In 2010, U.S. News & World Report ranked our Heart and Heart Surgery program 14th in the nation.
To our Colleagues and Patients:

As the Bluhm Cardiovascular Institute of Northwestern celebrates its fifth anniversary, we reflect on our original goal to build a nationally recognized program that is a destination for those requiring highly specialized cardiovascular care. Now, five years later, through hard work, dedication and attention to detail, we remain ever vigilant of maintaining this achievement.

We are once again proud to share our Clinical Activities and Outcomes Report, which highlights many aspects of our performance for 2009. We hope that it will serve as a valuable resource.

At the Bluhm Cardiovascular Institute, we evaluate our clinical outcomes so that we can fully understand how our treatments and procedures benefit our patients. We offer the latest advances in cardiovascular care including innovative treatment, promising research and multidisciplinary support. We regularly review and evaluate our clinical outcomes and, based on the results, develop methods to monitor and improve the healthcare we offer to our heart and vascular patients.

Our clinical excellence, comprehensive programs and superior clinical outcomes have again been recognized at the national level. In 2010, *U.S. News & World Report* ranked our Heart and Heart Surgery program 14th in the nation.

Throughout this report, we share stories from many of the patients who have been referred to us for specialized care and treatment. Close cooperation with referring physicians is a critical component of the high-quality care we provide and we strive to constantly ensure that patients, especially those at high risk, can benefit from a highly coordinated approach.

We are committed to open communication with referring physicians and progressive clinical care. We work to investigate new technologies, medications, techniques and devices while offering our patients the most advanced treatment available in a healing environment that is designed to respond to the patient’s needs.

Our hope is that physicians and patients alike will find this report educational, informative and useful when planning cardiovascular care. Please know that when you need advanced treatment, the nationally recognized experts at the Bluhm Cardiovascular Institute are available to evaluate and respond to your medical needs.

Patrick M. McCarthy, MD

*Chief*
Division of Cardiac Surgery
Northwestern Memorial Hospital

*Director*
Bluhm Cardiovascular Institute

*Heller-Sacks Professor of Surgery*
Northwestern University
Feinberg School of Medicine
At a Glance

WORLD-RENOUNDED CARDIOVASCULAR CARE
IN THE HEART OF CHICAGO

• In 2010, *U.S. News & World Report* ranked our Heart and Heart Surgery program 14th in the nation.

• Our outcomes for heart failure and heart attack patients consistently rank better than the U.S. national rate for 30-day hospital mortality.

• We are among the leaders in transcatheter heart valve intervention and have received the highest rankings from the industry’s most stringent outcome monitors for valve replacement surgery.

• We are one of only four hospitals in Illinois offering a Medicare Destination Therapy Ventricular Assist Device Program certified by The Joint Commission.

• Our Medicare-approved Heart Transplant program, a Blue Distinction® Center for Transplants and an OptumHealthsm Transplant Center of Excellence, ranks among the best in the country for one-year patient survival at 96 percent.

• The Division of Vascular Surgery at Northwestern Memorial received a Ruth L. Kirschstein National Research Service Award Institutional Training Grant (T32) to fund its “Vascular Surgery Scientist Training Program.”

• We will be expanding our outpatient and inpatient services regionally by providing a staffed cardiovascular clinic at Northwestern Lake Forest Hospital, our affiliated hospital in north suburban Lake County, Illinois.

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A diagnosis of aortic stenosis led Eric Gonsalves to the Internet, helping guide his decision to come to Northwestern Memorial for his aortic valve replacement surgery.

POWER OF THE INTERNET

A heart murmur was the first indication that something might be wrong with Eric Gonsalves’ heart valve. His physician heard the murmur during an exam and recommended some tests to find out if he had aortic stenosis. “I didn’t think I was experiencing any symptoms,” says Mr. Gonsalves. “I did get tired when I was climbing hills during a vacation to Spain and Portugal. I thought it was just old age.”

Aortic stenosis is a condition in which the leaflets (or cusps) of the valve become restricted in their motion, often due to calcium buildup narrowing the opening through the valve. As a result, the heart is forced to work harder and less efficiently in order to maintain an adequate amount of blood flow through the body. When severe, this added workload on the heart can result in heart failure.

After undergoing an echocardiogram and an angiogram, Mr. Gonsalves was told he had aortic stenosis and needed surgery. “My physician said I would need my aortic valve replaced,” he recalls. Both family and friends recommended Northwestern Memorial and Patrick M. McCarthy, MD, chief of Cardiac Surgery at Northwestern Memorial, director of the Bluhm Cardiovascular Institute and the Heller-Sacks Professor of Surgery at Feinberg. Taking matters into his own hands, Mr. Gonsalves turned to the Internet to help guide his decision. Once on the Bluhm Cardiovascular Institute’s Web site, Mr. Gonsalves reviewed physician information and was able to learn about mortality statistics for aortic valve surgery at Northwestern Memorial.

Then, after reading about one of Dr. McCarthy’s patients with positive outcomes after undergoing an aortic valve surgery, he made his decision. “I wanted Dr. McCarthy to do my surgery because, in my opinion, he is the best.”

Mr. Gonsalves made an appointment at the Bluhm Cardiovascular Institute, and upon evaluation, Dr. McCarthy discovered that his aortic stenosis had reduced blood flow through his aortic valve to only 25 percent of normal. Dr. McCarthy performed a minimally invasive aortic valve replacement in May of 2009.

“During the surgery, Dr. McCarthy kept my wife and daughter updated through phone calls each time a major step was taken,” says Mr. Gonsalves. “That was wonderful because it gave my wife assurance that everything was going well. All the physicians and nurses at Northwestern Memorial were great, including my cardiologist, Dr. Kansal.” Preeti Kansal, MD, is a cardiologist on the medical staff at Northwestern Memorial and assistant professor of Medicine at Feinberg.

Today Mr. Gonsalves is back to his busy career as a senior banking consultant and gardens in his spare time. “My parents both lived past 80,” he says. “I’m 62 and still going strong.”

If you would like more information about the Bluhm Cardiovascular Institute, visit heart.nmh.org.
DISTRIBUTION OF CARDIAC SURGERY PROCEDURES
CALENDAR YEAR 2009

The distribution of cardiac procedures highlights the complexity of services performed at the Bluhm Cardiovascular Institute. Overall, 63% of procedures were valve operations, either isolated or in combination with another procedure (e.g., coronary artery bypass graft (CABG) surgery, Maze).

HEART VALVE SELECTED INFORMATION
CALENDAR YEAR 2009

The Bluhm Cardiovascular Institute repairs mitral valves in 77% of all isolated mitral valve cases. The repair of the mitral valve, especially for mitral valve prolapse, is a complex procedure requiring advanced surgical skills. For patients with a preoperative diagnosis of mitral valve prolapse at the Bluhm Cardiovascular Institute the repair rate was 96%.

Bioprosthetic valves were used in 100% of isolated mitral valve replacements and in 99% of isolated aortic valve replacements. This is considerably higher than the national benchmarks.

IN-HOSPITAL MORTALITY FOR MITRAL VALVE PROCEDURES
CALENDAR YEARS 2005-2009

The Bluhm Cardiovascular Institute has demonstrated exceptional outcomes for isolated mitral valve repair and mitral valve replacement + CABG as witnessed by 0% in-hospital mortality rates in 2009. Cumulative five-year data shows in-hospital mortality for isolated mitral valve repair at 0.5%, for mitral valve repair + CABG at 2.2% and mitral valve replacement + CABG at 0%.

AORTIC VALVE REPLACEMENT IN-HOSPITAL MORTALITY
CALENDAR YEARS 2005-2009

The Bluhm Cardiovascular Institute has demonstrated excellent in-hospital mortality outcomes for isolated aortic valve replacement and aortic valve replacement + CABG procedures at 1% and 3.5%, respectively, over the last five years.

In 2006, 2007, 2008 and 2009 the Society of Thoracic Surgeons in-hospital mortality rates for isolated mitral valve repair were 1.7%, 1.6%, 1.5% and 1.1%, respectively; for mitral valve repair + CABG were 6.4%, 5.5%, 4.8% and 5.1%, respectively; and for mitral valve replacement + CABG were 9.5%, 10.0%, 9.1% and 9.3%, respectively.

In 2006, 2007, 2008 and 2009 the Society of Thoracic Surgeons in-hospital mortality rates for isolated aortic valve replacement were 2.7%, 2.5%, 2.7% and 2.5%, respectively, and for aortic valve replacement + CABG were 4.9%, 4.3%, 4.7% and 4.2%, respectively.
Coordination among nursing transplant teams helped ensure seamless care for Allus Brown during a heart and kidney transplant.

**NURSING EXCELLENCE SUPPORTS THE DELIVERY OF EXCEPTIONAL CARE**

Years ago, Allus Brown, a Marine Corps veteran and avid athlete, was diagnosed with dilated cardiomyopathy, a weakening of the heart that can potentially result in heart and kidney failure. As time passed, he experienced chest pain and shortness of breath. “I kept going to work until one day the chest pain got so bad that my supervisor sent me home,” says Mr. Brown, who is 54. Instead of going home he went to the Bluhm Cardiovascular Institute for treatment. “I knew it was time to look after my health.”

With dilated cardiomyopathy, the ventricles, or the bottom portion of the heart, become weak and enlarged, often for no obvious reason. The impaired ventricles are unable to pump enough blood to meet the body’s needs.

Mr. Brown was evaluated by a team led by Edwin C. McGee, Jr., MD, cardiac surgeon on the medical staff at Northwestern Memorial, surgical director of Heart Transplantation and Mechanical Assistance at the Bluhm Cardiovascular Institute and assistant professor of Surgery at Feinberg, and William G. Cotts, MD, cardiologist on the medical staff at Northwestern Memorial, medical director of Heart Transplantation and Mechanical Assistance at the Bluhm Cardiovascular Institute and associate professor of Medicine at Feinberg. His heart and kidney failure was confirmed through diagnosis and he was placed on the waiting list for a heart and kidney transplant.

To relieve Mr. Brown’s symptoms and to keep him alive until he received a new heart, Dr. McGee implanted a ventricular assist device (VAD), a mechanical device that takes over the pumping action of a diseased heart. “After I received the VAD I felt a lot better and was able to be active again,” recalls Mr. Brown. “I even danced at my daughter’s wedding and had a great time.”

Mr. Brown received his heart and kidney transplant in December of 2009 after extensive coordination by both the heart and kidney nurse transplant coordinator teams. Together, they reviewed the donor offer with the surgeons and patient, arranged for hospital admission and timing of the transplants and communicated with the multidisciplinary teams needed for the surgery. “The nurses were really pulling for me and working hard to take care of me,” says Mr. Brown. “I feel like we have all been through a lot together.”

Today, he looks forward to going back to work and joining the company basketball league after nearly seven years of being unable to play.
HEART TRANSPLANT AND VAD VOLUME
CALENDAR YEARS 2005–2009

The volume of the Heart Transplant program has grown by an average annual rate of 50% since inception. Likewise, the volume of the VAD program has grown by an average annual rate of 65%.

HEART TRANSPLANT AND VAD SURVIVAL

Our comprehensive program, including both heart transplant and VAD, has achieved outstanding outcomes. The Kaplan-Meier survival curves below illustrate excellent survival rates for our patients.

HEART TRANSPLANT SURVIVAL*

NORTHWESTERN MEMORIAL HOSPITAL (NMH)
INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION (ISHLT) ADULT HEART

LVAD AS BRIDGE TO TRANSPLANT SURVIVAL

Source: optn.transplant.hrsa.gov
Dates: January 1, 2008-December 31, 2009


*NMH survival curve includes three heart retransplants.
Infections and unsuccessful vascular procedures at other hospitals led James Danauskas to Northwestern Memorial’s Program for Limb Preservation where his peripheral artery disease was successfully treated.

PHYSICIAN EXPERTISE

James Danauskas underwent bypass surgery at another hospital on the popliteal arteries in both of his legs in the late 1990s. He was suffering from peripheral artery disease (PAD), a condition that occurs when fatty deposits build up in the inner linings of the artery walls in the legs or arms. This process causes narrowing or blockages that restrict blood circulation to the limbs. To restore normal blood flow, vascular surgeons perform surgical bypass, angioplasty and stenting.

Unfortunately, his original bypass surgery failed and over the next decade he underwent numerous additional surgeries, including a repeat bypass, removal of several aneurysms in his legs and multiple procedures to drain fluid from infections. “I was seeing a physician assistant for wound care because after all these surgeries I ended up with a non-healing infected wound in my right leg,” says Mr. Danauskas, who is 73. “One day my surgeon told me I needed more help than he could provide. He made me an appointment with Dr. Rodriguez and told me this was the surgeon who could help me.”

At the Bluhm Cardiovascular Institute, Mr. Danauskas was evaluated by Heron E. Rodriguez, MD, vascular surgeon on the medical staff at Northwestern Memorial, co-director of the Program for Limb Preservation and assistant professor of Surgery at Feinberg.

In March of 2010, Dr. Rodriguez performed surgery to remove dead and infected tissue in Mr. Danauskas’ right leg. He also removed an infected prosthetic bypass graft that was implanted in Mr. Danauskas’ leg during a previous surgery. Mr. Danauskas was up and walking around the day following surgery. “I’ve had no swelling and I’m off pain medication,” he says. “It’s amazing I can still walk and be active after all that I’ve been through. Dr. Rodriguez is a wonderful guy. Everyone involved in my care at Northwestern Memorial was excellent.”

“It’s amazing I can still walk and be active after all that I’ve been through.” James Danauskas
VASCULAR SURGERY MORTALITY
CALENDAR YEARS 2007–2009

The Bluhm Cardiovascular Institute demonstrates superior outcomes in comparison to national academic medical centers as witnessed by a notably lower 30-day mortality rate over the last three years.

LOWER EXTREMITY BYPASS MORTALITY
CALENDAR YEARS 2007–2009

The Bluhm Cardiovascular Institute has demonstrated exceptional outcomes for lower extremity bypass procedures as witnessed by a 0% 30-day mortality rate over the last three years.

OPEN AND ENDOVASCULAR ABDOMINAL AND THORACIC AORTIC ANEURYSM REPAIR 30-DAY MORTALITY
CALENDAR YEARS 2007–2009

Over the last three years, the Bluhm Cardiovascular Institute has achieved noteworthy 30-day mortality rates for abdominal and thoracic aortic aneurysm repairs.

Cases selected based on National Surgical Quality Improvement Program sampling methodology and include both elective and ruptured repairs.
**ENDOVASCULAR PROCEDURE VOLUME**  
**CALENDAR YEARS 2000–2009**

The Bluhm Cardiovascular Institute has shown a marked increase in endovascular procedures for both thoracic aortic aneurysm repairs and abdominal aortic aneurysm repairs over the last 10 years.

**SUPERFICIAL INCISIONAL SURGICAL SITE INFECTION**  
**CALENDAR YEARS 2007–2009**

The Bluhm Cardiovascular Institute has exhibited considerably lower superficial vascular surgical site infection rates when compared to national academic medical centers over the last three years.

**CAROTID ENDARTERECTOMY AND STENTING 30-DAY STROKE OUTCOMES**  
**CALENDAR YEARS 2007–2009**

The 30-day stroke outcomes for carotid endarterectomy and carotid artery stenting were notably lower than national comparisons. Carotid endarterectomy demonstrated exemplary stroke outcomes at 0% over the last three years.
CAROTID ENDARTERECTOMY AND STENTING 30-DAY MORTALITY
CALENDAR YEARS 2007–2009

The 30-day mortality outcomes for carotid endarterectomy and carotid artery stenting were exceptionally better than national comparisons. Carotid endarterectomy and carotid artery stenting demonstrated exemplary mortality outcomes at 0% over the last three years.

CAROTID ENDARTERECTOMY 30-DAY MORTALITY

Northwestern Memorial Hospital uses internal data compared to Society for Vascular Surgery (SVS) aggregate data. SVS benchmark is from all participants from 2002 through December 6, 2009 for carotid endarterectomy procedures.

CAROTID ARTERY STENTING

Northwestern Memorial Hospital uses internal data compared to Society for Vascular Surgery (SVS) aggregate data. SVS benchmark is from all participants from 2001 through December 6, 2009 for carotid artery stenting procedures.
A multidisciplinary team of medical and surgical experts provided treatment for Rita Sterling’s atrial fibrillation, eliminating her fears of suffering a stroke.

**MULTIDISCIPLINARY TEAM APPROACH**

Rita Sterling was an active 62-year-old when she had her first stroke. When she suffered a second stroke later that year, she was diagnosed with a patent foramen ovale (PFO) by Charles J. Davidson, MD, interventional cardiologist on the medical staff at Northwestern Memorial, medical director of the Bluhm Cardiovascular Institute and professor of Medicine at Feinberg.

A PFO is an incomplete closure of the wall between the two upper chambers of the heart, through which blood can flow in either direction. Dr. Davidson used a minimally invasive approach through the skin (percutaneously) to close Ms. Sterling’s PFO.

“After my third stroke I was diagnosed with atrial fibrillation,” says Ms. Sterling. “The diagnosis was a real surprise because I wasn’t experiencing any symptoms.” Atrial fibrillation is defined as chaotic or abnormal electrical signals or pathways in the atria or upper chambers of the heart, resulting in an irregular heartbeat that prevents the atria from contracting or squeezing normally. Instead, the atria quiver, decreasing the amount of blood ejected from the heart with each heartbeat. Individuals with atrial fibrillation are at increased risk for stroke, heart attack and heart failure.

Ms. Sterling was referred to the Bluhm Cardiovascular Institute’s Program for Atrial Fibrillation where her care was coordinated through a multidisciplinary team approach. She consulted with Jeffrey J. Goldberger, MD, cardiac electrophysiologist on the medical staff at Northwestern Memorial and professor of Medicine at Feinberg; Richard Lee, MD, cardiac surgeon on the medical staff at Northwestern Memorial, surgical director of the Center for Heart Rhythm Disorders at the Bluhm Cardiovascular Institute and associate professor of Surgery at Feinberg; and Jane Kruse, RN, atrial fibrillation nurse coordinator. She was reluctant to undergo surgery and began taking medication to reduce her risk of stroke and protect against a dangerously high irregular heart rate.

After experiencing frequent episodes of atrial fibrillation and ongoing discussion with the multidisciplinary team, Ms. Sterling decided to undergo surgery. “Although I still wasn’t having any symptoms from the atrial fibrillation, I was anxious and living in fear of having another stroke.”

In September of 2009, on the advice of Dr. Goldberger, Ms. Sterling underwent Stage I of the Hybrid Maze, a minimally invasive procedure where the surgical team, led by Dr. Lee, placed scar lines around the pulmonary veins from the outside of the heart forcing the electrical impulse to travel along one path. During the procedure Dr. Lee also removed Ms. Sterling’s left atrial appendage, a place in the heart where blood clots often form in individuals who have atrial fibrillation.

Today, Ms. Sterling has a normal heart rhythm. “It is a big relief not to be worried about having another stroke,” she says. “Without this surgery I would have been on medication for the rest of my life. I’m so thrilled to be medication-free.”
PERCENT OF PATIENTS WITH DIAGNOSIS OF ATRIAL FIBRILLATION TREATED AT TIME OF ISOLATED MITRAL VALVE SURGERY
CALENDAR YEAR 2009

Patients often present with an initial diagnosis of atrial fibrillation and, in the course of the preliminary evaluation, mitral valve disease is found. At the Bluhm Cardiovascular Institute, atrial fibrillation surgery was performed in 91% of isolated mitral valve surgery patients with a previous history of atrial fibrillation. By comparison, the Society of Thoracic Surgeons’ average was 53%. It is beneficial to patients to eliminate atrial fibrillation and its risks during a single surgery.

CARDIAC CATHETER ABLATION VOLUME
CALENDAR YEARS 2006–2009

The Bluhm Cardiovascular Institute has demonstrated 17% growth in cardiac catheter ablation volume from 2006-2009.

IMPLANTABLE CARDIOVERTER DEFIBRILLATOR VOLUME
CALENDAR YEARS 2007–2009

The Bluhm Cardiovascular Institute has demonstrated consistent growth in implantable cardioverter defibrillators (ICD) by an average annual rate of 23% over the last three years.

IMPLANTABLE CARDIOVERTER DEFIBRILLATOR ADVERSE EVENTS
CALENDAR YEARS 2007–2009

Over the last three years, the Bluhm Cardiovascular Institute has demonstrated commendable outcomes for ICD in both primary prevention and secondary prevention patients.
CORONARY DISEASE

After undergoing coronary stenting to open a blocked artery, Vicki Amick turned to her love of painting to help fight the challenges of coronary artery disease.

HEALING THE BODY AND MIND

Out of the blue, Vicki Amick started to pass out. Once it happened in the middle of an arts and crafts store. Another time she lost consciousness at home. “That time it was really scary because I vomited while I was unconscious,” recalls Mrs. Amick, who is 60. “Fortunately my husband was there and knew what to do.”

Following that incident, Mrs. Amick’s husband took her to Northwestern Memorial where her cardiac, vascular and neurologic systems were evaluated. Marla A. Mendelson, MD, cardiologist on the medical staff at Northwestern Memorial, medical director of the Program for Women’s Cardiovascular Health at the Bluhm Cardiovascular Institute and associate professor of Medicine and Pediatrics at Feinberg, recommended a stress test. Based on the results, Dr. Mendelson recommended a diagnostic cardiac catheterization, a procedure that examines blood flow to the heart.

The cardiac catheterization showed that Mrs. Amick had coronary artery disease. Her left anterior descending artery was 90 percent blocked. The reduced blood flow through the blocked artery was causing her to pass out.

Coronary artery disease occurs through a slow process called atherosclerosis when deposits of fats, cholesterol and calcium build-up inside an artery. The buildup of these deposits, called plaque, narrows the artery and decreases blood flow and oxygen to the heart. Physicians can perform coronary stenting in which a small tube is placed into the artery to keep it open and restore normal blood flow when plaque narrows an artery.

“Art allows me to lose track of myself, to relax my mind and body, which is important to heal.”
Vicki Amick
In January of 2010, Mrs. Amick underwent coronary stenting performed by Keith H. Benzuly, MD, interventional cardiologist on the medical staff at Northwestern Memorial and associate professor of Medicine at Feinberg.

“Although it was a big relief to have an answer to my problem and to have it fixed, I was still discouraged,” says Mrs. Amick. After the surgery, Mrs. Amick worked with nurses at Northwestern Memorial who helped her understand that she did not have to be defined by her disease. With encouragement from her healthcare team, Mrs. Amick turned to her love of painting. “Art allows me to lose track of myself, to relax my mind and body, which is important to heal,” says Mrs. Amick.

Mrs. Amick attends Northwestern Memorial’s Cardiac Rehabilitation program three times a week to do both cardiovascular and strength training exercises. “I’m amazing even myself,” she says. “I can walk five miles now without having to stop and rest. Being in cardiac rehabilitation reminds me how good it feels to be healthy.”
The Bluhm Cardiovascular Institute has exhibited a low incidence of vascular complications, outperforming national registry comparisons for both diagnostic cardiac catheterization and PCI over the last three years.

Northwestern Memorial Hospital uses internal data compared to American College of Cardiology National Cardiovascular Data Registry (NCDR) aggregate data. NCDR benchmark is from time period July 2008-June 2009.

National standards recommend a goal of 90 minutes or less from the patient’s arrival in an emergency department to the time the affected artery is opened via PCI. A high percentage (80% or greater) of patients at the Bluhm Cardiovascular Institute receive PCI within 90 minutes or less.
OPERATIVE MORTALITY FOR CORONARY ARTERY BYPASS GRAFT SURGERY
CALENDAR YEAR 2009

At the Bluhm Cardiovascular Institute, the operative mortality for CABG is superior, outperforming national database comparisons over the last five years.

ISOLATED CORONARY ARTERY BYPASS GRAFT SURGERY:
PERCENT OF INTERNAL MAMMARY ARTERY GRAFTS USED
CALENDAR YEAR 2009

Bypassing a blocked coronary artery with arteries as opposed to veins is widely accepted as beneficial. At the Bluhm Cardiovascular Institute, multiple arterial grafts are routinely used for first-operative CABG surgery, exceeding national comparisons over the last five years.

Harvesting the saphenous vein requires proficiency with the use of complex equipment. The Bluhm Cardiovascular Institute offers this minimally invasive harvesting technique, which can lead to smaller incisions, shorter recovery time and less pain.

MEAN INITIAL VENTILATION TIME AFTER CORONARY ARTERY BYPASS GRAFT SURGERY
CALENDAR YEAR 2009

Patients at the Bluhm Cardiovascular Institute require less time on a ventilator after CABG than the national average.
With an annual expense that exceeds $500 billion, cardiovascular disease leads in the consumption of U.S. healthcare resources, according to the American Heart Association (AHA). Unfortunately, along with the high price tag comes growing evidence of gaps in care including unnecessary testing, procedures and hospitalizations often with less than optimal patient outcomes.

To address these gaps in care and to expand Northwestern’s impact in addressing the worldwide burden of cardiovascular disease, the Center for Cardiovascular Innovation was established at Feinberg. The overall goal of the center is to seek new knowledge that will directly impact healthcare policy decisions and enhance the quality of care for all patients with cardiovascular disease.

Robert O. Bonow, MD, will lead the center along with a group of individuals who bring unique backgrounds, talents and expertise to this collaborative effort. Dr. Bonow is a cardiologist on the medical staff at Northwestern Memorial; director of the Center for Cardiovascular Innovation; chief of the Division of Cardiology; vice chair of Development and Innovation for the Department of Medicine; and the Goldberg Distinguished Professor at Feinberg.

The center will conduct innovative research studies and broadly disseminate the findings to health professionals, policy makers and the public. Future research studies will focus on:

- Improving systems of healthcare delivery, including seamless transitions from inpatient to outpatient care settings
- Reducing underuse, overuse and misuse of tests, procedures and medications
- Enhancing quality of life and clinical outcomes from the patient’s perspective
- Reducing mortality and rehospitalization rates

“Our goal is to impact healthcare policy at the national level through research and evidence-based medicine to improve quality and patient outcomes.” Robert O. Bonow, MD

If you would like more information about the Center for Cardiovascular Innovation, please call 312-695-1105 or visit www.medicine.northwestern.edu/cvinnovation.
Since its inception in 1972, the Department of Preventive Medicine at Feinberg has been a leader in understanding the causes and consequences of cardiovascular disease (CVD) for people of all ages and in finding new ways to prevent it. The department participates in numerous large-scale national studies that are expanding the boundaries of our ability to detect and prevent CVD.

Recently, the department has led research to define the concept of cardiovascular health and understand the genetic, environmental and behavioral factors that can help us achieve and maintain cardiovascular health for a broader percentage of the population.

**Ideal cardiovascular health can be defined as having ideal levels of health factors, including:**

- Untreated cholesterol <200 mg/dL
- Untreated blood pressure <120/<80 mm Hg
- Untreated fasting blood glucose <100 mg/dL

**Ideal health behaviors include:**

- Not smoking
- Participating in physical activity (at least 150 minutes per week, or 30 minutes per day most days)
- Maintaining a healthy weight
- Eating a healthy diet rich in fruits, vegetables, whole grains and fish, and low in sodium and simple sugars

Preventive medicine research at Feinberg has demonstrated that maintaining this pattern of ideal cardiovascular health is associated with dramatically longer lifespan; markedly lower rates of CVD during the remaining lifespan; improved quality of life; and lower Medicare costs at older ages. These concepts were recently incorporated into the AHA’s 2020 Strategic Impact Goal, which commits the AHA to improving the cardiovascular health of all Americans by 20 percent in the next decade.

Donald M. Lloyd-Jones, MD, is chair of the Department of Preventive Medicine and lead author of the AHA 2020 Strategic Impact Goals statement. “We all need to understand the serious nature of CVD and stroke and that it is never too late to start living a healthier lifestyle,” he says. “Taking that first step brings you closer to overall cardiovascular health.” Dr. Lloyd-Jones is a cardiologist on the medical staff at Northwestern Memorial, medical director of the Center for Preventive Cardiology at the Bluhm Cardiovascular Institute and associate professor of Preventive Medicine at Feinberg.

If you would like more information about the Department of Preventive Medicine, please call 312-908-7914 or visit www.preventivemedicine.northwestern.edu.
Regenerative medicine seeks to help the body repair itself by regenerating damaged tissue. While conventional medicine attempts to improve the function of damaged tissue with medication or surgery, regenerative medicine seeks to grow new cardiac and vascular tissue.

The Program in Cardiovascular Regenerative Medicine at Northwestern Memorial is currently investigating approaches including:

- **Gene therapy**, which attempts to increase the production of naturally occurring proteins or nucleic acids. This approach relies on the insertion of genes into diseased cells and tissues to increase production of factors that can aid in tissue repair.

- **Autologous stem cell therapy**, which attempts to regenerate and replenish tissue by increasing the supply of naturally occurring reparative cells at sites of damage. This approach relies on the phenomenon of plasticity, autologous stem cells from one tissue generating specialized cells of another tissue.

Douglas W. Losordo, MD, interventional cardiologist on the medical staff and director of the Program in Cardiovascular Regenerative Medicine at Northwestern Memorial, director of the Feinberg Cardiovascular Research Institute and the Eileen M. Foell Professor of Heart Research at Feinberg, recently completed a clinical research trial of patients suffering from chronic chest pain due to blocked arteries. Stem cells collected from a patient’s blood are injected into their hearts and arteries through a catheter. The goal is for the stem cells to improve blood flow by stimulating the growth of new blood vessels and expanding the diameter of coronary arteries.

*If you would like more information about the Program in Cardiovascular Regenerative Medicine, please call 312-695-0072 or visit [www.fcvri.northwestern.edu](http://www.fcvri.northwestern.edu).*

Stem cells from the bone marrow (green) are injected into areas of heart muscle (red) that have been damaged by a heart attack. The stem cells will help to repair the damage by stimulating new blood vessel formation and replacing damaged heart muscle cells.
Melina R. Kibbe, MD, a vascular surgeon on the medical staff at Northwestern Memorial, is developing a bioactive and biodegradable liquid cast arterial stent that may lead to a radical change in the treatment of atherosclerosis. As an associate professor of Surgery at Feinberg and the principal investigator of the study, Dr. Kibbe believes that this study may be the first to create a biodegradable arterial stent that forms in the body and is tailored to the patient’s individual anatomy.

While stent technology has improved in recent years, failure rates remain high. Given the widespread nature of atherosclerosis and the prevalence of arterial stenting – in 2006 more than 1.3 million Americans underwent coronary angioplasty and more than 90 percent of these patients received an arterial stent – this highly innovative and novel translational research has the potential to impact millions of Americans.

Dr. Kibbe, in collaboration with Guillermo A. Ameer, ScD, associate professor of Biomedical Engineering at the McCormick School of Engineering at Northwestern University, is working to develop a liquid cast drug-eluting biodegradable stent that will polymerize in the body and mold to the contour of the freshly angioplastied artery. This technology will serve to protect the freshly angioplastied artery from developing a blood clot while simultaneously promoting vascular healing. This approach seeks to overcome the challenges of bare-metal, drug-eluting and pre-formed biodegradable stents by tailoring to the contours of the individual artery and by coating its entire surface area, leading to a decrease in clotting potential and an increase in surface area for drug delivery.

In 2009, President Obama named Dr. Kibbe among the 100 researchers to receive the Presidential Early Career Award for Scientists and Engineers, the highest honor bestowed by the U.S. government on young professionals in the early stages of their independent research careers. Dr. Kibbe was recognized for her innovative research in the field of nitric oxide vascular biology and the development of novel translational therapies for patients with vascular disease.

*If you would like more information about Dr. Kibbe’s research on liquid cast arterial stents, please call 312-503-6701.*
The PARTNER Trial: Placement of Aortic Transcatheter Valves Trial

Through The PARTNER Trial, physicians and researchers at the Bluhm Cardiovascular Institute continue to investigate a transcatheter technique, a minimally invasive approach through the skin for implanting a prosthetic heart valve inside the stenotic aortic valve.

- In January of 2009, Northwestern Memorial became the first hospital in Illinois to place a transcatheter aortic heart valve through the transapical approach.

- In August of 2009, Northwestern Memorial completed its enrollment in The PARTNER Trial. The Food and Drug Administration recently permitted continued access to the transcatheter technology for patients through a non-randomized registry, so Northwestern Memorial continues to screen eligible patients who may benefit from this technology.

- To date, Northwestern Memorial has placed the most transcatheter aortic valves in the state of Illinois.

The purpose of the randomized PARTNER Trial is to evaluate the safety and effectiveness of the Edwards SAPIEN™ transcatheter heart valve and its transfemoral and transapical delivery systems. The Edwards SAPIEN valve is intended to treat patients who are considered high risk or who are not candidates for conventional aortic valve replacement surgery. The implantation of the valve does not require traditional open heart surgery and can be performed in the cardiac catheterization lab.

The procedure uses an expandable valve with a stainless steel frame crimped onto a balloon delivery catheter the width of a pencil. It is introduced through an artery in the groin or a small incision between the ribs. During the procedure, the prosthetic valve remains compressed until it reaches the aortic valve, at which time it is expanded with a balloon and opened within the diseased aortic valve. The delivery catheter is then removed and the transcatheter valve replaces the native valve and functions in its place. The technology allows insertion of the prosthetic valve while the heart is still beating, eliminating the need for cardiopulmonary bypass and its associated risks.

The prosthetic valve is an investigational device, which means that it is being studied and is not for sale commercially in the United States. Data is being collected on the valve for potential approval by the Food and Drug Administration.

If you would like more information about The PARTNER Trial at Northwestern Memorial, please call 312-695-1806.

SAPIEN valve image permission by Edwards Lifesciences, LLC.

Due to declining health, Doris Snyder, who is 101, underwent a successful transcatheter aortic valve implantation via transapical approach making her the oldest recipient in the world.

Principal Investigator: Patrick M. McCarthy, MD

The purpose of this study is to evaluate the long term safety and effectiveness of the Carpentier-Edwards® PERIMOUNT Magna® Mitral Pericardial Bioprostheses Models 7000/7000TFX and the Carpentier-Edwards® PERIMOUNT Magna® Mitral Ease™ Pericardial Bioprosthesis Model 7200TFX in patients undergoing mitral valve replacement with or without concomitant procedures requiring cardiopulmonary bypass.

Detection of Microembolic Signals During Aortic Valve Surgery Using Transcranial Doppler (TCD)

Principal Investigator: S. Chris Malaisrie, MD

Transcatheter aortic valve implantation (TAVI) is an emerging therapeutic option for patients with severe calcific aortic stenosis and high surgical risk. As of yet, there is no data documenting the occurrence of cerebral emboli during the procedure. For this study we seek to define the prevalence of microembolic signals and occurrence of cerebral emboli using Transcranial Doppler (TCD) in patients undergoing TAVI compared to patients undergoing standard therapies for aortic stenosis (aortic valve replacement and aortic balloon valvuloplasty).

Evaluation of the HeartWare Left Ventricular Assist Device System for the Treatment of Advanced Heart Failure

Principal Investigator: Edwin C. McGee, Jr., MD

This research study is evaluating a new heart assist device, the HeartWare Ventricular Assist System (VAS), in participants suffering from end-stage heart failure and who require circulatory assistance while awaiting a heart transplant. The VAS is a miniaturized mechanical blood pump and is the smallest full support pump currently available.

LAA Occlusion: Evaluation of Surgical Techniques

Principal Investigator: Richard Lee, MD

Most of the strokes in patients with atrial fibrillation (AF) appear to originate in the left atrial appendage (LAA). The surgical treatment of AF eliminates the LAA in an effort to reduce stroke. The purpose of this randomized study is to evaluate three surgical techniques commonly used to occlude the LAA: staple excision, surgical excision or internal ligation. Although these surgical techniques are simple to apply and all reduce the flow of blood into the LAA, many times flow into the LAA is noted following the procedure. Residual flow may not effectively reduce stroke. This study will measure the success of each technique.
CLINICAL TRIALS & RESEARCH HIGHLIGHTS: CARDIOLOGY

RADAR: A Randomized, Partially-Blinded, Multi-Center, Active-Controlled, Dose-Ranging Study Assessing the Safety, Efficacy, and Pharmacodynamics of the REG1 Anticoagulation System Compared to Unfractionated Heparin or Low Molecular Heparin in Subjects with Acute Coronary Syndrome

Principal Investigator: Keith H. Benzuly, MD

The RADAR study is enrolling patients with acute coronary syndrome to determine the safety and effectiveness of a revolutionary new type of anticoagulation system. This investigational medication actually consists of two drugs. The first component is a powerful blood thinner that is engineered to encode its own reversing agent. The second drug is the specific reversing agent that immediately stops the blood thinning, promotes normal clotting and allows both drugs to be broken down by the body’s naturally occurring enzymes.

TOPCAT: Treatment of Preserved Cardiac Function Heart Failure with an Aldosterone Antagonist

Principal Investigator: Sanjiv J. Shah, MD

This randomized, double-blind, placebo-controlled trial is designed to test the hypothesis that the addition of an aldosterone antagonist, spironolactone, to conventional therapy can reduce risk of death and hospitalizations for major cardiovascular events in patients who have symptomatic heart failure with preserved ejection fraction (HFpEF).

Appraise 2: Apixaban for Prevention of Acute Ischemic Safety Events - 2 A Phase 3 Randomized, Double Blind Evaluation of the Safety and Efficacy of Apixaban in Subjects with a Recent Acute Coronary Syndrome

Principal Investigator: Dan J. Fintel, MD

The purpose of this study is to determine if apixaban is superior to placebo for preventing the composite of cardiovascular death, myocardial infarction or ischemic stroke in subjects with a recent acute coronary syndrome (ACS) and at least two additional risk factors for recurrent ischemic events.

S-ICD® System Clinical Investigation

Principal Investigator: Bradley P. Knight, MD

The purpose of this study is to determine the safety and effectiveness of an investigational device, S-ICD system, to treat life-threatening ventricular tachyarrhythmias. The S-ICD System is a subcutaneous defibrillator designed to provide the same defibrillation therapy as a conventional ICD, without requiring a wire to be placed in or on the heart. As a result, the S-ICD System may prove to be less invasive than standard ICDs.
CLINICAL TRIALS & RESEARCH HIGHLIGHTS: VASCULAR DISEASE

Evaluation of the Conformable GORE TAG® Thoracic Endoprosthesis for Treatment of Acute Complicated Type B Aortic Dissection (TAG 08-01)

Principal Investigator: Mark K. Eskandari, MD

TAG 08-01 is sponsored by W.L. Gore & Associates and is a multi-center trial to demonstrate the safety and efficacy of the Conformable GORE TAG® Thoracic Endoprosthesis for the treatment of Acute Complicated Type B Aortic Dissections. Subjects will be evaluated through hospital discharge and return for follow-up visits at 30 days, six months and annually through five years post-treatment.

The PEVAR Trial: Prospective, Multi-center, Randomized Controlled Trial of Endovascular Aneurysm Repair Using a Bilateral Percutaneous Approach (PEVAR) vs. Standard Approach (SEVAR) Using the IntuiTrak® Endovascular AAA Delivery System and Prostar XL or Perclose ProGlide Suture-Mediated Closure System

Principal Investigator: Mark D. Morasch, MD

This study is sponsored by Endologix, Inc. with collaboration from Abbott Vascular and is a multi-center, randomized, controlled trial designed to compare a bilateral percutaneous approach and the standard cut-down approach in the endovascular treatment of abdominal aortic aneurysms. Subjects will be evaluated through hospital discharge and return for follow-up visits at 30 days and six months.

Atrium iCAST™ Iliac Stent Pivotal Study

Principal Investigator: Heron E. Rodriguez, MD

This study is sponsored by Atrium Medical and is a prospective, multi-center trial designed to determine the safety and effectiveness of the Atrium iCAST PTFE covered iliac stent. Subjects will be evaluated at hospital discharge and return for follow-up visits at 30 days, six months, nine months and annually through three years post-treatment.

Evaluation of the clinical performance of the Valiant® Thoracic Stent Graft with the Captivia Delivery System for the Endovascular Treatment of Acute Complicated Type B Aortic Dissections

Principal Investigator: Mark K. Eskandari, MD

This study is sponsored by Medtronic Vascular and is a multi-center trial designed to demonstrate the safety and effectiveness of the Valiant Thoracic Stent Graft with the Captivia Delivery System for the Endovascular Treatment of Acute Complicated Type B Aortic Dissections of the descending thoracic aorta. Subjects will be evaluated at hospital discharge and return for follow-up visits at 30 days, six months and annually through five years post-treatment.
THE PATIENT EXPERIENCE

CARDIAC BEHAVIORAL MEDICINE

Treating cardiovascular disease is most successful when the focus is on the physical, emotional and behavioral health of the patient. To achieve this comprehensive approach, the Bluhm Cardiovascular Institute offers the Cardiac Behavioral Medicine service. Kim R. Lebowitz, PhD, director of Cardiac Behavioral Medicine and assistant professor of Psychiatry and Surgery at Feinberg, specializes in helping patients adjust to a diagnosis of cardiovascular disease and become more resilient throughout the course of treatment. Dr. Lebowitz, along with fellow clinical cardiac psychologists, responds to patient needs with techniques that include strategies that facilitate behavior change, improve coping strategies and minimize stress.

To improve clinical programs and treatments offered to cardiovascular patients, the Cardiac Behavioral Medicine service conducts clinical research trials, including:

- **Psychosocial Functioning, Health Behaviors and Frailty in Cardiac Surgery Patients**, offered to patients undergoing cardiac surgery to examine the impact of cardiac surgery on mood, social functioning and lifestyle behaviors. Research indicates that a change in mood or health behaviors can occur after cardiac surgery and may impact surgical recovery or outcome.

- **The Effect of Relaxation on Mood Among Patients Undergoing Coronary Artery Bypass Graft Surgery**, offered because many patients experience increased anxiety or sadness before or after CABG. This study will examine whether a relaxation exercise will impact the emotional experience of surgery.

If you would like more information about the Cardiac Behavioral Medicine service, please call 312-695-4965.

PATIENT SATISFACTION

CALENDAR YEAR 2009

Hospital Consumer Assessment of Healthcare Provider and Systems (HCAHPS) is a national standardized survey of hospital patients created to capture a patient’s experience during a given hospital stay. The survey results are publicly reported on the Centers for Medicare and Medicaid Services Web site for all participating hospitals. These graphs highlight the results of cardiovascular disease patients at Northwestern Memorial compared to state and national averages for all patient populations in 2009*. For a complete list of results, refer to hospitalcompare.hhs.gov.

The first set of data represents the percentage of Northwestern Memorial cardiovascular patients who would definitely recommend the hospital to others.

The second set of data represents the percentage of Northwestern Memorial cardiovascular patients who gave the hospital a rating of 9 or 10 from a scale of 0 (lowest) to 10 (highest).

*State and national data is for all patient populations from October 2008 through September 2009.
# Contact Us

## Bluhm Cardiovascular Institute of Northwestern — Leadership

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<th>Center for Preventive Cardiology</th>
<th>Center for Heart Valve Disease</th>
<th>Center for Vascular Disease</th>
<th>Program in Cardiovascular Regenerative Medicine</th>
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<tr>
<td>Charles J. Davidson, MD</td>
<td>Bradley P. Knight, MD</td>
<td>Donald M. Lloyd-Jones, MD</td>
<td>Robert O. Bonow, MD</td>
<td>William H. Pearce, MD</td>
<td>Douglas W. Losordo, MD</td>
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<td>Rod S. Passman, MD</td>
<td>Medical Director</td>
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<td>Heron E. Rodriguez, MD</td>
<td>For a complete list of physicians, clinical staff and further information about the Bluhm Cardiovascular Institute, please visit heart.nmh.org</td>
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<tr>
<td></td>
<td>Medical Director</td>
<td>Program for Atrial Fibrillation</td>
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<td>Co-Director</td>
<td>For additional copies of this report, please send requests to: <a href="mailto:BCVI_info@nmh.org">BCVI_info@nmh.org</a></td>
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## For More Information, Please Contact the Bluhm Cardiovascular Institute

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<tr>
<td>866-662-8467</td>
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<td>Outpatient Clinic</td>
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<td>312-695-2714</td>
<td>312-NM-HEART (664-3278)</td>
<td>Clinical Trials Unit of Northwestern</td>
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