

Before Heart Surgery: A Patient Guide

Your healthcare team may have discussed the need for heart surgery with you. To better understand these discussions and what to expect, this brochure will explain:

- How the heart works
- Pre-surgery testing
- Surgery overview
- Preparing for surgery
- Care after surgery

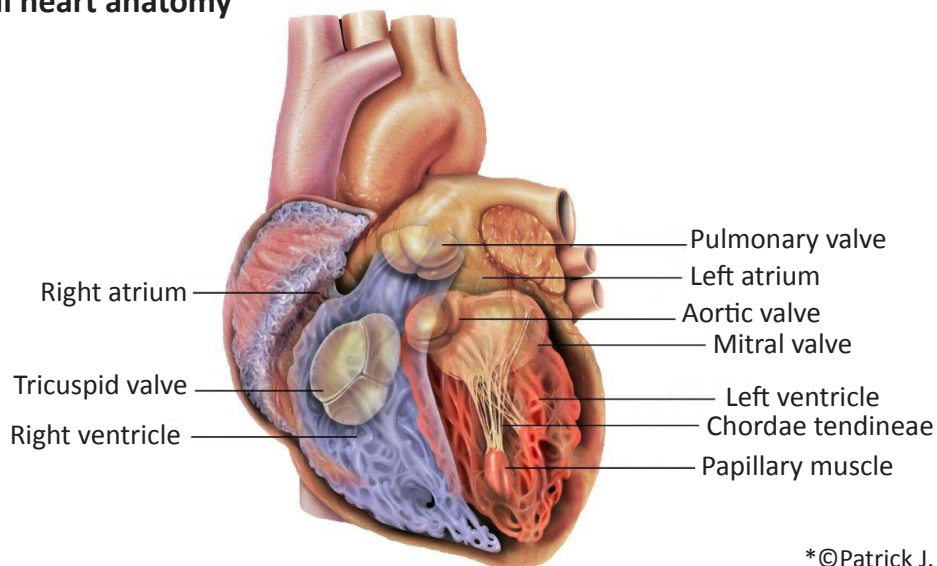
If you have questions, ask your physician or nurse.

The heart

To better understand your heart problem, it is helpful to learn more about the heart and how it works. The heart is the most active muscle in the human body. It is about the size of a closed fist. The average heart beats 100,000 times a day, pumping about 2,000 gallons of blood. The right side of the heart pumps blood to the lungs where it gets oxygen; the left side of the heart then pumps the blood out to all parts of the body.

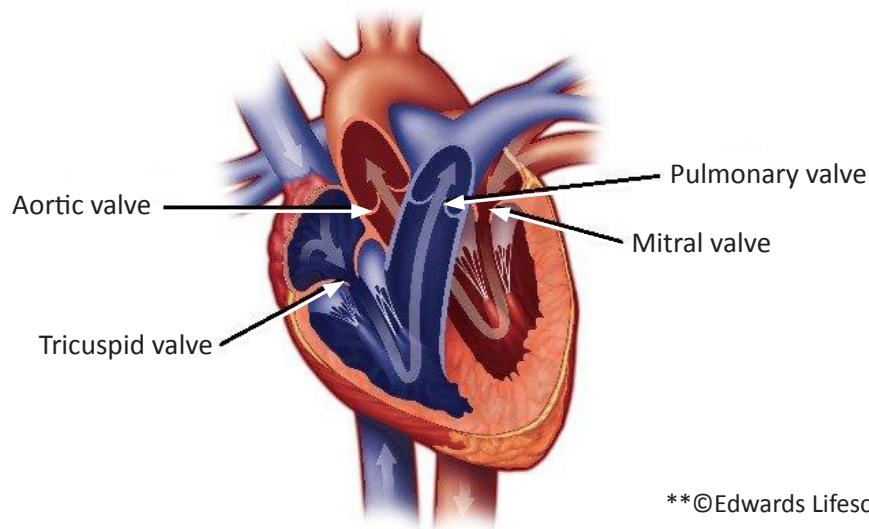
The heart has 4 chambers that pump the blood. The 2 upper chambers are called the right atrium and left atrium. The 2 lower chambers are called the right ventricle and left ventricle. Figure 1 shows where the atria and ventricles are in the heart.

Figure 1. Normal heart anatomy



There are 4 valves in the heart that open and close with each heartbeat. This ensures the blood flows in only one direction. The mitral and tricuspid valves direct the blood from the upper chambers (atria) to the lower chambers (ventricles). The aortic and pulmonary valves then direct the blood flow from the lower chambers out to the lungs and other parts of the body. The closing of the heart valves produces the sound of the heartbeat. Figures 1 and 2 show where each of the valves is located.

Figure 2. Blood flow through the heart



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Pre-surgery evaluation

You will need an evaluation before surgery. This evaluation will help your physician decide if surgery is the best treatment option for you.

As part of your evaluation, the care team will assess your overall health and other chronic conditions you may have, such as diabetes, or kidney or lung problems. These diseases may affect how you recover after surgery. Depending on your health, you may need to meet with physicians from other specialty areas. They will talk with you, examine you and perhaps order tests. These specialty areas may include:

- Anesthesia
- Neurology
- Nephrology
- Immunology
- Gastroenterology
- Infectious Disease
- Pulmonary Medicine

If you need other consults or tests to help the care team make the decision about heart surgery, we will help you complete the process as quickly and easily as possible. The next section explains tests and procedures that are often part of the evaluation process.

Pre-surgery testing

Depending on your condition, you may not need all of these tests. If you have had these tests in the past, we will review those results first. Sometimes it is important to repeat a test so your surgeon has the most up-to-date information. Your physician will review any important test findings with you.

Cardiac catheterization (angiogram)

In this test, the physician inserts a catheter into a large blood vessel that leads to the heart. Then they inject a special dye that shows how well the blood flows to the heart. It will show any blockage or narrowing of the arteries in the heart. If present, the surgeon can treat the blockages during surgery. A heart catheterization may also be used to:

- Check for heart valve problems.
- Measure blood pressures within the heart.

You will get detailed instructions if you are scheduled for this test.

Echocardiogram

An echocardiogram (echo) is a noninvasive test. It uses high-frequency waves (ultrasound) to create a real-time, moving picture of the heart and how it functions. The technician coats a small probe (transducer) with a light gel. They place the probe on your chest to get the images of your heart. This test measures how much blood your heart ejects, or pumps, with each heartbeat. This is known as the ejection fraction. A lower number means a weaker heart muscle.

This test also shows the:

- Size of the heart chambers
- Thickness of the heart muscle
- Function of heart valves
- Presence of blood clots in any of the heart chambers

Transesophageal echocardiogram

The transesophageal echocardiogram (TEE) also uses sound waves to look at the heart. It measures how well the heart valves work — if they open and close correctly. This will show if there is any blood leakage from valves. In this test, the technician puts a probe into your mouth and down your esophagus (tube to the stomach). The probe rests behind your heart and lets the technician see certain parts of the heart more clearly than with the standard echo.

Before the test, you cannot eat or drink for several hours. During the test, you will get sedation; this will make you sleepy. After the test you will need a ride home from family or friends. You will get detailed instructions if you are scheduled for this test.

Chest X-ray

A chest X-ray shows the size of the heart and checks for lung disease. A heart that is too large means there is some form of heart disease. A chest X-ray will also show any fluid in the lungs. You may have fluid in your lungs if you have severe heart failure that is not managed by medication.

Carotid duplex ultrasound

The carotid arteries, which are in the neck, provide most of the blood flow to the brain. In this test, sound waves check how well the blood flows through these arteries. This shows any blockages or narrowing that may need treatment to prevent strokes.

Magnetic resonance imaging

Magnetic resonance imaging (MRI) uses a magnetic field and radio waves to create detailed images of the heart chambers, blood vessels and valves. It also shows blood flow through the heart and blood vessels.

Coronary computed tomography angiography

A computed tomography (CT) scan is a special way of looking inside your body. A CT scan produces images that are “cross-sectional planes” and shows your heart much like slices taken out of a loaf of bread. These “picture slices” can show a detailed 3D view of the heart and its vessels. A coronary CT angiogram (CTA) looks at the coronary arteries for narrowing or blockages. In some cases, you may have this test instead of a cardiac catheterization.

Blood tests

The care team will draw blood for many different types of tests during the surgery evaluation. Some of the tests check blood type, cholesterol level, blood sugar, liver function and kidney function. Other tests look for signs of infection. You must have the blood type and cross-match drawn at Northwestern Memorial Hospital so that we have blood available if needed during surgery. Not all surgery patients need a blood transfusion, but it is important to be prepared.

Dental exam

You must have a recent dental exam (within 6 months) before any heart valve surgery. This should include an X-ray of the teeth and jaw. You may see your own dentist for this exam. If you do have dental problems, please be sure to complete any major dental work before surgery. This is because an infection in your mouth could increase your risk for a severe infection after heart valve surgery.

Pulmonary function test

If you smoke or have lung problems, a pulmonary function test (PFT) shows how well your lungs work. This test will measure::

- How easily the air moves in and out of your lungs
- How much air the lungs can hold
- How much oxygen goes from the lungs to the heart

During the test, you will take deep breaths and blow into a mouthpiece that is attached to a machine. The care team will also draw a blood sample at this time.

This test helps to identify the type and extent of possible lung disease. You may also have PFTs along with a cardiopulmonary exercise test.

Surgery

The surgeon will do the heart surgery in 1 of 3 ways. These pictures show different ways the surgeon may approach the heart.

- **Thoracotomy** (Figure 3) is a chest incision between the ribs.
- **Sternotomy** (Figure 4) is a 6- to 8-inch incision in the middle of the chest. The surgeon will use this method if they need to make a larger cut. After repairing the heart, the surgeon uses wires to keep the breastbone together and closes the incision.
- **Mini-sternotomy** (Figure 5) is a small, 3- to 5-inch cut in the upper or lower chest. This opens part of your breastbone. The exact site of the cut may vary, depending on what part of the heart needs surgery. The surgeon uses special instruments to make the repairs. Then, they will use wires to keep the breastbone together and close the cut.

Figure 3. Thoracotomy

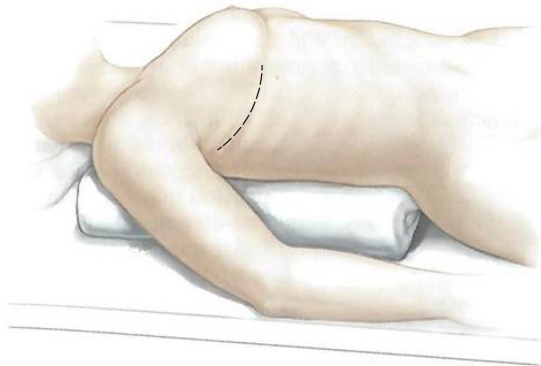


Figure 4. Sternotomy

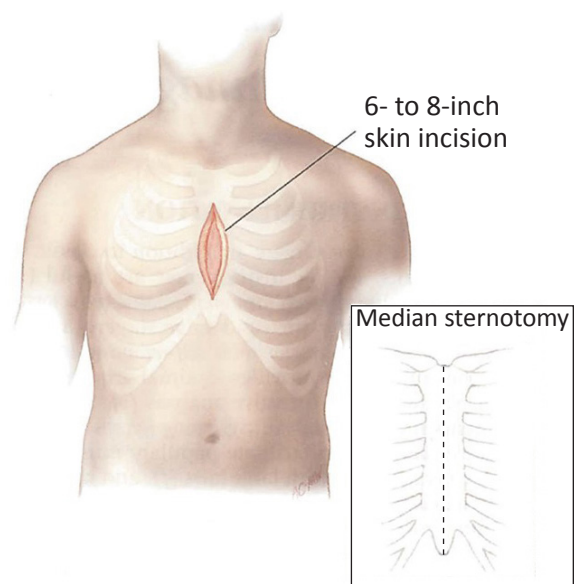
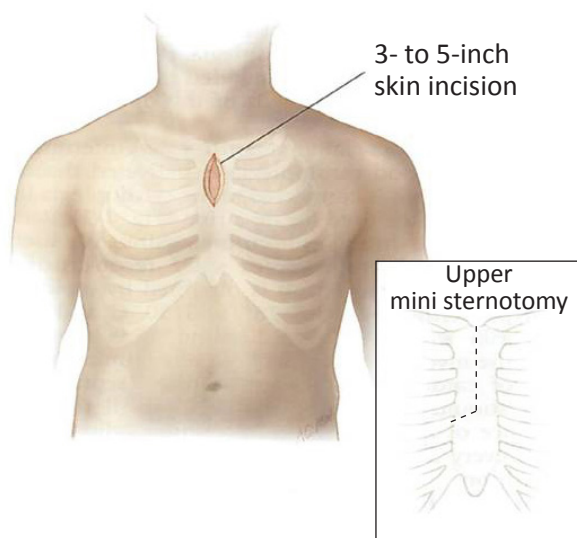


Figure 5. Mini-sternotomy



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Risks

Every surgery has some risk of complications. The amount of risk depends on factors such as your age and health.

Risks may include:

- Bleeding
- Infection
- Atrial fibrillation (AFib)
- Heart rhythm problems
- Lung or heart problems
- Stroke or kidney failure (this is rare)

Your surgeon will discuss your specific risks with you.

Hotel information for patients and families

We are committed to providing the best possible experience for our patients and their families. We understand that patients from out of town and visiting family members at the hospital may need to stay nearby overnight.

Some nearby hotels offer a “Northwestern” discounted rate for lodging. Go to **[nm.org/locations/northwestern-memorial-hospital](https://www.nm.org/locations/northwestern-memorial-hospital)** for the hotel guide.

Guide to the downtown medical campus



Guide to the Downtown Medical Campus



Northwestern Memorial Hospital Feinberg and Galter Pavilions

- 1 Main drive-through entrance
251 East Huron Street
 - 2 Emergency Department
250 East Erie Street
- #### Galter Pavilion
- 3 Stone Institute of Psychiatry
201 East Huron Street
 - 4 Physician offices
201 East Huron Street
 - 5 Robert H. Lurie Comprehensive Cancer
Center of Northwestern University
675 North Saint Clair Street
Same Day Surgery
675 North Saint Clair Street
Fifth Floor

Prentice Women's Hospital

- 6 Main drive-through entrance
250 East Superior Street
 - 7 Entrance
250 East Superior Street
- Robert H. Lurie
Comprehensive Cancer Center
of Northwestern University
250 East Superior Street
- 8 Entrance
Corner of Chicago Avenue
and Fairbanks Court

Other Locations

- 9 Lavin Pavilion
259 East Erie Street
Entrance and parking
Preoperative Clinic
17th Floor

- 10 Olson Pavilion
Ambulatory Surgery Center
710 North Fairbanks Court
Sixth Floor
- 11 Northwestern Memorial
HealthCare Human Resources
541 North Fairbanks Court
17th Floor
- 12 Stone Institute of Psychiatry
Administrative offices
and outpatient services
Oterrie Center
446 East Ontario Street
- 13 Physician offices
211 East Chicago Avenue
- 14 Immediate Care Center
635 North Fairbanks Court

- 15 Physician offices
737 North Michigan Avenue
(Entrance on Chicago Avenue)
- 16 Physician offices
150 East Huron Street
- 17 Physician offices
645 North Michigan Avenue
- 18 Arkes Pavilion
Physician offices
676 North Saint Clair Street
- 19 Northwestern Memorial
Imaging Center
676 North Saint Clair Street
- 20 Physician offices
680 North Lake Shore Drive

Need a physician? Call physician referral at 312.926.8400.
For more information on Northwestern Medicine, visit nm.org.

Before your surgery

If you develop a cold or flu before surgery, please call the nurse practitioner (NP) the day before your scheduled surgery. We may need to postpone your surgery until you are well.

Packing for your hospital stay

We recommend you do not bring valuables, such as money or jewelry, to the hospital. Please bring these items with you:

- A list of your allergies
- A list of all your current medications (prescription, over-the-counter, and herbal)
- Photo ID
- Medical insurance information and card
- Medicare card if you have Medicare
- Containers for your eyeglasses, contacts and dentures (if applicable) that are labeled with your name
- Toiletries (you will get basic self-care supplies in the hospital)

We will call you the day before surgery to confirm what time you should arrive at the hospital.

Antibacterial shower

Chlorhexidine gluconate (Hibiclens®) is an antibacterial soap that helps reduce the number of germs on your skin. Starting 3 days before surgery, shower every day with Hibiclens. Shower with Hibiclens the night before and the morning of your surgery.

How to wash with Hibiclens:

1. Thoroughly wet your body and hair.
2. Wash your hair with shampoo and rinse it off.
3. Wash your face and body well with regular soap and rinse it off.
4. Turn off the water. Do not use a washcloth. Use your hands to apply Hibiclens to all skin surfaces (except your genitals) from your jaw line to your feet. All your skin in the front and back should have a heavy coat of Hibiclens on it.
5. Keep the Hibiclens on your body for 2 minutes, then rinse it off.
6. Dry off with a clean towel.
7. Do not put any body lotion on your clean skin.
8. Put on clean clothes.

If you have a beard or mustache, you may want to shave it off. This may make care easier in the weeks after surgery. It also will reduce discomfort when the care team removes the breathing tube after surgery.

Nail polish and makeup

Patients should remove any nail polish and makeup before surgery. During surgery, your care team will check your circulation by looking at your skin and nails.

Diet

Do not eat or drink anything after midnight the night before surgery or the morning of your surgery. This includes gum and hard candy.

Medications

On the morning of surgery, take only the medications that you were instructed to take with a small sip of water. If you have diabetes, follow your nurse practitioner's guidelines for taking medications.

Arriving at the hospital

The surgery nurse practitioner will call you 1 or 2 days before your procedure with a surgery time. Please arrive at the time you were instructed to come. Park in Parking Garage A at 222 East Huron Street. **To receive discounted parking, bring your ticket in with you.**

Come to the reception desk in the main lobby of Galter Pavilion at 201 East Huron Street, which is across the street from Parking Garage A. This is where your family can check in, get visitor passes and validate discount parking. Then, go to the 5th floor registration desk in the Same-Day Surgery Unit.

When you first arrive at the registration desk, the staff will check your information and update it as needed. They will direct you to the waiting area until the nurse calls you. When you are called, you will go to the 7th floor pre-operative (pre-op) room.

In the pre-op room, you will change into a hospital gown and cap. A nurse will review your medical history and check your temperature, blood pressure and pulse. They will put an intravenous (IV) line into a vein in your arm or hand.

Your anesthesiologist will talk with you before surgery. Tell the anesthesiologist if you have any crowns, bridges or loose teeth so they can take extra care during surgery. A surgical resident or fellow may also see you.

During this time, your family can relax in the 7th floor waiting area. Once the nurse has prepared you for surgery, you may have 1 adult visitor at a time. If your surgery is delayed for any reason, your nurse will give you updates.

When the operating room is ready, the team will take you in to surgery. At that time, the staff will direct your family to the waiting room on the 7th floor. Family members should check in with the volunteer, who will give them updates on your progress during surgery.

During surgery

In the operating room, the care team will give you medication to help you relax and feel drowsy. They will connect you to a heart monitor, and you will breathe oxygen through a face mask. They may put a special catheter, known as an arterial line, in your arm to watch your blood pressure at all times.

Next, the anesthesiologist will give you general anesthesia until you are completely asleep. You will have a breathing tube to help you breath during surgery. It may cause a slightly sore throat afterward. For heart valve surgery, the care team will put a TEE probe in your esophagus. The probe lets the surgeon look at your valves before and after the surgery.

After surgery

You will go directly to the Intensive Care Unit (ICU). Your surgeon will speak to your family to answer any questions they may have. When you arrive in the ICU, you will still be asleep. The ICU staff will need some time, usually 45 to 60 minutes, to settle you into the room. Once you are settled into your ICU room, the ICU nurses will let your family know they can come and see you.

The ICU nurse will work with your family to determine the best time for visitors. This is to ensure you get the rest you need for recovery.

You will likely be asleep for 4 to 6 hours after surgery. As you wake up, you will be very groggy. You may have soft restraints on your wrists. These will gently remind you not to pull out any tubes and drains. It is normal to try to remove these unfamiliar objects while you are groggy. We will remove the restraints as soon as you are awake and aware of your surroundings. As you wake up, your care team will assess your condition, pain level and readiness to determine if they can remove the breathing tube.

You will have many tubes and wires attached to your body.

- A **breathing tube** in your throat will help you breathe. While the tube is in place, you will not be able to speak. Do not try to speak. You will be asked “yes” and “no” questions so you can communicate with the nurse. The care team will take the tube out as soon as you are awake and able to breathe on your own.
- **Chest tubes** will collect fluid that may build up around your heart and lungs. The care team will take some of these tubes out the day after surgery. Some chest tubes may stay in longer, depending on the amount of drainage.
- A **monitor** will record your heart rate, rhythm and blood pressure.
- A **Swan-Ganz catheter** is a special IV line that the care team usually puts in your neck in the operating room. It measures the pressure in your heart and lungs. Your care team will give you IV fluids and medications based on these measurements and adjust them as needed.
- You will be wearing a **temporary pacemaker**. This will help your heart if the rate is too slow. The care team will remove the pacemaker before you go home.
- The care team will put **IV lines** in your neck, hands or arms to give other fluids and medications. They will gradually remove these during your hospital stay. They will take out the last IV before you go home.
- A **pulse oximeter** checks the oxygen level in your blood. It is connected to a small clip that fits on your finger.

- A **catheter**, or tube, will drain urine from your bladder. The nurses will check your urine output often. This catheter is usually removed within the first 24 to 48 hours after surgery.
- **Elastic stockings** and **compression boots** gently squeeze your calves to help blood flow. This also helps prevent blood clots from forming in your legs.

Once the care team removes your breathing tube, your nurse will have you start deep breathing and coughing exercises. To be sure you are taking deep breaths, you will use a device called an incentive spirometer. You should take 10 deep breaths with the spirometer every hour you are awake. Your nurse will show you how to do this and how to support your incision with a pillow when coughing. This, along with turning in bed every few hours, helps prevent the mucus and fluid build-up in your lungs that might lead to pneumonia.

Your care team

Your surgeon uses a team of professionals to care for you after surgery. Members of this team may include:

- **Registered nurses (RNs):** Nurses who monitor your condition, give pain medication and as other necessary medications. They also do other activities to help you recover.
- **Cardiac surgery fellows:** Physicians in specialty training who help the attending physician and work with specialists on your care team.
- **Critical care specialists:** Physicians who help during your ICU stay.
- **Cardiologists:** Physicians who manage medication changes during the hospital stay.
- **Physician assistants (PAs):** Licensed healthcare professionals who help the surgeons during the surgery and with management right before and after your surgery.
- **Advanced practice nurses (APNs):** Nurses with advanced degrees who help with daily assessments and coordination of care among the post-op team.
- **Physical therapists (PTs):** Licensed healthcare professionals who assess physical movement and ability to return to activity. Physical therapists also instruct patients on how to avoid stress on incisions and how to start exercise safely.
- **Occupational therapists (OTs):** Licensed healthcare professionals who teach you how to safely perform daily at-home activities while you have lifting and other restrictions after your surgery.
- **Discharge planners and social workers:** Clinicians who help with any arrangements for home health, rehabilitation and skilled care that you may need after discharge. They start to follow your progress in the ICU.

Your care team may ask other specialists to see you, as needed. Your surgeon is in frequent contact with this team and directs your care.

Pain management

It is important that you take your pain medication as needed. Good pain relief can help you become more active and speed your recovery. Let your nurses and physicians know how your pain medication is working.

Rate your pain on a scale of 0 to 10, with 0 meaning no pain and 10 being the worst. It is best to take pain medication before pain becomes severe; otherwise it is more difficult to manage. Many patients find it helpful to take pain medication before walking or other activities. At first, the care team will give you IV pain medication. Later on, you will take the pain medication by mouth.

Diet

Nausea is common after surgery, so the care team will remove your diet restrictions slowly. You can have medication to treat nausea if needed.

It is important to drink fluids after surgery. After the care team takes out your breathing tube, you will be able to take ice chips. Slowly, you will progress to a liquid diet. When you are able to tolerate solids, you will resume a regular diet. Most patients will be on a heart-healthy (low-fat, low-sodium) diet after surgery.

Activity

On the day after surgery, your activity will increase. Your nurse or therapist will help you sit at the side of the bed and then, in the chair. When you are getting out of bed, do not use your chest muscles or arms to pull yourself up. Cross your arms over your chest, sit up and swing your legs over the side of the bed. This will help your breastbone heal if you have had a chest incision.

If you can, your nurse will help you walk in your room and later, in the hall. It is normal to feel weak and unsteady at first. Always ask your nurse for help when getting out of bed.

Most patients stay in the ICU for 1 to 2 days. Sometimes your condition may require a longer stay.

Visitors

Visitors are allowed 12 hours per day. We ask that only 2 visitors are in the room at any time. Visitors are not allowed to sleep in patient rooms. Visitors who are sick or have been recently exposed to an infection will not be allowed to see you. Children under the age of 18 may not visit. Everyone entering your room and leaving your room must wash their hands. Please go to [nm.org/conditions-and-care-areas/covid-19-resourcecenter/visitor-policy-updates](https://www.nm.org/conditions-and-care-areas/covid-19-resourcecenter/visitor-policy-updates) for the latest visitor policy.

Step-Down Unit

As you progress, you will be transferred to the Step-Down Unit, where you will get care until you go home. We will monitor your heart rhythm while you are in the hospital. You also will play a more active role in your care.

The nurse will help you bathe. You will learn how to wash around your incision. Do not apply any lotions or creams to your incision. Once the care team takes out all your tubes and drains, you may shower with help. Your chest incision may appear bruised and may be discolored from the soap used to wash your skin before surgery.

The care team will encourage you to slowly increase your activity each day. You may start walking in the halls 3 to 4 times each day and sitting in a chair for all your meals.

Increase the time and distance each time you walk. This light exercise will help you become stronger as you prepare to go home. A physical or occupational therapist will teach you about activity and exercise.

As you recover, keep using your incentive spirometer. Cough and breathe deeply 10 times every hour while you are awake.

A dietitian may visit to explain any specific diet guidelines. These may include following a low-sodium diet to prevent fluid buildup, limiting the fluids you drink and following a low-fat, low-cholesterol diet.

The mind-body connection

Emotions and behaviors can play an important role in your recovery. The cardiac behavioral medicine team can help you and your family manage the emotional, behavioral and social parts of your heart health, surgery and recovery.

One of our cardiac behavioral medicine specialists may visit you in the hospital to offer relaxation techniques or other tips to help you. They are also available on an outpatient basis to help you prepare for surgery, adjust after surgery or make any necessary lifestyle changes. A relaxation CD is available to help you learn relaxation techniques.

You can also listen to relaxation audio recordings online (in English) and download them to a device. The link is [nm.org/cvrelaxation](https://www.nm.org/cvrelaxation). Enter the password: **heart**.

Cardiovascular surgery can trigger many emotions. Do not be surprised if you or your loved ones feel sad, excited, scared, frustrated or worried at times. For most patients, these emotional changes resolve quickly. However, some patients can develop clinical depression or clinical anxiety, which can interfere with your surgery and recovery.

Monitor your mood and report any lasting changes in your mood that last for more than 3 to 4 days to your care team. Possible symptoms of clinical depression or anxiety can include:

- Sadness or feeling down
- Less interest in activities that you used to enjoy
- Decreased motivation or energy
- Disrupted sleep or appetite
- Feelings of guilt, worthlessness or hopelessness
- Thoughts of wanting to die
- Feelings of panic or intense fear
- Nightmares or recurrent thoughts of your surgery

The cardiovascular team will work with you to make your surgery and recovery as smooth as possible. To make you comfortable while in the hospital, bring some items from home such as photographs, favorite music, or puzzles and games that can distract you when you are uncomfortable or unable to sleep. You may also use your cell phone.

After you return home, you may feel emotionally exhausted. If you become frustrated with your recovery, focus on your overall progress since surgery. Celebrate each milestone in your surgery and recovery. Communicate your needs clearly with friends and family so they are aware of your limits and desires.

For more information about your recovery after you leave the hospital, please refer to the discharge instructions that your care team will give you.

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