Bluhm Cardiovascular Institute
Surgical Instructions
Maze Procedure
To our patients:

The Bluhm Cardiovascular Institute of Northwestern Memorial Hospital is a world-class heart and vascular program that offers comprehensive state-of-the-art surgical treatments in all areas of cardiovascular care. Our Center for Atrial Fibrillation offers a multidisciplinary approach to the diagnosis and treatment of patients with atrial fibrillation. Internationally recognized specialists in cardiology, cardiac surgery and electrophysiology work together to develop the best treatment plan for each patient. Our patients benefit from the most advanced medical and surgical techniques based on the latest research findings.

This booklet has been developed to answer your basic questions and provide information about atrial fibrillation including symptoms, causes, diagnostic tests and treatments. It describes the Maze procedures, how they are performed and how to prepare for surgery.

At the Bluhm Cardiovascular Institute, we are dedicated to ensuring that you and your family have the best possible experience and that you thoroughly understand your care plan. Please contact your physician or nurse practitioner if you have additional questions or concerns.

Sincerely,

Bluhm Cardiovascular Institute Team
What You Need to Know About the Maze Procedure

This booklet will help answer any questions you may have about your upcoming surgery by guiding you through the Maze procedure—a specialized type of heart surgery used to treat atrial fibrillation. It also will explain atrial fibrillation and describe the types of Maze procedures. Finally, this information will serve as your guide in preparing for surgery and understanding what to expect after surgery.

To better understand the Maze procedure, it is helpful to know how the heart works.

The Heart

The heart is a muscular pump that delivers blood to the lungs and to all body tissues. It has four chambers—the two upper chambers (the right and the left atrium) and the two lower chambers (the right and the left ventricle). The right atrium receives blood from the body, pumping it to the right ventricle. The right ventricle then pumps the blood to the lungs, where it receives oxygen. The left atrium receives the oxygen-rich blood from the lungs sending it to the left ventricle, where the blood is then returned to the body.

The heart needs a “spark plug” or electrical impulse to pump. This electrical signal is sent to the heart from the sinoatrial node in the right atrium. The signal then travels through the upper chambers (atria) to the lower chambers (ventricles), creating an electrical circuit.
that makes the heart contract and pump blood to all parts of the body. This circuit is the most efficient heart rhythm (see Figure 1).

**Understanding Atrial Fibrillation (AF)**

Atrial fibrillation (AF) is a fast heart rhythm that begins in the upper chambers of the heart. The result of atrial fibrillation is decreased output of blood from the heart to the body. (see Figure 2).

When the heart does not pump well, blood clots may form inside the heart, most often in the left atrial appendage which is a small pocket of tissue. If the blood clot breaks free it can travel to the brain and cause a stroke.

- Atrial fibrillation is common and causes:
- An increased risk of stroke and heart failure
- A need to take blood thinning medication such as warfarin (Coumadin®)
- Rapid and irregular impulses in the atrium (over 300 per minute)
- An irregular heartbeat
Symptoms of Atrial Fibrillation

- Feeling dizzy or faint
- Shortness of breath
- Tiring easily with activity
- Anxiety
- Palpitations (racing heart)
- Swelling in the ankles and feet
- Sometimes there are no symptoms at all

Causes of Atrial Fibrillation

- Hypertension (high blood pressure)
- Heart problems such as valve disease or coronary artery disease
- Lung disease
- Family history of atrial fibrillation
- Other diseases such as thyroid problems
- Alcohol, tobacco and caffeine intake
- Slow heartbeat due to sinoatrial node problems

Tests

Prior to surgery, your physician will perform a physical exam and will review your symptoms and health history. Based on the exam, other tests may be done and often include the following:

- **Electrocardiogram**, which records your heart’s electrical activity. It detects abnormal changes in heart rate and rhythm.

- **Holter monitor**, which records your heart rate and rhythm over time (24 to 48 hours). You will be asked to keep a diary of your activities and how you are feeling.

- **Echocardiogram**, which uses high-frequency sound waves (ultrasound) to look at how the various parts of the heart work. The resulting images show the size, shape and movement of the chambers of the heart and valves.

Tests may be done to look at the blood flow to the heart and brain. Your physician or nurse can provide more details about these tests.
Treatment

Maze Procedure Overview

Atrial fibrillation often is treated with medication or therapeutic procedures. If these options do not work well, your physician may suggest surgery.

In many cases, the Maze procedure is an option for patients with atrial fibrillation who have failed or declined medical therapy, have severe symptoms of atrial fibrillation or need other heart surgery. The Maze procedure is an effective surgical treatment that creates electrical blocks or barriers in the upper heart chambers (atria), forcing electrical impulses that stimulate the heartbeat to travel to the lower chambers (ventricles). Like a maze puzzle, abnormal electrical signals are forced to move along one path, in one direction, to the lower chambers, restoring the heart rhythm and the pumping of blood to normal.

The original Maze procedure, first performed in 1987, created “blocks” through carefully placed incisions that were then sewn back together. The incisions generated scar tissue that served as the barrier.

Since that time the Maze procedure has evolved. Physicians are continually discovering new sources of energy to create these lines of scar in the heart. These new tools shorten the procedure time, making it easier to perform this surgery with other heart operations. In some cases, the scar lines may be placed without using a heart-lung machine.

Depending on the type of atrial fibrillation surgery your surgeon performs, you will receive either an incision down the middle of the chest (sternotomy), or small incisions on the sides of the chest (thoracotomy). Your physician will discuss the Maze procedure that best matches your particular surgical needs.

Risks

Every surgery carries some risk. The amount depends on such factors as your age and overall health. In some cases, a pacemaker or other procedures may be needed. Your surgeon will discuss individual risks with you.
Before Surgery

Exams

You should be in the best possible health at the time of surgery. Your physician may recommend certain tests to rule out specific health problems prior to surgery. Pre-surgery appointments may include visits with a cardiologist, cardiac surgeon, nurse practitioner, behavioral medicine specialist and preoperative assessment service.

- The *behavioral medicine specialist* will identify your risk factors for coronary artery disease, explain ways to reduce your risk factors and provide assistance with stress management, smoking cessation and preparation for upcoming surgery.

- The *nurse practitioner* will review important activities before and after surgery, details about medicines that may need to be discontinued before surgery and your arrival time on the day of surgery.

These visits will include a thorough review of your health history and a physical exam. Staff will assist you in scheduling the necessary appointments and tests.

For each appointment, please bring:

- A list of your current medications and allergies
- Questions for the physician and nurse practitioner
- Your medical insurance card

Medications

Certain medicines can increase your risk for bleeding during and after surgery. Talk with your surgeon if you are taking any blood-thinning medicines such as warfarin (Coumadin®),
heparin, Lovenox® or Plavix®. You also must stop taking nonsteroidal anti-inflammatory drugs such as Advil® or Motrin® prior to surgery.

Please contact your physician to confirm when to stop taking these medicines. This could be as little as two days or as long as 14 days before surgery. You may stop taking any aspirin or aspirin-containing products one week before surgery and any herbal medicines two weeks prior to surgery.

If you are diabetic, ask your physician about taking your insulin on the day of surgery. Do not take any new medication without informing the prescribing physician about your impending surgery.

**Autologous Blood Donation**

Your physician may talk with you about the need for a blood transfusion during surgery. In some cases, you may donate your own blood prior to surgery (autologous donation). For more information about this process, please ask your nurse practitioner.

**The Day Before Surgery**

If you develop a cold or flu prior to surgery, please call the nurse practitioner. Surgery may be postponed until you are well.

**Antibacterial Shower**

On the evening before or the morning of surgery, you will be asked to shower with a special soap (such as Dial®) to reduce the amount of germs on your skin. Also, be sure to wash your hair. Patients with beards should consider shaving. This may ease care in the weeks after surgery. It also will reduce discomfort when the breathing tube is removed after surgery.

**Nail Polish and Makeup**

Patients should remove any nail polish and makeup before surgery. During surgery your circulation is checked by looking at your skin and nail beds.
Diet

Eat a bland meal for dinner the night before your surgery. Do not eat or drink anything after midnight the night before surgery or the morning of your surgery. This includes gum and hard candy.

Preparing for Your Hospital Stay

Leave your valuables such as money and jewelry at home. Please bring these items with you:

- Photo ID
- Your medical insurance card
- Your Medicare card if applicable
- A list of allergies
- A list of current medicines including vitamins and herbal supplements
- Containers for eyeglasses, contact lenses and dentures
- Toiletries

Day of Surgery

At Home

- Do not swallow water when brushing your teeth.
- Unless instructed otherwise, take your regular medicine on the morning of surgery with a small sip of water.
- If you are diabetic, follow your physician’s guidelines.

At the Hospital

Please arrive two hours before the time of surgery (unless told otherwise) at Northwestern Memorial Hospital’s Galter Pavilion, 201 E. Huron St. Parking is available at the garage allocated across from the hospital facility at 222 E. Huron St. Please bring your ticket with you for parking validation.
Stop at the reception desk in the main lobby of the Galter Pavilion, where your family can check in and obtain visitor passes. Then go to the fifth floor registration desk in the Same Day Surgery Unit.

When you first arrive at the registration desk, your information will be checked and updated as needed. You will be directed to the waiting area until called by the nurse. From the fifth floor, you will go to the seventh floor preoperative (pre-op) room.

Once in the pre-op room, a nurse will review your medical history and take your temperature, blood pressure and pulse. An intravenous line will be inserted into the vein in your arm or hand.

Your anesthesiologist will talk with you prior to surgery. Be sure to tell the anesthesiologist about your crowns, bridges or loose teeth so extra care can be taken. You also may be visited by a surgical resident or fellow.

During this time your family can relax in the waiting area on the seventh floor. They will be able to visit once the nurse has you prepared for surgery. You may have two adult visitors at one time.

The wait time before surgery is about two hours. If your wait is extended, your nurse will provide updates.

When you are in the operating room, your family will be shown to the waiting room on the seventh floor. Family members should check in with the volunteer, who will provide you with updates on your progress during surgery.

**During Surgery**

In the operating room, you will be given medication to help you relax and feel drowsy. You will be connected to a heart monitor and you will breathe oxygen through a face mask. A special catheter, called an arterial line, may be placed in your arm to monitor your blood pressure at all times.

Next, you will be given general anesthesia, including intravenous medicine and anesthetic gases mixed with oxygen and delivered though the face mask. A transesophageal echocardiogram (TEE) probe will
be placed in your throat. The probe allows the surgeon to look at your valves before and after the surgery. A breathing tube will assist you during surgery and may cause a slight sore throat afterward.

During surgery, you will be placed on a heart-lung machine, which takes over the work of your heart and lungs. This machine provides oxygen-rich blood to all parts of the body. Once your surgery is complete, you will be taken off the heart-lung machine.

After Surgery

You will go directly to the Intensive Care Unit (ICU). Patients who have a simplified Maze procedure and do not require the heart-lung machine may recover in the post-anesthesia recovery unit. Your surgeon will speak to your family to answer any questions they may have.

After surgery you will have many tubes and wires attached to your body that will:

- Help you breathe
- Empty your stomach
- Remove blood or fluid that may build up near your incision
- Provide fluid and medicines
- Measure blood pressure and oxygen levels
- Monitor your heart rate
- Drain urine

As you recover, each of these tubes will be removed. You can expect to be in the ICU for one day. Then you will go to the Step-down Unit, where you will receive care until you go home. Your heart rate and rhythm will be monitored while in the hospital. It is common to still have atrial fibrillation in the first few months after Maze surgery. If needed, atrial fibrillation may be treated further with
cardioversion before you go home. This nonsurgical procedure uses small amounts of electrical current, given through paddles or patches placed on the chest, to restore your heart to a normal rhythm. If you have a slow heart rate, a pacemaker may be needed. Your physician or nurse will provide more information about these procedures.

You will have an echocardiogram, which uses high-frequency sound waves (ultrasound), before you go home to check the size of your atria. Most patients go home in five days. If you have had simplified Maze surgery, you may be ready for discharge within two to three days.

Please refer to the booklet, *After Heart Surgery What to Expect* for more detailed information about your hospital stay, home care guidelines and long-term follow-up care. Ask your nurse practitioner for a copy if you do not have one. Most patients recover from heart surgery six to eight weeks.

**Medications**

The Maze procedure causes swelling in the heart that will go away as your body recovers. Until then it is important to take certain medications such as antiarrhythmics to treat atrial fibrillation, diuretics to reduce extra fluid and warfarin (Coumadin®) to prevent blood clots.

Once you remain in normal sinus rhythm for a period of time, these medications may be stopped. Always follow your physician’s guidelines regarding these medications.

If you are taking blood thinners such warfarin (Coumadin®), you will require weekly blood work after you go home until you are on a stable dose. Please refer to the warfarin booklet, which provides information about foods to avoid, medicine that cannot be taken and when to call your physician.

**Follow-up Exams**

You should visit your cardiologist within four weeks of going home and have your heart rate and rhythm checked at this time. Patients with implanted pacemakers or defibrillators should have their devices set to detect atrial fibrillation episodes. If atrial fibrillation is found,
your physician should attempt to restore sinus rhythm within six to eight weeks after surgery.

Your heart rate and rhythm should be checked by a continuous heart monitoring device at three months. The atrial fibrillation nurse coordinator will provide you with additional details. Patients with pacemakers or defibrillators should have their device checked. If no atrial fibrillation or flutter is detected, antiarrhythmic medication may be discontinued by your cardiologist.

Six months after going home, the monitoring described above should be repeated. If continued sinus rhythm is documented, your cardiologist may discontinue anticoagulation. You should then have a 48-hour Holter monitor test each year to record your heart rhythm. For this test, you will carry a small recording monitor attached to electrodes that have been placed on your chest. The monitor will provide a continuous recording of your heart rhythm during normal activities.

If you feel you have signs of atrial fibrillation after surgery, call your physician immediately.
At Northwestern Memorial Hospital, a comprehensive range of inpatient and outpatient services are provided in a healing environment where patients and their caregivers are supported by advanced technology and an organizational commitment to quality and patient satisfaction. We are a major referral center for the Midwest and beyond with a longstanding tradition of providing patient-focused care.

As one of the country’s premier academic medical centers, Northwestern Memorial serves as the primary teaching hospital for Northwestern University’s Feinberg School of Medicine. We are committed to the advancement of healthcare through clinical innovation, medical education and scientific research. The medical staff represents virtually every specialty and is comprised of more than 1,460 affiliated physicians who also serve as faculty members of the Feinberg School. At Northwestern Memorial, physicians and nurses are supported by the efforts of more than 6,000 employees and hospital volunteers who work to advance our mission of Patients First.

Northwestern Memorial’s heart and heart surgery specialties are ranked among the nation’s best by *U.S. News & World Report* magazine.
For More Information

Please contact us with any questions, for consultations or to request additional materials:

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312-695-2885

At night or on weekends, call 312-695-4965 and ask for the Cardiothoracic Surgery fellow to be paged.

To learn more about the Bluhm Cardiovascular Institute, please visit www.heart.nmh.org.

If you would like additional information about Northwestern Memorial, please visit www.nmh.org.