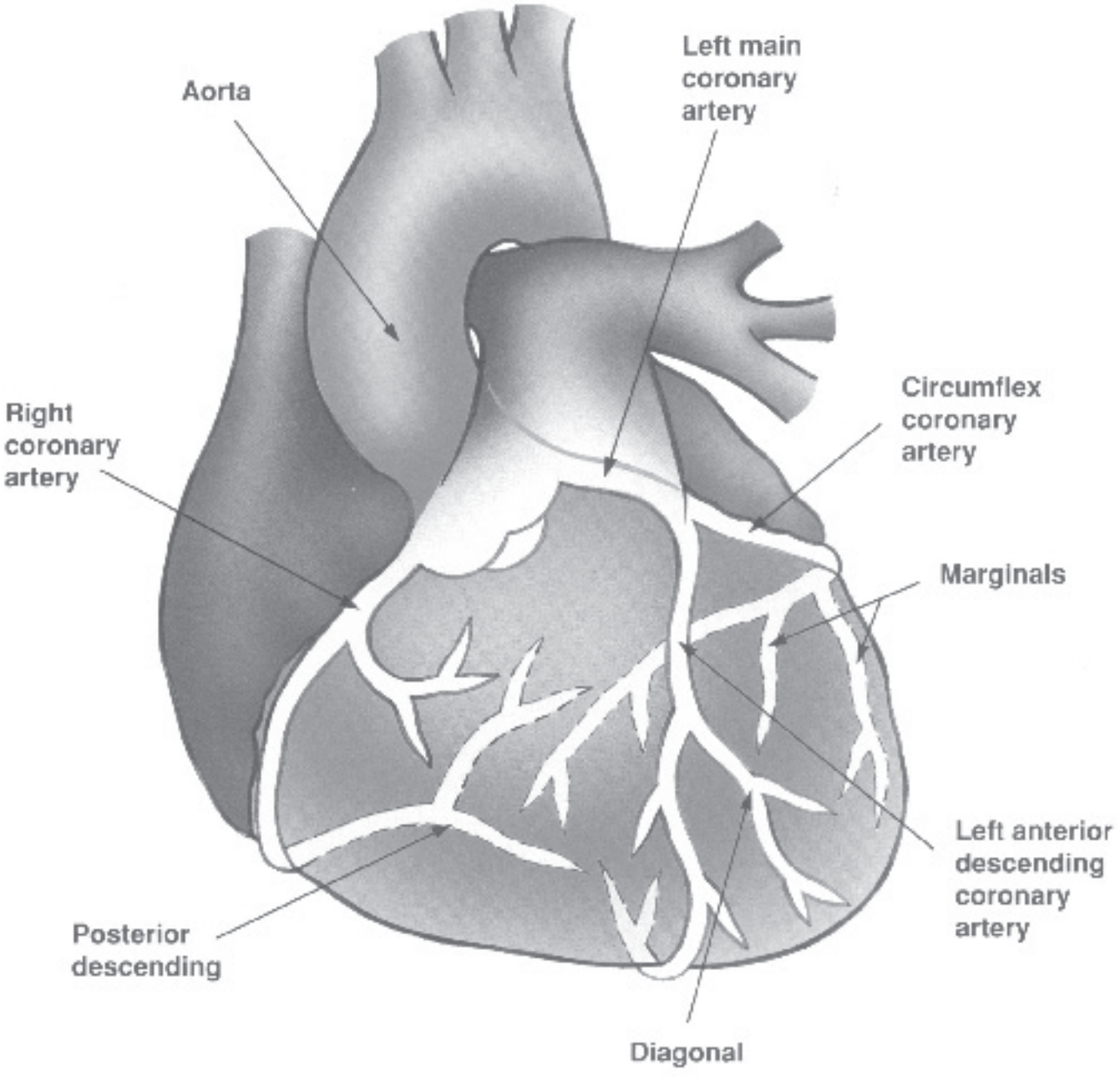
Suggested Walking Routine

Week (After discharge)	Date	Minutes (Per walk)	Frequency (Times per day)
1st week	_____	5-10	3-4
2nd week	_____	10-15	3
3rd week	_____	15-20	2
4th week	_____	20-30	1
5th week	_____	30-40	1
6th week	Continue walking 30-40 minutes every day while increasing the pace.		

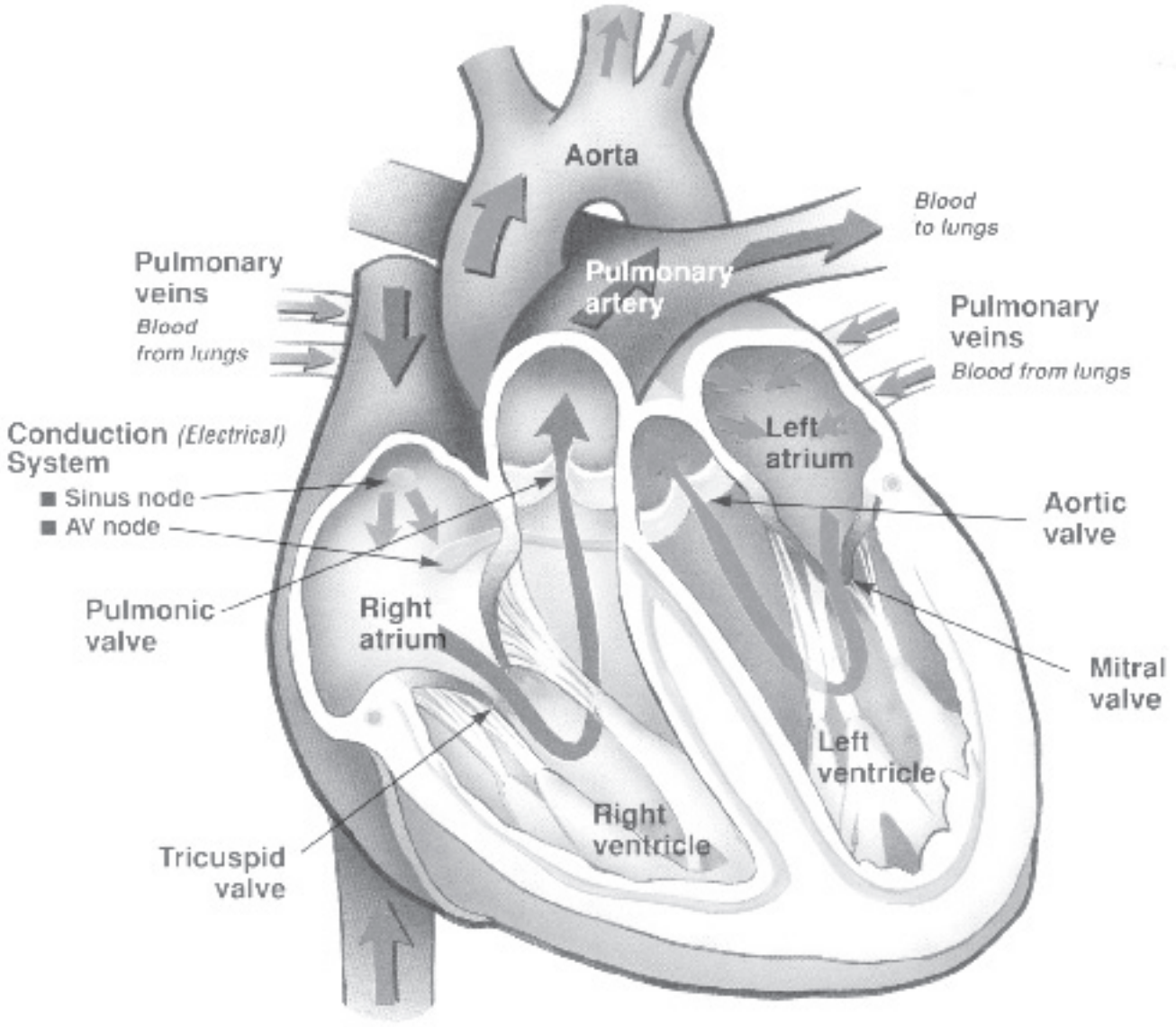
For more information, please see the "Cardiac Rehabilitation" section of the "Information for the Heart and Vascular Patient" guide.

Cardiovascular Surgery

Your Heart (Outside)



Your Heart (Inside)



Cardiovascular Surgery

Same Day Admission for Cardiac Surgery Sheet

Things to know

- You have been scheduled for Cardiac Surgery at Hoag Hospital your physician has decided to admit you on the same day as the surgery.
- The morning of your surgery, park in the visitor's "Dolphin" parking structure. Enter into the Sue and Bill Gross Women's Pavilion and **REPORT TO** the Registration and Information desk.

Please Read the Following Instructions Carefully:

1. If you are taking aspirin, Coumadin® or other blood-thinner, please discontinue these medications (unless instructed not to do so), about 3-5 days prior to surgery.
2. If you have not pre-registered for your surgery, please call Hoag Hospital Admitting at **949/764-8275**.
3. Please call the pre-certification phone number on your insurance card to inform your insurance company of your upcoming cardiac surgery, except Medicare patients. The surgeon's office will call provide the clinical information to the insurance company.
4. Pre-testing (blood work, EKG, X-ray and breathing test) is required before surgery, along with any other tests the surgeon feels is necessary for your surgery. This workup will hopefully be completed during your pre-operative visit before surgery. Occasionally, additional tests need to be done at another time.
5. Shower with Hibiclens® (a special soap) or use the Chlorhexidine Gluconate cloths the evening prior to surgery and the morning of surgery, **AS DIRECTED**. You will be provided with one or the other and instructed on use during your preoperative visit.
6. Do not eat any solid food or drink ANYTHING after midnight, prior to the day of surgery.
7. Please leave personal items at home, including rings, watches, credit cards, etc. A family member can bring your necessities to you the day after surgery. Anything you wear or bring on the day of surgery will be returned to your family or given to security for safe keeping.
8. Upon admission to Hoag Hospital, you will be directed to the Surgical Admitting Unit where the nursing staff will greet you and complete your paperwork. Your family member may accompany you to this area.
9. In case of delay, please feel free to bring something to occupy your time such as a book. Rarely, surgery can be delayed or cancelled due to an emergency or hospital occupancy.
10. A staff member from the operating room will "prep" you for surgery either in the Surgical Admitting Unit or the Surgical Holding Area. This is a clipping of hair in the areas on or near the surgical site.
11. Your cardiac anesthesiologist will meet you before the surgery to answer questions and alleviate concerns. This generally takes place in the Surgical Holding Area.
12. If any family members or significant others plan to wait during the surgery, they may do so in the Surgical Waiting Room located on the lobby level by the Courtyard Café. Check-in with the volunteer in the waiting room. We will provide updates on the surgery, if we know someone is waiting there.
13. If you have questions, please do not hesitate to ask your physician or the nursing staff. We are here to help and encourage you and your family to become involved/informed regarding your hospital stay, your condition and your follow up needs.
14. Be sure to discuss any safety concerns you may have with your physicians and/or nursing staff.

Blood Transfusion

Your surgeons will make every attempt to avoid the use of blood during your surgery. However, due to the nature of the surgery, a percentage of our patients do require a blood transfusion during their hospital stay. Blood products are available through Hoag's own blood bank – Hoag Blood Donor Services. Besides using "bank" blood, there are other options, including autologous (self-donated) or directed blood donation. During surgery, we also utilize a cell-saver which recycles shed blood. Your own blood is collected, filtered and returned back to you.

Autologous Donation

In some elective cases, you may donate your own blood prior to surgery. This method requires careful planning, may delay surgery and is contraindicated with many medical problems. You can discuss this option with your surgeon.

Directed Donor

Through Hoag Blood Donor Services, your family or friends can donate and direct their blood to you. The limitations to this type of donation include the necessity of the donor to have your same blood type, specific qualifications for donors, and the need for 48-74 hours to process the directed donor blood. If your surgery is urgent or emergent, there will not be enough time to obtain directed donor blood. In this case, we would use bank blood. Directed donor blood is good for 42 days.

Your family and friends' donated blood will always be welcomed as the "gift of life" for you and if not for you, for other patients.

Hoag Blood Donor Services

Hoag Blood Donor Services can coordinate and answer any questions about blood donations. They can be reached at 949/764-5621 and are open Mondays through Fridays from 8 a.m. to 4 p.m.

All blood used at Hoag Hospital comes from volunteer blood donors who have undergone an extensive health history screening and a comprehensive set of blood tests for HIV, hepatitis and other infectious diseases, but no blood transfusion is without a small risk of infection.

Your blood type is confirmed prior to transfusion and multiple clerical checks and tests are performed to help ensure that you receive compatible blood.

Recent studies* indicate that the risk of receiving an infected unit of blood is approximately:

- 1 in 205,000 for Hepatitis B
- 1 in 1,800,000 for Hepatitis C
- 1 in 1,000,000 for HIV

*(Dodd et al. Transfusion 2002; 42:975-979)

Notes