Cardiac Surgery
A guide for patients and their families
Welcome to The Johns Hopkins Hospital

We are providing this book to you and your family to guide you through your surgical experience at the Johns Hopkins Heart and Vascular Institute. The physicians, nurses and other health care team members strive to provide you with the safest and best medical care possible. Please do not hesitate to ask your surgeon, nurse or other health care team member any questions before, during and after your operation.

The booklet consists of two major sections. The first section informs you about the surgery and preparing for the hospital stay. The second section prepares you for the recovery period after surgery in the hospital and at home.
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**Looking back,**

*it was the choice of my life.*

It’s not easy to put your heart in someone else’s hands.

But for me, the choice was clear: I trusted it to Hopkins.

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*My Heart. My Choice*  
**Patient Lou Grasmick,** Founder & CEO, Louis J. Grasmick Lumber Company, Inc.
Welcome to Johns Hopkins Cardiac Surgery

The Johns Hopkins Hospital has a distinguished history of advancements in the treatment of cardiovascular diseases in adults and children, beginning with the Blalock-Taussig shunt in 1944. Our cardiac surgery program today offers a full complement of surgical interventions from time-honored surgeries such as coronary artery bypass, valve replacement and repair, and congenital cardiac repairs to new, groundbreaking therapies including minimally-invasive heart surgery, off-pump coronary bypass and surgical ablation for atrial fibrillation. We also offer comprehensive treatment for congestive heart failure, including surgical ventricular remodeling procedures, cardiac transplantation and ventricular assist devices. Our program is an integral part of the Broccoli Center for Aortic Diseases at Johns Hopkins, one of only a few centers in the world that provides comprehensive management and surgical repair of aortic diseases, having particular expertise with patients suffering from Marfan syndrome and other connective tissue disorders.

In addition to offering groundbreaking technology, our surgical program provides patients with the advantage of an on-site multidisciplinary team of cardiologists, electrophysiologists, interventional radiologists, vascular surgeons, nurses, nurse practitioners and physician assistants, dietitians, physical therapists and social workers. This team often expands to include immediate care from on-site physicians from every medical specialty required. Our multidisciplinary approach and expertise have gained us the reputation of being the best-prepared surgical practice to handle procedures that may be complex and/or complicated by underlying illness or age.

Our large volume, consisting of many complex and complicated procedures in all areas, including pediatric and aortic cardiac procedures, assures patients that they are receiving the best care possible from some of the most experienced surgeons in the world.

These same surgeons are committed to continually studying and evaluating new methods of surgical treatment and improving surgical outcomes through clinical and laboratory research. One such area is protection of the brain and neurological systems during bypass operations. Often, patients will benefit from new therapies not readily available at other medical centers.

Our team is committed to excellence, and our goal is to provide compassionate care to our patients and their families. Your surgeon will speak with you and your family before your surgery and throughout your hospital stay. We have highly trained surgeons in the hospital 24 hours a day, seven days a week, 365 days a year. We hope that you will find this information helpful to you and your family. To request more information or advice, contact us at 410-955-2800.
The heart is a hollow, four-chambered muscular organ that lies beneath and to the left of the breastbone (sternum). Its primary function is to pump oxygen-rich blood to all parts of the body. The heart pumps approximately four quarts of blood per minute at rest and 10 to 15 quarts during exercise.

Blood enters the right side of the heart after it has delivered nutrients and oxygen to the body tissues. The blood is then pumped to the lungs, where it is cleansed of waste gas (carbon dioxide) and provided with a fresh supply of oxygen. The left side of the heart receives this oxygen-rich blood from the lungs. Most of the pump work of the body’s circulation is done by the lower left chamber of the heart, called the left ventricle. This pumping action is repeated 60 to 100 times per minute, and each pump is counted as a pulse beat.

There are four valves in the heart—tricuspid, pulmonic, mitral and aortic—which act as one-way doors. The valves allow blood to move forward in a specific direction through the heart and prevent it from leaking backward.

Like all organs in the body, the heart requires oxygen-rich blood to perform its work. The oxygen-rich blood is supplied to the heart muscle (myocardium) by a network of blood vessels called coronary arteries. The two main coronary arteries—right and left—lie on the surface of the heart and branch into a system of smaller arteries so that every portion of the heart is supplied with nourishment. The right coronary artery and its branches supply the front and back of the right side of the heart (right ventricle) as well as the bottom of the left side of the heart (left ventricle). The left coronary artery divides into the left anterior descending artery, which supplies the front of the heart, and the circumflex artery, which winds its way around the left side to the back of the heart.

The entire body depends on the proper functioning of this organ. Diseases and abnormalities of the one-way doors (valves) or of the blood vessels (coronary arteries) may decrease the heart’s function.
Who’s Taking Care of You

Our cardiac specialists: a multidisciplinary team of compassionate and caring health care professionals.

Your cardiac surgeon will be in charge of this multidisciplinary team throughout your hospital stay.

Cardiac Surgeons (board certified)
Cardiac Resident Physicians
(board certified or board eligible general surgeons
with five years’ experience in general surgery)
Cardiac Anesthesiologists
Cardiac Anesthetists
Cardiac Intensivists
Cardiac Physician Assistants
Cardiac Surgical Assistants

Cardiac Nurse Practitioners
Cardiac Perfusionists
Mechanical Circulatory Support (MCS) Coordinators
Cardiac Transplant Coordinators
Cardiologists
Critical Care Fellows
Operating Room Nurses
Operating Room Technicians
Intensive Care Unit Nurses
Progressive Care Unit Nurses

Pharmacists
Physical Therapists
Radiologists
Respiratory Therapists
Social Workers
Dietitians
Occupational Therapists
Pastoral Care
Medical Office Coordinators
Patient Representatives
Heart Surgery

How is surgery accomplished?

Your surgeon will meet with you and explain the operation and its risks and benefits. You will have the opportunity to ask any questions you or your family may have. After we receive your signed consent form, your surgery will proceed. You will be transported to a sterile operating room, sedated and placed under anesthesia by the cardiac anesthesiology team.

In the traditional approach to heart surgery, the surgeon opens the chest by dividing the breastbone (sternum) and connects you to the heart-lung machine. By performing the functions of the heart and lungs, this machine allows the surgeon to operate directly on the heart. When the operation is finished, the heart resumes beating on its own and the heart-lung machine is disconnected. Then the divided breastbone is wired together so it can heal, which requires at least six to eight weeks. Finally, the skin is closed by stitches, staples or a special glue, depending on the surgeon’s preference. The sternal wires will remain in the chest bone and are not removed. If staples are used, they will be removed between seven to 14 days after surgery. The glue wears off by itself over several weeks. You may also speak with your surgeon to see if you are a candidate for less invasive therapies.

How long will the operation take?

The length of your operation will depend on the type of surgery that you are having. Most surgeries take at least four to five hours. Included in this time is the preparation for surgery, which requires approximately 45 to 60 minutes.

What are the risks of heart surgery?

Several factors influence the risk of heart surgery. These factors vary with each individual and depend on the extent of one’s heart disease, as well as one’s medical and surgical history. Your surgeon will talk with you about the risks to be considered for your surgery.

Note: The risks will be written on the informed consent form that you must sign prior to surgery.
What can I do to get ready for my operation?

1. Medications

If you are currently on aspirin, please take your daily aspirin up until the time of your surgery, unless your surgeon instructs you not to take it. Do not take additional doses of aspirin or aspirin-containing products.

Some medications may increase the risk of bleeding with anesthesia and surgery and should be stopped. Your surgeon may want you to stop certain medications which contain aspirin or aspirin products, herbal medications or nonsteroidal anti-inflammatory (NSAID) medications five to seven days before your surgery.

If you are taking any of the following medications, please contact your surgeon’s office to find out if or when to stop them:

- Blood pressure medicines called ACE (angiotensin-converting-enzyme) Inhibitors (e.g. Lisinopril, Captopril, Enalapril).
- Blood pressure medicines called ARBs (angiotensin receptor blockers such as Cozaar [losartan] or Diovan [valsartan]).
- Blood thinners such as Coumadin (warfarin), Lovenox, Plavix, Fragmin, Pradaxa (dabigatran).

If you have questions regarding what medications to continue or stop before surgery, please call your surgeon’s office.

Please bring a list of your current prescribed and over-the-counter medications with you to your preoperative visit.
2. **Smoking**

It is extremely important that you STOP SMOKING as soon as possible. People who smoke will have more mucus accumulation in their lungs, which is harder to remove after surgery and may slow down your recovery.

Please consult your primary care provider about smoking cessation aides. Patients who smoke may require additional respiratory treatments after surgery.

3. **Blood Requirements**

Anemia, or low blood count, is normal after surgery. Your heart will beat faster to meet the needs of your body; this will make you feel tired.

We make every effort to conserve blood during your surgery; however, you may need to receive a blood transfusion during your hospitalization. You can arrange to donate your own blood through the Red Cross several weeks in advance of your surgery. This is known as directed donation. If you wish to do so, please notify the surgeon’s office as soon as possible so arrangements can be facilitated with a blood bank.
Where do I report for preoperative testing?

You will be instructed to report to either the Johns Hopkins Outpatient Center or Green Spring Station. Please remember to bring a list of all of your medications, including the name, dose and how often you take them. This list should include over-the-counter and herbal medications. The preoperative evaluation will be performed by a cardiac physician assistant (PA) who works closely with your surgeon and is a certified health care provider. The PA will record your medical and surgical history and perform a physical examination. You will also have blood drawn for testing, an electrocardiogram (EKG) and chest X-ray. Your preoperative testing will take approximately four hours to complete.

Your insurance company may require that your testing be done at a certain location other than a Johns Hopkins facility. If preauthorization is required, this can be coordinated with the surgeon’s medical office coordinator. The results of this testing will be sent to your surgeon’s office. It will then be reviewed by your surgeon and the cardiac team before surgery.

When will I see my surgeon?

You can call 410-955-2800 and press option “2” to make an appointment. You will have an opportunity to meet your surgeon before your surgery. Please feel free to call the surgeon’s office if you have any questions (press option “3”).

What else should I know?

- You will have an opportunity to review instructions related to your surgery.
- You will be given an information pamphlet that will include instructions for the night before surgery and the morning of surgery.
- You will also be given instructions about using special soap or washcloths to prepare your skin for the operation to reduce the risk of surgical site infections.
- You will be told not to eat or drink after midnight before your surgery.
- You will be instructed about what medications to take with a sip of water on the morning of surgery.
Is there a person I can talk with who can help me with my family concerns?

After surgery, a social worker is available to help you and your family meet any emotional and social needs. The social worker provides counseling and guidance in coping with stress and gives information about resources and insurance coverage. If you need help with social needs before surgery, please call your surgeon’s office.

Before coming to the hospital, it is important to discuss with your family and friends the need to have someone stay with you after your discharge from the hospital. You will need help with activities of daily living, such as grocery shopping, preparing meals, transportation to medical appointments, etc. Services for this are not available from home care agencies without cost. You will also need to arrange for someone to take you home from the hospital after surgery.

Will I need rehabilitation after surgery?

Each patient is unique, and your medical team will review with you and your family the help you will need when released from the hospital. Various members of the therapy team, including occupational therapists, physical therapists and speech-language pathologists, may be involved in your recovery process. The therapy team may make a recommendation for a variety of possible rehabilitative locations including but not limited to cardiac rehabilitation, outpatient rehabilitation, home rehabilitation or inpatient rehabilitation. As each patient is unique, so is his/her discharge plan, and your providers will discuss with you and your family what they professionally feel is the best option for you.
Will I be able to eat and drink?

You will not be able to eat or drink anything from midnight the night before surgery. Before surgery, you may take your medications with small sips of water. You will be given intravenous (IV) fluids, which are started in the operating room and will provide the necessary nutrients and fluids you need during that time.

Where do I report?

On the morning of surgery you can park in the Orleans Garage located at 1800 Orleans Street. You will enter the hospital via the skywalk. Take the elevator in the garage to the fourth floor to access the skywalk.

Once you are in the hospital, stop at the security desk and then proceed to the GREEN elevators on your left to the fifth floor. Come off the elevators and make a left, then your first right, and sign in with the patient service coordinators on the left.

What will I do in the preoperative reception area on the morning of surgery?

For preparation you will be asked to:

- Put on a hospital gown.
- Remove all pins, barrettes, clips, etc., from your hair.
- Remove all dentures and bridgework.
- Remove all jewelry, including rings and body piercings.
- Remove all nail polish.
- Remove glasses and contact lenses and give to family members.
- Remove hearing aids.

We will then help you to a stretcher and transport you to the operating room. Your family may go as far as the entrance to the operating room with you. They may wait in the lounge where a patient representative is available during the daytime hours. The cardiac operating room nurses will provide your family with updates on how the operation is going. The surgeon will see your family soon after the surgery is completed.
After Surgery

After surgery, what should I expect?

Immediately after surgery, we will take you to the Cardiovascular Surgical Intensive Care Unit (CVSICU), which is located in the Zayed Tower, fifth floor (Zayed 5 East). Under the direction of your cardiac surgeon, your care in the CVSICU will be coordinated by an intensivist (a physician who has special expertise in managing intensive care patients), nurses, nurse practitioners, physician assistants, critical care fellows and resident physicians. Your surgeon and intensivist will evaluate you daily and are available to speak with you and your family.

Until you are fully awake, you will be attached to a ventilator (breathing machine) by a tube in your mouth, down your windpipe. This tube interferes with the function of the vocal cords, so you will not be able to speak while it is in place. You can communicate your needs by writing notes, mouthing words and pointing. Your hands will be lightly restrained while the tube is in place. Occasionally a smaller tube will be placed into this breathing tube to remove excess mucus. This may make you cough and feel uncomfortable for a couple of minutes.

When the CVSICU team feels that you are ready, they will remove this breathing tube and place a small green plastic mask over your nose and mouth to give you moist oxygen. This moisture helps break up mucus in your lungs and relieves throat discomfort. The nurse will encourage you to cough and to take deep breaths to expel the mucus.

After your breathing tube is removed, the nurse will give you small amounts of ice chips until it is safe for you to eat and drink. You will be able to drink fluids and eat the day after surgery but will be on a restricted amount of fluid.

You will be connected to specialized medical equipment to monitor your blood pressure, heart rate and heart pressures. These machines and the respirator make beeping and swishing sounds. The nurse and physician will use these machines to continuously watch your vital signs (temperature, pulse, respirations, blood pressure).

Two or three tubes will be inserted into your chest cavity during surgery. These tubes drain excess air and blood from the chest. They will be connected to a machine that makes a bubbling noise. The largest tube is usually removed the following morning. A smaller tube called a Blake drain will remain in your chest for an additional one to three days.

In addition, there may be two small wires on the lower portion of your chest. These are called pacemaker wires and are inserted during surgery. Sometimes the heart beats slowly and needs a temporary pacemaker for a short time after surgery. The pacemaker wires will be removed shortly before you are ready to go home. You will have a catheter in your bladder to measure your urine output. You may still feel a sensation of having to urinate. The nurse will remind you of this tube. It is generally taken out one to two days after your operation.
You will have a catheter in the artery in your wrist called an arterial line to monitor your blood count, blood gas (oxygenation) and glucose levels. When the arterial line is removed, a bandage will be placed on your wrist.

You may require insulin even if you do not have a history of diabetes, as the stress of surgery may make your blood glucose increase. You will find the nurses and doctors are constantly attending to your needs, and sleeping for long periods may be difficult.

You will remain in the intensive care unit approximately 24 hours. The time will vary depending on your needs and progress. You will be able to sit up once you are off the respirator and when your blood pressure is stable.

What are the CVSICU visiting hours and policies?

Your family may wait in the family waiting area located on Zayed 5 East during your surgery. Once you are transferred to the Cardiovascular Surgical Intensive Care Unit (CVSICU), it may be two to three hours before your family can visit. The CVSICU is located on Zayed 5 East. Your family’s visit will be approximately 10 minutes. After that, visitors can be coordinated with the Clinical Customer Service Coordinator. There is flexible visitation 24 hours a day and seven days a week. We ask that family members not visit between 6:15 a.m. and 8:15 a.m., and also 6:15 p.m. and 8:15 p.m. to allow for the staff shift change. Please check in at the front desk when arriving to the unit.

Visiting Age Guidelines

Children 16 and older are allowed to visit in the CVSICU with the approval of the patient’s nurse. Children who are sick or who may have been exposed to infectious diseases recently will not be allowed into the CVSICU. This measure is in place to protect both patients and children. Please advise the staff of your wishes for children to visit prior to bringing the children to the hospital. The hospital has many resources which can be utilized in preparation for ensuring the child’s visit will benefit all involved. Many aspects will be considered in determining if the visit is emotionally and physically safe for the patient and family. Please note that visiting may be restricted during influenza season.

CVSICU and the OR Waiting Room are both located on Zayed 5 East.
- CVSICU 410-955-4826
- OR Waiting Room 443-287-3706
After the cardiovascular surgical intensive care unit, then where?

Once you are ready to leave the CVSICU, we will transfer you to the Cardiovascular Progressive Care Unit (CVPCU), located in the Zayed Tower, 10th floor (Zayed 10 West). On this unit, we will continuously monitor your heart rate and rhythm at the bedside and at the nurses’ station. We will take your vital signs (temperature, pulse, respirations, blood pressure and oxygen level in your blood) every four hours while you are on the bedside monitor. The bedside monitor resembles a TV. The cables are long enough to enable you to get out of bed to the chair with help from a certified staff member on the CVPCU. You will remain in the CVPCU until you are discharged from The Johns Hopkins Hospital.

After your heart rate and rhythm have been stable, we will change your monitor to a telemetry device that will allow you greater freedom to move around your room and the nursing unit while still allowing the nurses to monitor your heart. We will take your vital signs less frequently (every eight hours) once you are attached to the telemetry monitor.

The care on this unit focuses on clearing your lungs of mucus and increasing your activity level. To clear your lungs, your nurse and physical therapist will give you instructions on the use of the incentive spirometer. We may order special respiratory treatments for you depending on how well you are clearing your lungs. While you are awake, we will instruct you to use the incentive spirometer every hour.

While in the CVPCU, you may be out of bed and walking. Your nurse will assist you with these activities. The physical therapist will also work with you on beginning exercises. It is important that you not attempt to get out of bed or walk by yourself. Activity progresses from sitting in the chair, to helping with your bath, to taking short walks in the hallway, to climbing stairs. Your doctor will prescribe pain medication that you may request if you are having any discomfort or pain. It is important that you report any pain to your nurse right away. You will have a call bell within your reach at all times.

Family may visit you at any time. One adult family member or significant person is welcome to stay with you in the room on a 24-hour basis. Each room is equipped with a sofa that changes into a bed. The Patient-Centered Care Packet that you will be given on admission to the CVPCU has patient and family information about patient care and services available to you.
What are the CVPCU visiting hours and policies?

We understand that visitors have a positive impact on the healing process and so we welcome all visitors, including children, if the patient so desires. Adult supervision is required for children who are visiting to minimize noise and disruption and maximize the children’s safety.

The CVPCU (Zayed 10 West) does not have formal, established visiting hours, but we do ask that visitors be respectful about noise levels, disruptions and the times that they choose to visit. Incoming calls to you are only permitted until 10 p.m.

We welcome phone calls to the nurses’ station but ask that the family’s spokesperson be the primary contact. This spokesperson may call the nurses’ station at 410-955-8460 for patient updates.

A nurse practitioner (NP) or physician assistant (PA) will be available from 6 a.m. to 6 p.m., seven days a week. They communicate with your surgeon every day and will manage your care throughout the day. They are a part of the medical team and will see you every day. Major decisions regarding your care are guided by your surgeon.

A discharge planner, who is a nurse, will also be available to help you with any discharge needs, including finding a rehabilitation facility if needed.

You or your family may also contact the nurses’ station to reach the NP, PA, discharge planner or social worker if needed.

Visiting Age Guidelines

Children 16 and older are allowed to visit in the CVPCU with the approval of the patient’s nurse. Children who are sick or who may have been exposed to infectious diseases recently will not be allowed onto the unit. This measure is in place to protect both patients and children. Please advise the staff of your wishes for children to visit prior to bringing the children to the hospital. The hospital has many resources which can be utilized in preparation for ensuring the child’s visit will benefit all involved. Many aspects will be considered in determining if the visit is emotionally and physically safe for the patient and family. Please note that visiting may be restricted during influenza season.
Chest X-rays? Blood drawing again? EKGs?

We will continue to evaluate your heart and lungs, and we will do periodic chest X-rays and EKGs (electrocardiograms) as necessary. Chest X-rays show how well your lungs are expanded and note if any fluid or congestion is present. EKGs show how your heart is functioning. Blood samples show how your body is functioning after surgery and help in adjusting your medication doses.

What are these wires in my chest?

You may have pacemaker wires in your chest when you leave the operating room. A small box called a pacemaker may be connected to these wires if necessary. The wires in your chest will be covered with a small dressing (bandage) and be removed approximately two to five days after surgery.

The heart may be irritable after surgery. Approximately 30 percent of patients develop an irregular heart rhythm called atrial fibrillation. Most of the time, this is controlled with medication and reverts back to a regular rhythm before you go home.

How long will my stitches (sutures) be in?

Most of your stitches will be internal and dissolve in time. In some circumstances, you may have staples holding the skin together. The nurse will remove these staples with minimal discomfort when the surgeon determines that they are ready to be removed. If these staples need to remain after you go home, a visiting nurse will remove them with orders from your surgeon. You may have small paper strips (steri-strips) applied to the chest and leg incisions for additional support. These gradually peel and should be removed one week after being discharged home. You may also have small chest tube sutures on the upper part of your abdomen. The visiting nurse will remove these sutures with minimal discomfort seven to 10 days following surgery. We will give you directions upon discharge from the hospital. Some surgeons also use a surgical glue to seal the incision. This does not need to be removed and will wear off gradually.
When can I take a shower or bath?

You may shower when you are off the bedside monitor and on telemetry as long as you are not having any problems with your blood pressure or heart rate. The shower stream should not go directly on your incisions. Use mild soap such as Ivory or Dove. Showering is permitted, but do not take a bath.

How will I feel after surgery?

You will have good and bad days. You may experience many different feelings that can be due to lack of sleep, decreased blood count, constant activity in your room, the hospital environment with its structured routine, physical discomforts from surgery and unfamiliar faces. You may experience a period of feeling down or blue, which usually takes place the first few weeks after surgery. It is normal to have difficulty focusing and concentrating in the first week or two after surgery. As activity increases and you return to a more normal routine, these feelings should disappear and your ability to concentrate should improve.

Oftentimes, you may feel restless and have trouble sleeping at night. The doctor will order pain and sleeping medicine for you. You must ask the nurse for pain and/or sleeping medicine when you feel you need them. We do not routinely bring them to you unless requested.

Why is my appetite so poor?

Due to decreased activity and medication, your appetite will be suppressed. We will encourage you to eat as much as you can and supplement your diet with high-calorie shakes. It is important to supply your body with protein-rich foods for wound healing at this time. If you want to speak to a dietitian, please tell your nurse.
What can I eat?

Your physician may order a diet restricted in sodium. Because of this, you will not be able to add salt to your meals. You will receive a cardiac menu to select your meals daily. Between-meal snacks may be ordered.

Dietary modifications or adjustments in your diet may include restrictions in calories, sodium, fats or cholesterol.

Understanding the importance of maximizing heart-healthy foods and minimizing the restricted foods is instrumental in preventing further heart disease. If you want to speak with a dietitian, ask your nurse.

Goals of Nutritional Therapy

- Reduce total fat intake to 30 percent of total caloric intake and limit saturated fats as much as possible.
- Limit or avoid foods high in cholesterol.
- Reduce sodium.
- Achieve and maintain an appropriate body weight.
- Increase intake of high-fiber foods.
- Decrease alcohol and caffeine.

Why must I exercise?

To prevent complications such as lung congestion (pneumonia) or blood clots in your legs, it is important to begin walking around the hall as soon as possible. Everyone feels tired after the surgery. However, it is extremely important to exercise the muscles. A physical therapist will see you and plan an exercise routine for you in the hospital as well as at home. We strongly encourage you to follow these instructions for a steady and full recovery. We will provide you with a booklet that reviews specific activity instructions for you.

We will also give you instructions on sternal precautions (protection for your breastbone). Sternal precautions help you protect your chest, your sternal bone and your surgical incision. **You may not lift anything heavier than 10 pounds for six to eight weeks after your surgery. You cannot raise both arms over your head at the same time, and no bending at the waist.** If you have steps at home, the physical therapist will help you walk up steps before discharge.

Vigorous arm activity is limited for six to eight weeks after surgery while the chest bone heals. Physical activities that require arm movement, such as golf, swimming, tennis, vacuuming, etc., will be restricted until cleared by your cardiac surgeon.
Medications?

Everyone’s medications will differ. We will give you written information about your medications. We will also give you prescriptions the morning of discharge that can be filled at any pharmacy. Due to hospital policy, we cannot give you a supply of medications to take home. Take only the medications prescribed for you at the time of discharge. Please speak to your primary care physician or cardiologist before resuming any previous medications.

*Do not* have your family bring your home medications to the hospital unless your doctor tells you to bring them.

Cough, cough, cough?

Anesthesia, decreased activity and shallow breathing make your lungs susceptible to congestion and partial collapse. It is important that you cough and do deep-breathing exercises frequently to prevent lung congestion, collapse and pneumonia. The physical therapist, respiratory therapist and nurse will assist you.
Why are my legs swelling?

If the large vein (saphenous vein) is removed from your leg for bypass grafts, it will take time for alternate (collateral) circulation to form. It is important to keep your legs elevated while you are sitting. This will reduce swelling (edema) and therefore prevent pressure on your leg incisions. You may also wear special stockings. Remember not to cross your legs, as this may cause circulation to slow down.

To prevent blood clots from forming in your legs, we may give you injections of heparin in your abdomen while you are in the hospital.

When will I be ready for discharge?

Everyone progresses at his/her own rate. You may begin to think about going home when you see that your activity is increasing and your suture lines are healing well. The usual length of hospital stay is four to seven days. To be discharged, you must:

- Have stable vital signs and a stable heart rhythm.
- Be weaned off oxygen with good oxygen levels.
- Be able to walk and be steady on your feet.
- Have blood lab results within normal range and have no signs or symptoms of infection.
- Be able to tolerate regular food and have a bowel movement.

If you are taking Coumadin (warfarin), you may need to stay in the hospital until your blood test, known as an INR, is at a target level that is determined by your surgeon.
Planning for a morning discharge

- Arrange for someone to stay with you for the first week after discharge.
- Have your family bring in clothes for you to wear home the day before you are discharged.
- Before your discharge, tell the nurse of any discharge needs (such as walker, bedside commode, prescription needs, etc.).

What about the trip home?

*It is important to arrange your ride home for early in the morning (9 a.m.) on the day of discharge.* If friends or family are driving you home, have them help you with your luggage. If your trip home takes several hours, you may ask them to bring a pillow and blanket so that you can rest. We ask that you stop for short rests, walk around and exercise your legs (weather-permitting) if your trip home is longer than one hour.

If you are going home on public transportation such as airlines, arrange the reservation as far in advance as you can. You can make special arrangements for baggage, wheelchairs or shuttle service. You should not wear restrictive clothing such as girdles, garters, tight pants or socks with an elastic band. Under certain circumstances, we may ask you to stay locally after discharge, before you fly home.

When can I anticipate full recovery?

Everyone increases their activity level at different rates. Some days will seem better than others. Week by week, you should be increasing your strength and activities. At first, dressing, personal hygiene, reading, writing, visiting, walking and resting should fill your day. Follow the exercise routine that the physical therapist has given you.

Avoid sleeping during the day except for an hour nap if needed. If you sleep too much during the day, you will be unable to sleep at night. This can set up a pattern of sleepless nights and tired days.

Most people are back to their regular routines in three to four months after surgery.
How shall I care for my incisions?

Wash your incision gently with soap and water. Do not rub or scrub. Use mild soap like Ivory or Dove. Gently pat dry during the first week. Do not apply moisturizers such as aloe, cocoa butter or vitamin E cream if your incision has any open areas.

The incision might give you periodic discomfort because of weather changes or “morning stiffness.” You can apply gentle heat (100° F) to the incision and take an analgesic (Tylenol) to ease the discomfort. Use heat and medicines as advised by your doctor. There is usually some pinkness along the incision, which will gradually decrease, generally in six months to a year. You might also experience some numbness on either side of your incision. This may persist for months but will gradually fade with time. Contact the outpatient coordinator or nurse practitioner for the following:

- Continuous or increased pain at the site of the incision
- Drainage from the incision
- An incision that is swollen, red, warm or sore to touch
- Lump near the incision

Take your temperature twice a day, in the morning and evening, and record it on the chart provided for you at discharge. *If your temperature is 101°F or higher, take two Tylenol and page the outpatient coordinator or nurse practitioner at 410-283-3779 and leave your call-back phone number after the beep.*

Why am I so round-shouldered?

There may be days when your incision site will be uncomfortable and you may have a tendency to assume poor posture. Do not let your head and shoulders slump forward. Try to maintain good posture while you are sitting, standing and walking.

What written information will I get?

We will give you a cardiac surgery discharge binder. This will have discharge instructions and information on the most frequently asked questions about discharge and recovery. There are sections on nutrition, diabetes, physical therapy, cardiac rehabilitation and informational websites.

Why do I need to weigh myself every day?

It is important to weigh yourself every day to make sure you are not gaining too much fluid. Weigh yourself *before breakfast* and after urinating every morning for two or three weeks after discharge, or until your follow-up visit with your doctor, and record it. Use the same scale and wear the same weight clothing each time. Notify your surgeon if you gain more than four pounds in one to two days, if you have increased shortness of breath or if you have swelling of both legs.
If you gain or lose five pounds from the first day that you weigh yourself at home, your body may be retaining or losing fluids too quickly. Do not plan to diet in order to lose weight until one month following surgery. Your body needs the necessary proteins and nutrients to heal properly.

**What should I watch for at home?**

Check your temperature in the morning and evening and record it. Notify the outpatient coordinator or nurse practitioner if a temperature of 100°F or higher persists for more than two days, or if you have a fever of 101°F at any time.

If you develop shortness of breath, new chest pain or palpitations (a rapid heart rate), **call 911.**

**How much exercise will I do?**

Your physical therapist will give you an exercise plan while you are in the hospital. You will need to perform all the prescribed exercises once with the therapist and two additional times on your own each day in the hospital.

This program is designed to gradually increase your physical activity to assist you in returning to your normal activity level. Your recovery will be slow and gradual, but progressive. Throughout the recovery period, you will have good and bad days. You may participate in a structured cardiac rehabilitation program but may not do any arm activities for three months. **Remember, gentle daily activity aids healing and speeds recovery! You should plan to walk progressively longer periods each week.**

**What are the benefits of cardiac rehabilitation?**

- Increases strength and endurance of your heart
- Decreases congestion in your lungs
- Gives you more energy
- Tones and stretches, and relaxes the muscles of the chest
- Increases your confidence
- Increases readiness for discharge
- Provides education about diet and lifestyle modifications

**When can I climb stairs?**

For the first week or so, plan your day so that you only do the stair climbing that is necessary (approximately once in the morning and once in the evening). Take your time and go slowly. If you become tired, short of breath or dizzy while stair climbing, sit down on the step and rest. You should tell the physical therapist before discharge that you have stairs to climb at home. This will enable the therapist to include this activity in your exercise program while you are in the hospital.
When will I be able to return to work?

The standard answer is about three months after your surgery, but it varies with the type of surgery, hospital course and type of work. Your doctor will discuss this with you before your discharge home or when you return to the clinic for your follow-up visit.

When can I drive a car?

Due to the healing of the breastbone, weakness, fatigue and general discomfort, you should not try to drive for at least four to six weeks after your surgery. However, you can be a passenger in a car.

When can I resume sexual activity?

In general, you are able to resume sexual activities when you can climb two flights of stairs or walk two blocks without undue fatigue. Sexual activity, as with any activity, should be postponed until you are rested.

Can I lift anything?

*Avoid lifting anything over 10 pounds for the first six weeks.* Lifting a heavy object will strain your muscles and pull on your breastbone. This will lead to discomfort and slow the healing of the breastbone. Therefore, do not lift children, pets, groceries, garbage bags, etc. Avoid opening stuck windows and heavy doors, moving furniture, vacuuming, or shoveling mounds of dirt or snow. Avoid pushing, pulling and carrying objects up or down hills.

Must I stop smoking?

Without cigarette smoking, your lungs are cleaner. Your blood carries more oxygen. Your heart does not suffer from the toxic effects of inhaling cigarette smoke. Make an effort to stop smoking from now on. Ask people not to smoke in front of you. Request booklets from the American Heart Association and the American Lung Association on helpful hints to quit smoking. Use these tips to stop smoking. Also, consult with your primary care physician or cardiologist about smoking cessation aids (e.g., nicotine patch, medication).

What medication will I be taking after I go home?

Your medications may change after surgery, and you must *take only the medications prescribed by your surgeon upon discharge.* Your nurse and doctor will give you information about the medications you will take at home. You will receive prescriptions the day of discharge that you can fill at your local pharmacy. Due to hospital policy, we cannot give you a supply of medications to take home. Do not return to the medications you were taking before surgery unless your surgeon tells you to do so.
How long will my chest ache?

For a few weeks after surgery, you may feel a generalized soreness, especially in your shoulders and back. This often comes from muscles being stretched during surgery. You may use a heating pad at home if desired. Remember, it takes six weeks to three months for you to fully recover; it is a gradual process. You are sent home with a mild narcotic to help with the pain/discomfort you feel. After one to two weeks, you should no longer need the narcotic. Instead, you may use acetaminophen to relieve the generalized soreness in your shoulders, back and breastbone.

If your surgeon used the mammary artery for a bypass graft, you may feel pain along the left side of the incision. This will gradually improve over several weeks, but you may have some residual numbness in the skin for several months.

When will I see my doctor?

You will return to see your surgeon for a postoperative visit three to four weeks from the date of your discharge. Prior to your discharge you will receive your postoperative appointment time and date. You will receive a letter in the mail including instructions and a requisition for your postoperative testing.

After your appointment, if your surgeon feels that there is no active issue of surgical concern, he will typically remain available and be updated by your internist and/or cardiologist about your subsequent postoperative progress. You should call your primary care physician and cardiologist and let them know you have been discharged from the hospital. They will let you know when they would like to see you in follow-up.
How We Help with Appointments and Other Arrangements for Out-of-Town Patients

Johns Hopkins USA

Johns Hopkins USA provides one point of contact for our out-of-town patients. Our staff can help patients identify appropriate physicians or specialists, coordinate multiple medical appointments, arrange second opinions and obtain general information on Johns Hopkins’ numerous services. In addition, Johns Hopkins USA staff can provide information regarding transportation, lodging and other travel needs. Call 855-884-6754(855-88-HOPKINS) to talk with Hopkins USA or visit the website at hopkinsmedicine.org/usa.

Johns Hopkins Medicine International

The professional staff of Johns Hopkins Medicine International coordinates all aspects of international patients’ medical care, paying special attention to personal, cultural and travel-related needs. The staff will arrange consultations, second opinions or treatments and will coordinate appointments in a time-efficient manner. The staff also provides medical record reviews before the patient travels to the United States, language interpreters, cost estimates and assistance with travel arrangements. For more information, call +1-410-502-7683 or visit the website at hopkinsmedicine.org/international.

Accommodations and Guest Services Office

The hospital has arranged special rates (and shuttle service in some instances) at several local hotels for patients and their families. Our Travel Center is available to help patients and families with air, hotel or ground accommodations. It is open Monday through Friday 8:00 a.m. to 5:00 p.m. Please call 1-800-225-2201 or 410-614-5100 for assistance.
## APPENDIX

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Coronary Artery Disease

What is coronary artery disease?
Coronary artery disease is a progressive thickening of the walls of the blood vessels due to atherosclerosis (deposits of cholesterol, fats and calcium). The thickened wall causes the vessel to narrow, thus decreasing blood flow to the heart muscle. This process can be compared to rust and sludge buildup in plumbing.

What causes coronary artery disease?
Some causes (risk factors) have been identified and associated with coronary artery disease. They are classified as changeable or unchangeable risk factors.

<table>
<thead>
<tr>
<th>Changeable</th>
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<tr>
<td>Cigarette smoking</td>
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<td>High blood pressure</td>
<td>Gender</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>(males are more prone)</td>
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<tr>
<td>High glucose levels</td>
<td>Age</td>
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<tr>
<td>Obesity</td>
<td>Diabetes</td>
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<td>Lack of regular exercise</td>
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During your stay in the hospital, you will learn ways to reduce the risk of further coronary artery disease by focusing on the changeable risk factors. In addition, if your cholesterol or triglyceride levels (fats in the blood) are high, you may be approached by the Johns Hopkins Preventive Cardiology group. They help by giving advice on how to lower fats in the diet, screening other family members (siblings and children), and provide education on other risk factors to prevent the progression of coronary artery disease.

What are the symptoms of coronary artery disease?
The major symptom of coronary artery disease is angina. Angina occurs due to decreased oxygen to the heart muscle. Everyone can experience angina in a different way. It may be felt as chest pain or pressure that radiates to the neck, jaw or arms; shortness of breath; or indigestion. Usually angina is brought on by exercise, stress or excitement, exposure to the cold, or after eating a heavy meal when the heart must work harder. Angina can occur at rest, which may indicate more serious disease.

Women frequently have different signs of coronary disease than men. They may only notice increasing fatigue, decreasing activity tolerance or toothaches. These can be as serious as angina.

If the blood flow is severely restricted to an area of the heart muscle, a heart attack (myocardial infarction) may result, which is the death of a portion of the heart muscle. The pain associated with a heart attack, unlike that of angina, is not relieved with nitroglycerin and rest.
Why heart surgery?

Your doctor recommends heart surgery when the pain or other symptoms are not manageable by medications and lifestyle changes alone. Or, you may have critical narrowing in vessels that diminish the blood flow to a large portion of the heart muscle, placing you at risk for a disabling heart attack.

The surgeon must bypass the obstruction in the artery since it cannot be dissolved or removed. Bypassing the blockages will supply the necessary oxygen, thereby relieving angina and increasing the function of the heart.

How are the blockages in the coronary artery bypassed?

The blockages in the coronary artery are not removed but will be bypassed using the saphenous vein from the leg, and/or the internal mammary artery from the chest. The saphenous vein is removed from the leg, and one end of the saphenous vein graft is sewn to the largest artery in the body (aorta) and the other end is sewn past the obstruction into the coronary artery. The internal mammary artery is freed at one end in the chest and sewn past the obstruction into the coronary artery. Either graft reroutes the flow of oxygen-rich blood to the heart muscle. These procedures can be compared to a road detour.

If you have a stent in place in the vessels bypassed, the stents are not removed.

Will my chest muscle function without the internal mammary artery?

Removing the internal mammary artery for use in the heart’s circulation has not been shown to cause any injury to the chest muscles. Some patients may experience numbness of the chest that lessens with time but may not disappear entirely.

Will my leg(s) function properly without the saphenous vein?

Removal of the saphenous vein will not hinder normal circulation in the leg(s). The blood that previously flowed through the saphenous vein will change its course of travel. This is known as “collateral circulation.” Following surgery, there may be some swelling in your leg(s) but this will decrease in time.
Valvular Disease

Why doesn’t my heart valve work properly?

The valves in your heart may be damaged due to infection, rheumatic heart disease or birth (congenital) defects. The affected valve leaflets (cusps) may grow thick and brittle from scar tissue or calcium deposits, or they may become thin and weak resulting in an inefficient valve.

There are several terms referring to valve disease.

**Stenosis**—the opening of the valve becomes smaller, thus allowing less blood to flow through.

**Regurgitation/Insufficiency** (leaky valve)—the valve does not close properly and allows blood to flow backward as well as forward in the heart.

How will I feel?

Due to the damaged valve, your heart must work harder to pump blood throughout the body. You may tire easily and feel short of breath with less activity or exercise. You may experience an irregular heartbeat due to overstretching of the heart muscle as in mitral stenosis, or dizziness and near fainting due to decreased blood flow to the brain as in aortic stenosis.

How will my valve be fixed?

Depending on the extent of your valve disease, you may need to have the valve repaired or replaced. To repair the valve, your surgeon may perform a commissurotomy or implant a valve ring. A commissurotomy is performed for a tight valve (stenosis). The valve leaflets are cut to loosen the valve slightly, allowing blood to pass easily. Another type of valve repair is a valve ring annuloplasty, which is sewn in place when the valve is leaking (regurgitant or insufficient). The valve leaflets are tucked in place with the ring.

Often the valve cannot be repaired and the surgeon must replace the damaged valve with a tissue (bioprosthetic) or mechanical valve. Tissue valves are valves from animals (e.g., cow, pig). They generally do not require long-term anticoagulation and are not as durable as mechanical valves. Mechanical valves are made from materials such as plastic or metal. They require long-term anticoagulation and are considered extremely durable, lasting longer than tissue valves.

Your surgeon will discuss the need for repair or replacement of the valve with you prior to surgery as well as the type of valve (tissue or mechanical) should replacement be necessary.
Valve Replacement Surgery: What Else Should I Know?

Prevention of Valve Infection

To prevent an infection (endocarditis) from occurring around the new heart valve or ring, you should receive antibiotics before having any procedures that could permit bacteria to enter your body. Among these procedures are:

- All dental procedures (cleaning, filling, removing teeth, root canals, gum or ulcer treatment). You may use dental floss. In fact, we encourage you to reduce tartar with any approved method.
- Surgical procedures such as colonoscopy, cystoscopy or other surgical procedures.

Discuss with your dentist or doctor whether the dosage of Coumadin (warfarin) needs to be decreased or stopped before any of the above procedures.

Signs and Symptoms of Common Infections

Notify your family doctor if you have any of the following signs or symptoms of an infection:

**Respiratory:** Fever higher than 101°F, or coughing up white, yellow or green-tinged mucus.

**Urinary:** Fever higher than 101°F, or burning, frequency, urgency or difficulty to urinate.

**Blood:** Any fever that lasts longer than two days and is accompanied by chills, weakness and a general feeling of ill health.

Identification

You will receive a valve identification card from the valve manufacturer that contains information about the type and size of your heart valve. Carry this with you at all times. **Remember, you must tell any doctor or dentist caring for you about your valve and the need for antibiotics.**

Valve Clicking

A mechanical heart valve (such as a St. Jude or Carbomedics) may produce a clicking sound as it closes. Some patients are more aware of this sound than others. It can be louder with activity or more noticeable when you are resting. As you adjust to the sound, it will become less distracting.
Aortic Aneurysms

What is an aneurysm: Why is it important?

The word “aneurysm” means out-pouching or bulging of a portion of a blood vessel that can occur anywhere in the body. When an aneurysm occurs in the aorta, the largest blood vessel in the body, it is either a thoracic aneurysm, located near the heart, or an abdominal aneurysm, located in the descending portion of the aorta.

When a blood vessel wall bulges, or dilates, it becomes thin and tense, just like blowing too much air into a balloon. At a certain size, that dilated portion of the vessel wall is in danger of rupturing or tearing (called a “dissection”). This can be a life-threatening emergency.

The goal of surgery is to intervene before that happens by removing the dilated portion of the vessel and replacing it with a graft, or tube of synthetic material, that won’t rupture or tear.

What causes an aortic aneurysm?

- Atherosclerosis (hardening of the arteries)
- Chronic or untreated high blood pressure
- Smoking
- Injury from trauma (for example, a car accident)
- Congenital abnormality (present from birth)
- Inherited conditions (for example, Marfan syndrome, Loeys-Dietz syndrome)

These are all conditions that have the potential to weaken the wall of the vessel, allowing it to dilate or balloon out over time.

What are the symptoms of an aortic aneurysm?

Aneurysms usually do not cause symptoms until they get quite large. They often are found during an examination for a different medical condition. When they are large enough to cause symptoms, people may notice chest or back pain, palpitations, fatigue, dizziness or shortness of breath.

Sudden severe back pain that feels like the worst pain anyone has ever had is usually a sign of a tear or rupture and is an extreme medical emergency.
How are aortic aneurysms discovered or diagnosed?

Large aneurysms can be seen on a chest X-ray. They are also detected by studies such as CT scan, MRI or echocardiography. These studies also help to determine the exact location and size of the aneurysm. When a small aneurysm is found, the study used to find it is repeated on a regular basis, usually every six to 12 months, to monitor any change in size. This helps determine the ideal time for surgical intervention.

How is the aneurysm fixed?

Surgical repair involves opening the chest to expose the aorta in the area of the aneurysm. A heart-lung machine is connected to maintain circulation while the surgeon removes the diseased portion of the aorta. Clamps are placed above and below the aneurysm, which is then cut out and removed. A fabric tube, or graft, is sewn onto both cut ends to replace the diseased portion that is removed. The chest is then closed. The breastbone is closed with permanent wire closures to allow it to heal; the rest of the skin and muscle is closed with sutures that eventually dissolve. The skin may be closed with staples, which are removed one to two weeks after surgery, or with a special surgical glue that dissolves over time.

There is another technique for repairing an aortic aneurysm that can be used for patients who are at too high of a risk to undergo major surgery. This involves placing a device called a “stent graft” inside the diseased portion of the aorta without removing it. The stent is placed from the outside of the body through a catheter that is put through an artery leading to the aorta. This stent graft can relieve most of the pressure of blood flowing through the aneurysm, preventing rupture.

How will I recover from aortic aneurysm surgery?

Recovery is similar to that of recovery from any open-chest procedure. This is described in the general section of this booklet discussing recovery from surgery.

In the future, it will be very important to:

- Permanently stop smoking.
- Maintain very good blood pressure control.
- Avoid heavy lifting.

It is important to discuss all this with your cardiologist and primary care doctors.

What else should I know?

Some aortic aneurysms are located very close to the aortic valve (the valve that allows blood to leave the heart); this may cause the aortic valve to function improperly and let some blood leak backward with each heartbeat. The additional strain on the heart can eventually result in heart damage. When this happens, the preferred surgical procedure may be to replace both the diseased portion of the vessel and the valve to which it is attached.

Johns Hopkins specializes in a procedure that replaces the aneurysm that lies close to the aortic valve, but avoids replacing the valve, allowing the native valve to remain in place. The advantages of this procedure, referred to as a valve-sparing aortic root replacement, are the avoidance of either taking a lifelong blood thinner medication or having to undergo a second valve surgery 12 to 15 years in the future. Your surgeon will discuss this option in greater detail if appropriate.
Atrial Septal Defect

An atrial septal defect, also referred to as a patent foramen ovale, is one of the most commonly occurring congenital (birth) defects of the heart in adults. It occurs more frequently in women than men.

What is an atrial septal defect?

An atrial septal defect is an opening in the wall (septum) that separates the two upper chambers of the heart (atria).

Normally the right atrium fills with oxygen-poor blood from the veins and flows through the heart to the lungs, where it is oxygenated. The blood returns to the heart via the left atrium and flows into the left ventricle, where it is pumped out to the organs of the body. An opening or defect in the wall between the atria allows oxygen-rich and oxygen-poor blood to mix, resulting in an overall increase in the amount of blood flow to the lungs, possibly resulting in damage to the lungs.

How does this affect me?

You may feel short of breath with exercise, tire easily or have an irregular heartbeat. Some patients may not have any symptoms and the defect may only be detected by special echocardiogram.

How will this opening be repaired?

The atrial septal defect will be closed by sewing the edges together or by placing a patch over the opening. This patch will be made from the sac surrounding the heart (pericardium) or synthetic material. This will prevent the mixing of oxygen-poor and oxygen-rich blood.

The repair of an atrial septal defect (ASD) is often done as part of another “main” cardiac surgical procedure (for example, valve surgery or coronary artery bypass surgery). If the defect is incidentally found during more frequently performed cardiac procedures, it is then routinely closed in the operating room. Some atrial septal defects do not require surgical closure and can be sealed in the cardiac catheterization laboratory with “umbrella-like devices” that are passed into the heart via the groin veins.
What is a ventricular septal defect?

A ventricular septal defect (VSD) is an opening in the wall (septum) that separates the two lower chambers of the heart (ventricles). Normally the right ventricle fills with oxygen-poor blood from the right atrium and flows to the lungs, where it is oxygenated. The oxygenated blood returns to the heart via the left atrium and flows into the left ventricle, where it is pumped out to the organs of the body. An opening or defect in the wall between the ventricles allows oxygen-rich and oxygen-poor blood to mix, resulting in an overall increase in the amount of blood flow to the lungs, possibly resulting in damage to the lungs.

How will this affect me?

If the opening between the ventricles is small, it doesn’t strain the heart. In that case, the only abnormal finding is a loud murmur.

You may feel short of breath with exercise, tire easily or have an irregular heartbeat.

How will this opening be repaired?

Closing small ventricular septal defects may not be needed. They often close on their own in childhood or adolescence. But if the opening is large, even in patients with few symptoms, closing the hole in the first two years of life is recommended to prevent serious problems later.

A VSD may also occur when a patient has a myocardial infarction (heart attack). Usually the defect is closed with a patch. Over time, the normal heart lining tissue covers the patch, so it becomes a permanent part of the heart. Some defects can be sewn closed without a patch. Repairing a VSD restores the blood circulation to normal.
Minimally Invasive Cardiac Surgery

What is minimally invasive cardiac surgery?

Most cardiac operations today are performed through a full sternotomy, which involves splitting the breastbone along its entire length. This approach provides excellent exposure to the heart and is used for the vast majority of cardiac operations. In recent years, however, less invasive approaches for heart surgery have been developed that use much smaller incisions that involve splitting only a portion of the breastbone or that avoid splitting the breastbone entirely. Minimally invasive incisions measure about 3 to 4 inches compared to 8 to 10 inches required for standard sternotomy incisions. Specialized handheld and robotic instruments are used to project the dexterity of the surgeon’s hands through these small incisions to safely perform the operation on your heart.

What are the potential benefits of minimally invasive cardiac surgery?

There is early evidence that such minimally invasive approaches translate into:

- Pain of less intensity and duration.
- Better cosmetic appearance of the wound.
- Fewer wound-healing complications.
- Reduced hospital stays.
- Reduced recovery time.
- Reduced physical activity precautions.

The smaller incisions associated with minimally invasive cardiac operations have subjectively resulted in less intense pain for a shorter duration than experienced with a standard sternotomy, although this varies from patient to patient. Furthermore, the smaller incisions produce smaller scars and, in certain cases, scars in locations that are routinely covered with clothing (e.g., bra, bikini top). Since less tissue is disrupted with smaller incisions, there is a significant reduction in wound-healing complications, including infections.

Hospital stays after minimally invasive cardiac operations routinely range from three to five days, compared to five to seven days for traditional sternotomy-based cardiac operations. Patients undergoing cardiac surgery performed through a standard full sternotomy are restricted from driving an automobile or lifting objects weighing more than 10 pounds for approximately four to six weeks, while many patients undergoing minimally invasive cardiac operations do not have lifting restrictions and can operate an automobile as soon as they are comfortable doing so without the use of narcotics (usually about two weeks).
What minimally invasive cardiac operations does Johns Hopkins offer?

The Johns Hopkins Minimally Invasive Cardiac Surgical Program currently offers the following operations using minimally invasive approaches:

- Mitral valve repair and replacement
- Aortic valve replacement
- Tricuspid valve repair and replacement
- Atrial septal defect closure (ASD closure)
- Patent foramen ovale closure (PFO closure)
- Biventricular epicardial pacing lead placement
- Surgical radiofrequency ablation for atrial fibrillation

Is a minimally invasive cardiac operation right for me?

Your surgeon will meet with you to discuss your eligibility and options for minimally invasive cardiac surgery. Your surgeon will explain the operation and its risks and benefits. You will have the opportunity to ask any questions you or your family may have prior to your surgery.

What should I expect after my minimally invasive cardiac operation?

You will recover in the Cardiovascular Surgical Intensive Care Unit (CVSICU) for the first 24 to 48 hours after surgery. During this time, you will be awakened from general anesthesia, weaned from mechanical ventilation (i.e., the breathing tube) and stabilized for transfer to the Cardiovascular Progressive Care Unit (CVPCU). Once you are transferred to the CVPCU, you will be encouraged to walk and perform deep breathing exercises almost immediately. Your medications will be adjusted, and any remaining chest drainage tubes and temporary pacing wires will be removed. For most patients undergoing minimally invasive cardiac surgery, this recovery lasts from two to three days.

Once you are discharged from the hospital, you will see your surgeon two to six weeks after your operation, depending on what type of minimally invasive incision was used.

What precautions must I take after my hospital discharge?

We ask that you follow the same general precautions outlined for cardiac operations performed through a standard sternotomy, with the following exceptions:

- **Lifting restrictions.** If any portion of your breastbone was divided during your operation, you should refrain from lifting any weight over 10 pounds for six weeks from the date of your operation. If not, you will have no specific lifting restrictions, although you should not engage in any activity that causes you pain.

- **Driving restrictions.** If any portion of your breastbone was divided during your operation, you should refrain from driving an automobile for six weeks from the date of your operation. If not, you may drive once you can comfortably operate the automobile without the use of narcotics.

- **Return to work.** If returning to your occupation does not interfere with any restrictions, you may consider returning to work as approved by your surgeon. It is generally a good idea to work on a limited schedule (e.g., half-day) for the first few days to week back at work.
Anticoagulation Medication

Special Medication

Coumadin (warfarin) is an anticoagulant or “blood thinner” that helps prevent your blood from forming harmful clots. As blood passes through a mechanical valve, there is a tendency for blood clots to form, which means that you will need lifelong anticoagulation. Unlike a mechanical valve, a tissue valve or ring is less likely to form clots. If you have a tissue valve implanted, you may be started on Coumadin for six weeks, after which it is stopped. You may also be on aspirin daily.

A blood test called an INR must be done within two to three days after you are discharged home. The doctor who follows your Coumadin therapy will tell you how much of the drug to take daily and when to report for the next blood test. Generally, you will need to have a blood test one to two times per week so the doctor can decide the correct dose. When the results of your blood tests have stabilized, you will only need to have a blood test once a month.

What restrictions or precautions will I need to take if I am on Coumadin?

- Avoid nonsteroidal anti-inflammatory drugs (NSAID) medications, such as cold remedies, pain relievers, arthritis medications, antibiotics and many more, because they may strengthen the effects of Coumadin. You may take Tylenol. NOTIFY the person following your Coumadin therapy before taking any other medications.

- Limit foods that are high in vitamin K, such as dark green leafy vegetables (kale, spinach, broccoli, etc.) and fish (trout, tuna, salmon, etc.); this does not include shellfish. Limit alcoholic beverages (wine, whiskey, beer, etc.) to one or two drinks per day, if desired. Avoid the above food and drink on the day before your blood test is drawn.

- Take Coumadin as ordered at the same time each day. Do not stop the drug or change the dose without a doctor’s order. If you have any questions about your Coumadin therapy, be sure to ask your doctor. Please keep a daily record of the drug to prevent missing a dose or taking it twice.

- Report to your doctor any blood in the urine, black stools, prolonged or new nose bleeds or menstrual periods, bleeding gums, bruising for any unknown reasons, spitting/coughing up of blood, or new headache.

- If you note any unusual swelling or pain, you should call the health care professional managing your Coumadin therapy.

- Head injuries should always be checked by a doctor. Having a headache, uncontrolled vomiting, blurred vision or confusion/sleepiness may indicate internal bleeding.

- Notify the person managing your Coumadin of any procedures you are planning to have (dental, cystoscopy, surgery, barium enema, etc.). Also, inform any doctor treating you that you are on Coumadin.

- Avoid situations that have a high risk of injury (playing contact sports, using a straight edge razor, walking barefoot, etc.) since you have an increased tendency for bleeding.

- Carry an identification card and wear a Medic Alert bracelet or chain to notify others that you are on a blood thinner. You may obtain this by writing to:

  Medic Alert, 2323 Colorado Avenue, Turlock, California 95382 USA, 1-800-ID-Alert (1-800-432-5378)
  www.medicalert.org
Information on The Johns Hopkins Hospital, heart surgery and recovery from heart surgery may be found on the following websites:

The Johns Hopkins Heart and Vascular Institute
www.hopkinsmedicine.org/heart

The Johns Hopkins Hospital and Health System
http://www.hopkinshospital.org

The Johns Hopkins Hospital Patient Information
http://www.hopkinshospital.org/patients

The Society of Thoracic Surgeons – Patient Information
http://www.sts.org/sections/patientinformation

The American Heart Association
http://www.heart.org

Cove Point Foundation – Congenital Heart Disease
Helen B. Taussig Children’s Heart Center
http://pted.org

Please scan this QR code for the most recent Johns Hopkins Visitor Guide.
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