We are pleased to provide for your review, the first edition of Novant Health’s outcomes book, Cardiology and Cardiovascular Surgery. This publication reflects the annual clinical performance at Novant Health Heart & Vascular Institute facilities in 2012.

Novant Health has been a proud affiliate of the Cleveland Clinic since September 2011. This relationship has facilitated the implementation of consistent processes across our organization, enabling us to achieve best practice clinical outcomes metrics in cardiovascular medicine and surgery.

Published in collaboration with the Cleveland Clinic, this outcomes book is a demonstration of our organizational partnership and of our joint, unrelenting commitment to transparent clinical quality, leading-edge medical research and innovation, and best practice process improvement.

By achieving clinical standardization at all Novant Health Heart & Vascular Institute facilities, our physicians, nurses, caregivers and administrative leadership are coordinated in our commitment to providing the highest quality clinical product at the lowest cost. By so doing, we are confident the value we provide for our referring physicians, patients and community positions us as this region’s industry leader in the population management of cardiovascular disease and as a pioneer in demonstrating value in an era of healthcare reform.

Yele Aluko, MD  
Senior Vice President  
Novant Heart and Vascular Services  
Medical Director  
Novant Health Heart & Vascular Institute  
Novant Health Presbyterian Medical Center  
Charlotte, NC

C. Raymond Workman, MD  
Medical Director  
Novant Health Heart & Vascular Institute  
Novant Health Forsyth Medical Center  
Winston-Salem, NC
Welcome to the first edition of Novant Health Heart & Vascular Institute’s cardiology and cardiovascular surgery annual outcomes book. Cleveland Clinic Cardiovascular Management Services takes great pride in helping to produce outcomes books for our affiliate programs. Through outcomes, we are able to demonstrate the level of quality we provide for review by our peers, management and patients.

Cleveland Clinic is committed to measuring and transparently reporting outcomes in a continuous effort to improve care. Cleveland Clinic’s cardiovascular program sets the standard for quality, innovation and efficiency, and through our Cardiovascular Management Services, we help community hospitals and health systems with all aspects of their cardiovascular programs.

This book reflects the teamwork that takes place every day among our staff, all with the end goal of providing the highest quality care and patient experience. This year’s edition highlights outcomes and volumes of this affiliate program. When possible, we also provide comparisons to national benchmarks from the Society of Thoracic Surgeons and the National Cardiovascular Data Registry.

Our affiliate program is looking forward to another busy year ahead. I hope you find this outcomes book informative and useful. I welcome your comments and feedback. We truly want to collaborate and develop a relationship with all providers for a healthier community.

Bruce W. Lytle, MD
Chairman, Miller Family Heart & Vascular Institute
Novant Health is on a journey to transform the patient experience so that our patients can focus on what really matters – getting better and staying healthy. As one of the nation's top not-for-profit integrated health systems, Novant Health has created a cohesive and consistent experience across its 14 medical centers, 350 physician clinic locations, as well as numerous outpatient surgery centers, medical plazas, rehabilitation programs, diagnostic imaging centers and community health outreach programs.

Novant Health’s 24,400 employees and physician partners are working to make healthcare simpler and more convenient for the communities we serve in North Carolina, Virginia, South Carolina and Georgia, providing unparalleled access through technology and points of care that are seamlessly integrated into one system.

It strives to bring its mission, vision and values to life by delivering the most remarkable patient experience, in every dimension, every time. Here are just some of the ways Novant Health is making a difference:

- Maintaining an active community health outreach program.
- Demonstrating superior outcomes for many health conditions as indicated by Novant Health’s state and national quality scores.
- Creating innovative programs that address important health issues. Many of our programs and services are recognized nationally.
- Transforming patient care at the bedside.
- Believing in its role as a good corporate citizen, working with community agencies and organizations to make our communities better places to live and work.

In 2012, Novant Health partnered with the Cleveland Clinic at its flagship facilities - Novant Health Forsyth Medical Center and Novant Health Presbyterian Medical Center. Accredited by the Joint Commission and members of the American Hospital Association, Forsyth Medical Center and Presbyterian Medical Center provide remarkable care not only through sophisticated, high-tech diagnostic, surgical and therapeutic care, but through a warm and compassionate staff, as well. Both facilities show their commitment to the leading-edge of medicine by investing resources into new technology, programs and services for their hospitals and their communities.
**Forsyth Medical Center**

Located in Winston-Salem, NC, Forsyth Medical Center is a 921-bed acute care facility offering a full spectrum of services including emergency, surgical, rehabilitative, behavioral care as well as specialties like heart disease, cancer and stroke. It has received numerous awards for its quality programs and excellent patient outcomes. As one of the largest medical centers in the state, its emergency department receives more than 91,500 visits each year. Coupled with Novant Health Medical Park Hospital, a 22-bed surgical facility located nearby, close to 40,000 surgical procedures including 6,500 general surgery cases, 7,000 orthopedic and neurological procedures and 1,099 cardiac and vascular surgeries were performed at the Forsyth medical campus in 2012.

**Presbyterian Medical Center**

Located in Charlotte, NC, Presbyterian Medical Center is a 622-bed acute care facility that has been named one of the best hospitals in the nation and has consistently received recognition for its quality care. Founded in 1903, Presbyterian Medical Center provides leading-edge health services ranging from prevention and early detection to advanced treatments in cancer, stroke and heart disease and routinely receives more than 88,500 emergency department visits each year. Combined with nearby Novant Health Charlotte Orthopedic Hospital, Presbyterian Medical Center performs more than 30,000 surgical procedures a year including 11,100 general surgery cases, 7,200 orthopedic and neurological procedures and 1,042 cardiac and vascular surgeries in 2012.
Achievements

**Novant Health Forsyth Medical Center**
**Cardiac Surgery Ranked in top 14%**

The Society of Thoracic Surgeons (STS) has developed a comprehensive rating system for the quality of cardiac surgery among hospitals across the country. In the current analysis of national data covering the period from January 1, 2012 through December 31, 2012, Forsyth Medical Center cardiac surgery program has been awarded the highest national quality rating – 3 stars – from STS for Coronary Artery Bypass Grafting Surgery. Only 14 percent of hospitals nationwide received this 2012 STS 3-star rating.

⭐️⭐️⭐️

**Novant Health Presbyterian Medical Center**
**First site in North and South Carolina to perform a TAVR**

In 2011, Presbyterian Medical Center became the first site in North and South Carolina to perform a transcatheter aortic valve replacement (TAVR), and the procedure is now provided at Novant Health Forsyth Medical Center. TAVR is a catheter-based approach to valve replacements for patients with severe aortic stenosis who cannot endure or are at very high risk with traditional open-heart surgery. With more than 60 transfemoral and transapical procedures performed at both facilities, Novant Health Heart & Vascular Institute is a regional leader in providing this leading-edge technology.
Contents

4 Achievements
6 Overview
8 Isolated Coronary Artery Bypass Graft
11 Valve Surgery
12 Patient Experience
14 Interventional Cardiology
17 Electrophysiology
19 Heart Failure
20 Innovations
24 Staff Biographies
27 Contact Information
2012
Novant Health total cases = 6,099

Novant Health Forsyth Medical Center
Total cases = 3,013
Total cardiac surgery cases = 551
Total cardiology cases = 1,180

Novant Health Presbyterian Medical Center
Total cases = 3,086
Total cardiac surgery cases = 439
Total cardiology cases = 1,321
In 2012, Novant Health surgeons performed over 6,000 procedures. Forsyth Medical Center performed 3,013 procedures and Presbyterian Medical Center performed 3,086 procedures.

**Novant Health Case Distribution**

In 2012, Novant Health surgeons performed over 6,000 procedures. Forsyth Medical Center performed 3,013 procedures and Presbyterian Medical Center performed 3,086 procedures.

- **11% Thoracic**
- **16% Cardiac**
- **7% ICD**
- **23% Vascular**
- **9% Pacer**
- **34% CathPCI**

**Forsyth Medical Center**

- **13% Thoracic**
- **18% Cardiac**
- **7% ICD**
- **33% CathPCI**
- **20% Vascular**
- **9% Pacer**

**Presbyterian Medical Center**

- **8% Thoracic**
- **14% Cardiac**
- **7% ICD**
- **36% CathPCI**
- **26% Vascular**
- **9% Pacer**

**Novant Health Cardiac Case Distribution**

Isolated coronary artery bypass grafting (CABG) operations accounted for 52 percent of the cardiac procedures. Valves and other cardiac procedures represented 48 percent of all cardiac cases in the Novant Health.

- **52% CABG**
- **16% Valve**
- **10% CABG & valve**
- **22% Other*”

**Forsyth Medical Center**

- **58% CABG**
- **20% Other*”
- **11% Valve**
- **11% CABG & valve**

**Presbyterian Medical Center**

- **44% CABG**
- **25% Other*”
- **10% Valve**
- **21% CABG & valve**

*Other includes complex procedures such as aortic aneurysms, double valve procedures, etc.*

Source: STS Registry
Cardiac Presentation on Admission

<table>
<thead>
<tr>
<th>Type</th>
<th>Percent</th>
<th>Forsyth</th>
<th>Presbyterian</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST Elevation MI (STEMI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-ST Elevation MI (Non-STEMI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable Angina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable Angina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: STS Harvest report period ending 12/31/2012

*Other category includes No Symptoms or Angina and Symptoms Unlikely to be Ischemia

Previous Interventions

In 2012, 97 percent of procedures at Forsyth Medical Center were primary operations and 3 percent were reoperations. Presbyterian Medical Center had 95 percent primary procedures and 5 percent reoperation.

Risk-Adjusted CABG Operative Mortality

The Society of Thoracic Surgeons (STS) algorithm for predicted risk of mortality counts hospital deaths and deaths occurring after discharge within 30 days. In 2012, risk-adjusted operative mortality for primary isolated revascularization was 0.7 percent for Forsyth Medical Center and 2.3 percent for Presbyterian Medical Center. The STS benchmark is 2 percent.
Age $\geq$ 65 Years Old

Novant Health treats a large number of elderly patients. Advanced age and associated medical conditions are known risk factors that can adversely affect cardiac surgical outcomes.

Risk Factors

Although advanced age and female gender are known risk factors affecting outcomes, other factors may also have an adverse effect. Our patients' risk factors are shown here.

Perioperative Medications

The National Quality Forum has developed a set of standardized cardiac surgery performance indicators to measure quality of care. At Novant Health, compliance with recommended discharge medication was above 99 percent among eligible cases.
Internal Mammary Artery Used

Arterial grafts are known for their excellent long-term patency and are the conduits of choice for coronary revascularization. In 2012, 99 percent of patients undergoing primary isolated revascularization procedure at Novant Health received at least one arterial graft.

### Percent of Patients

<table>
<thead>
<tr>
<th>Year</th>
<th>Forsyth</th>
<th>Presbyterian</th>
<th>STS Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>95%</td>
<td>90%</td>
<td>85%</td>
</tr>
<tr>
<td>2011</td>
<td>95%</td>
<td>90%</td>
<td>85%</td>
</tr>
<tr>
<td>2012</td>
<td>95%</td>
<td>90%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Internal mammary artery used includes patient who received either left IMA, right IMA or both. Excludes patients with prior CABG surgery and contraindications for IMA.

Source: STS Harvest report ending 12/30/2012

Risk-Adjusted Postoperative Complications

Major complications after cardiac surgery include prolonged ventilation, renal failure, any reoperations, permanent stroke and deep sternal infections. In 2012, there were no deep sternal infections after isolated revascularization procedures at Novant Health.

Off-Pump Coronary Bypass Surgery

In 2012, 99 percent of isolated coronary artery bypass graft procedures were on-pump at Novant Health.
Novant Health Valve Case Distribution

Forsyth Medical Center
- 36% AVR & CABG
- 29% AVR
- 12% MVR & CABG
- 23% MVR

Presbyterian Medical Center
- 27% AVR & CABG
- 37% AVR
- 6% MVR & CABG
- 30% MVR

Key: MVR = Mitral valve repair/replacement
AVR = Aortic valve repair/replacement
CABG = Coronary artery bypass grafting

Source: STS Registry
When Julie Taylor, 55, of Winston-Salem, N.C., started feeling rundown, she assumed the exhaustion was due to a recent family vacation in heat-soaked Texas. But when her husband noticed large bruises behind her knees and on her thighs, Taylor immediately scheduled an appointment with her primary care doctor. The resulting diagnosis – leukemia – caught her off guard.

“By all accounts, I was healthy,” Taylor says. “I wasn’t overweight, watched what I ate and walked every day. And I didn’t have a family history of cancer. So to hear the word ‘leukemia’ was a total shock.”

But the biggest surprise was yet to come. After successfully completing an eight-month course of chemotherapy that put her leukemia into remission, Taylor again started feeling fatigued. One day, she walked into her oncologist’s office for an appointment, and two days later, she needed a wheelchair just to make it through the door.

An echocardiogram identified the culprit – her heart had enlarged, and the leaflets in two of her heart valves weren’t meeting, causing blood to regurgitate in the heart and resulting in congestive heart failure. After intensive medication therapy stabilized Taylor’s chemotherapy-related heart condition, she eventually underwent successful heart surgery to repair the two leaking heart valves.
Cardiologist David L. Smull, DO, medical director of the heart failure program at Novant Health Heart & Vascular Institute in Winston-Salem, N.C., determined that Taylor’s congestive heart failure was caused by the very chemotherapy drugs that had helped treat her leukemia. In fact, a growing volume of research shows that chemotherapy drugs may increase the risk for future heart disease and heart attacks in cancer survivors.

Patients like Taylor are what inspired William O. Ntim, MD, a cardiologist at Novant Health Heart & Vascular Institute in Charlotte, N.C., to start a cardio-oncology program in order to better understand the effects of cancer therapy on the cardiovascular system. Under the direction of program medical director, Dr. Ntim, and in conjunction with Dr. Smull, the cardio-oncology program has created collaboration between Novant Health Heart & Vascular Institute and Novant Health Cancer Center, resulting in the implementation of system-wide algorithms for the identification of cancer patients who are at risk for cancer treatment-related heart disease. This has enabled early referral to cardiology for diagnoses and preventive treatment, as needed.

Dr. Ntim is also working with cardiologists at Cleveland Clinic to incorporate new ultrasound technology into the program to help predict which cancer patients may suffer cardiac problems before witnessing a drop in their ejection fractions. The goal is to standardize cardiovascular disease prevention and management within the Novant Health system and contribute to research in this new field of medicine.

Today, Taylor is once again the picture of perfect health. In fact, her determination and drive led her to climb Stone Mountain outside Atlanta, Ga., just four months after her heart surgery. She also spent her recovery time completing a bachelor’s degree in nursing and is now an operating room nurse at the very medical center in which she was treated.

“I may not be the typical cardiovascular patient, but my oncologist, cardiologist and cardiovascular surgeon all listened to me and were able to figure out what was wrong,” Taylor says. “It really is amazing.”
Cardiac Catheterization Laboratory Procedures Distribution

In 2012, Novant Health performed more than 8,000 procedures in patients with simple and complex cardiac disease.

Risk Factors Among Patients Undergoing PCI procedure

In many cases, patients who had PCI procedures at Novant Health in 2012 had more risk factors than patients at comparable hospitals.

Source: NCDR CathPCI Outcome Report 4Q 2012
Patients with PCI procedures receiving prescriptions for all medications (aspirin, P2Y12 inhibitor, and statin) at discharge is a key performance measure for ACC. In 2012, Novant Health compliance with recommended discharge medications was well above the ACC 50th percentile.

Source: NCDR CathPCI Outcome Report 4Q 2012
In 2012, Forsyth Medical Center PCI risk-adjusted mortality rate was 1.74 percent and Presbyterian Medical Center was 0.86 percent. The American College of Cardiology (ACC) risk-adjusted mortality rate for the 90th percentile was 0.86 percent.

ACC practice guidelines recommend PCI balloon inflation within 90 minutes of arrival in the emergency department for patients with ST-elevation myocardial infarction (STEMI). In 2012, the proportion of STEMI patients receiving immediate PCI within 90 minutes was 89.4 percent at Forsyth Medical Center and 100 percent at Presbyterian Medical Center.
Electrophysiology Lab Case Distribution

In 2012, Novant Health performed 1,800 cases in their electrophysiology labs.

Forsyth Medical Center
- 33% Ablations
- 28% Pacemakers
- 28% ICD
- 28% EP Study

Presbyterian Medical Center
- 28% Ablations
- 35% Pacemakers
- 28% ICD
- 9% EP Study

Source: Novant Health Internal Report (updated from "Novant Health")

Electrocardiogram Procedures

Source: Novant Health Internal Report (updated from "Novant Health")
In 2012, Novant Health has had no Cardiac Perforations, Myocardial Infarctions or Pericardial Tamponade associated with ICD implantations.

Source: NCDR ICD Outcome Report 4Q2012

The graph displays the average length of stay (LOS) associated with ICD implantations. Novant Health LOS is less than the ACC benchmark.

Source: NCDR CathPCI Outcome Report 4Q2012
In order to achieve superior clinical outcomes, Novant Health uses multiple metrics to assess best practice in patients with heart failure. The information below displays compliance performance at Novant Health.

### Forsyth Medical Center

In order to achieve superior clinical outcomes, Novant Health uses multiple metrics to assess best practice in patients with heart failure. The information below displays compliance performance at Novant Health.

### Presbyterian Medical Center
The affiliation between the Cleveland Clinic and Novant Health enhance opportunities to provide new treatments and therapies to patients as well as to accelerate mutual accomplishments in cardiac care. The following pages highlight some of the latest innovations being investigated at Novant Health Heart & Vascular Institute locations at Novant Health Forsyth Medical Center and Novant Health Presbyterian Medical Center, as well as at the Miller Family Heart and Vascular Institute at Cleveland Clinic’s main campus.
**Centerline Analysis Software**

Endovascular repair of aortic aneurysms and dissections is critically dependent on a proper understanding of the geometry of a patient’s arteries. Cleveland Clinic researchers have developed an automated system that extracts the centerlines of the aorta and branch vessels from a patient’s CT scan and then builds a complete mathematical model of the relevant vasculature. Unlike the data stored in a CT scan, this model represents the anatomy in a way that can be easily manipulated and understood by computer software. Software developed by Cleveland Clinic utilizes these models to help design and implant endovascular devices. This technology will make minimally invasive vascular repairs safer, more effective, and more widely available. Centerline Analysis software is utilized at Novant Health Heart & Vascular Institute facilities.

**Structural Heart**

In recent years, there has been increased interest in developing new ways to treat structural heart pathology. Transcatheter aortic valve replacement (TAVR) is a recent innovation offered at Novant Health and Cleveland Clinic. Mitral valve treatment in patients with congenital heart failure (CHF) and closure of the left atrial appendage (LAA) to reduce the risk of stroke are other innovations offered at the Cleveland Clinic. A new technique using the Lariat stitch for left atrial appendage closure via an epicardial approach, avoiding the traditional transeptal approach is being evaluated at Novant Health Heart & Vascular Institute.
PreSERVE AMI

The PreSERVE AMI study is a phase II trial of an intra-coronary infusion of AMR-001 - a bone marrow-derived autologous CD34 selected cell product - in patients who recently suffered an acute myocardial infarction. Researchers at Novant Health Heart & Vascular Institute are participating in this trial designed to assess the safety and effectiveness of infusing these bone marrow-derived stem cells into the coronary arteries of patients post-STEMI. Results will be assessed by evaluating and comparing the change in myocardial perfusion between the stem cell treatment group and the control group. The results will be measured quantitatively by gated single photon emission computed tomography myocardial perfusion imaging (gated SPECT MPI), as well as by secondary endpoints measured with a cardiac MRI.

Subcutaneous Defibrillation

Sudden cardiac death (SCD) is the leading cause of death in the United States. The Cleveland Clinic and Novant Health Heart & Vascular Institute at Presbyterian Medical Center are among a select group of US hospitals to use a new device to treat and prevent SCD. The subcutaneous implantable defibrillator allows the leads to be tunneled under the skin. Traditional implantable devices require open heart surgery and lead placement in the veins. Such placement can lead to malfunction and other complications. In addition to reducing these risks, the technology provides an additional treatment option for patients who are unable to have transvenous lead placement. Additionally, researchers at the Novant Health Heart & Vascular Institute are participating in The S-ICD System Post Approval study to document long-term safety and effectiveness outcomes associated with the implantation of the SQ-RX pulse generator and Q-TRAK electrode in a commercial clinical setting.
Absorb™ Stent

The Absorb stent is a polymer-based stent/vascular scaffold that is completely bioabsorbable. Researchers at the Cleveland Clinic and the Novant Health Heart & Vascular Institute are comparing the early and long term results of Absorb with those of the most advanced permanent metallic and polymer drug-eluting stents. The device is used to treat patients with coronary artery disease. Novant Health Heart & Vascular Institute was the first site in the greater Charlotte region to enroll a patient in the trial. Permanent polymer stents can lead to arterial inflammation and stent thrombosis. The Absorb stent dissolves once the artery can stay open. This allows the artery to function naturally, expanding and contracting to meet the heart’s need for blood. Absorb may also reduce the need for long-term anticoagulant therapy.

Preventive Cardiology

Novant Health Heart & Vascular Institute is participating in The Odyssey Outcomes study to evaluate the effect of alirocumab SAR236553/REGN727, a monoclonal antibody that promotes recycling of the LDL receptor, thereby lowering LDL cholesterol. The impact of this monoclonal antibody activity on coronary heart disease (CHD) death, non-fatal myocardial infarction (MI), fatal and non-fatal ischemic stroke, and unstable angina requiring hospitalization will be studied in patients treated with intensive statin therapy who have recently experienced an acute coronary syndrome.
Novant Health Heart & Vascular Institute providers in the greater Winston-Salem market

ADULT CARDIOLOGY
Kenneth Bodek MD
David Bohle MD
Madhulika Chandra MD
Jeffrey Clevenger MD
Michael Drucker MD
Kerry Gilliland MD
Davidson Givens MD
Charles Harris Jr MD
John Hoyle MD
Usman Khawaja MD
Lai Kok MD
William Means MD
Mark Mitchell MD
Nizar Noureddine MD
Saeed Payvar MD
John Powers MD
Robert Preli MD
Gary Renaldo MD
Kenneth Rhinehart MD
David Smull DO
Mitch St. Clair MD
Behzad Taghizadeh MD
Samuel Turner MD
Asif Wahid MD

Kendra Edge PA-C
Lindsey Hawks PA
Camilla Helton PA-C
Megan Hulen NP
Andrew Jones PA-C
Kala Murphy FNP
Tiffany Noel PA-C
Sheila Orem NP
Burton Shelton NP
Boonpon Thongteum NP

CARDIOVASCULAR AND THORACIC SURGERY
Bret Borchelt MD
David Duncan MD
Joel Morgan MD
Christopher Culley PA
Steven Shearer PA
Timothy Wombacher PA-C
Robert Yakos PA-C

VASCULAR SURGERY

VASCULAR DIAGNOSTICS
Joel Deonanan MD
Shawn Fleming MD
Phillip Moore MD
Stephen Motew MD
R. Bradley Thomason III MD
C. Raymond Workman MD
Jean Goff PA-C

Novant Health Heart & Vascular Institute providers in the greater Charlotte market

ADULT CARDIOLOGY
John Alexander MD
Akinyele Aluko MD
John Bailey MD
Martin Cutrone MD
David Dowdy MD
Adrian Dusa MD
R. Brian Fazia MD
Jonathan Fisher MD
Kevin Hsu MD
Robert Iwaoka MD
Richard Jacoby MD
Apur Kamdar MD
James Kay MD
Mark Kremers MD
Martin Kreshon Jr MD
Jonathan McLean MD
Telly Meadows MD
Edward McMillan MD
Michael Miller MD
Gary Niess MD
William Ntim MD
John Pasquini MD
Robert Price MD
Bernard Reen III MD
James Roberts MD
Kevin Sharkey MD
David Smith MD
Christopher Stephenson MD
Lokesh Tejwani MD
Joseph Trask Sr. MD
Ronald Uszenski MD
Jerome Williams Jr MD
Dennis Wilson MD
Leigh Younce MD

Janise Brewington FNP
Andrea Hicks NP
Vanessa La Loggia NP
Ann Michael PA
Kelly Thomas NP

CARDIOVASCULAR AND THORACIC SURGERY
D. Scott Andrews MD
Barry Chan MD
Charles Harr MD
Harold Howe Jr MD
Stephanie Betters NP-C
Joseph Matarese PA-C
Carlos Anzola PA-C
Brigitte Gamrat PA-C
Leah Hall PA-C
Myerlann Haser PA-C
William Wearmouth II PA-C

PEDIATRIC CARDIOLOGY
William Hammill MD
David Ohmstede MD

PREVENTION
Cardio-Pulmonary Rehab
Medical Nutrition Therapy
Thomas Barringer III MD
John Pasquini MD

VASCULAR SURGERY
Robert Allen MD
Lance Diehl MD
Stephanie Betters NP-C
Joseph Matarese PA-C
Carlos Anzola PA-C
Brigitte Gamrat PA-C
Leah Hall PA-C
Myerlann Haser PA-C
William Wearmouth II PA-C
Cleveland Clinic

INSTITUTE LEADERSHIP
Bruce W Lytle MD Chairman Sydell and Arnold Miller Family Heart & Vascular Institute
Daniel Clair MD Chairman Vascular Surgery
Steven E Nissen MD Chairman Robert and Suzanne Tomsich Department of Cardiovascular Medicine
Joseph F Sabik III MD Chairman Thoracic and Cardiovascular Surgery

CARDIOVASCULAR SURGERY
A Marc Gillinov MD
Douglas R Johnston MD
Bruce W Lytle MD
Kenneth R McCurry MD
Stephanie Mick MD
Tomislav Mihaljevic MD
Nader Moazami MD
José L Navia MD
Gösta B Pettersson MD PhD
Eric E Roselli MD
Joseph F Sabik III MD
Nicholas G Smedira MD
Edward G Soltesz MD
Lars G Svensson MD PhD

CARDIAC ELECTROPHYSIOLOGY AND PACING
Bruce D Lindsay MD Section Head
Peter Aziz MD
Bryan Baranowski MD
Mandeep Bhargava MD
Thomas Callahan IV MD
Daniel Cantillon MD
Lon W Castle MD
Mina K Chung MD
Thomas Dresing MD
Fetnat Fouad-Tarazi MD
Fredrick J Jaeger DO
Mohamed Kanj MD
David O Martin MD
Mark Niebauer MD
Walid I Saliba MD
Richard Sterba MD
Khaledoun Tarakji MD
Patrick J Tchou MD
Donald A Underwood MD
Niraj Varma MD
Oussama Wazni MD
Bruce L Wilkoff MD
CLINICAL CARDIOLOGY
Ben Barzilai MD Section Head
Ajay Bhargava MD
Caroline Casserly MD
Michael Faulx MD
Adam Grasso MD PhD
Donald F Hammer MD
Joel B Holland MD
Julie Huang MD
Carlos Hubbard MD PhD
Fuad Y Jubran MD
Umesh Khot MD
Richard Krasuski MD
David Majdalany MD
Steven E Nissen MD
Mehdi Razavi MD
Curtis Rimmerman MD
Michael B Rocco MD
Michael B Rollins MD
Terrence G Tulisiak MD
Donald A Underwood MD

INVASIVE CARDIOLOGY
Stephen Ellis MD Section Head
Christopher Bajzer MD
Corinne Bott-Silverman MD
Joseph G Cacchione MD
Leslie Cho MD
Khosrow Dorosti MD
Michael Faulx MD
Perry L Fleisher MD
Irving Franco MD
Frederick A Heupler Jr MD
Robert E Hobbs MD
Martin Joseph MD
Samir Kapadia MD
Richard Krasuski MD
Amar Krishnaswamy MD
A Michael Lincoff MD
Ravi N Nair MD
Russell E Raymond DO
Jonathan Scharfstein MD
Mehdi Shishehbor DO
Conrad C Simpfendorfer MD
John Stephens MD
E Murat Tuzcu MD
Vladimir Vekstein MD
Patrick L Whitlow MD
Forsyth Medical Center

3333 Silas Creek Parkway
Winston-Salem, NC 27103
Main Number 336-718-5000

Presbyterian Medical Center

200 Hawthorne Lane
Charlotte, NC 28204
Main Number 704-384-4000

Cleveland Clinic Main Campus

www.clevelandclinic.org/heartcenter
Cleveland Clinic

To promote quality improvement, Cleveland Clinic has created a series of Outcomes books similar to this one for many of its programs and affiliate programs. Designed for a physician audience, the Outcomes books contain a summary of our surgical and medical trends and approaches, data on patient volumes and outcomes, and a review of new technologies and innovations.

Although we are unable to report all outcomes for all treatments provided – omission of outcomes for a particular treatment does not necessarily mean we do not offer that treatment – our goal is to increase outcomes reporting each year. When outcomes for a specific treatment are unavailable, we often report process measures associated with improved outcomes. When process measures are unavailable, we may report volume measures; a volume/outcome relationship has been demonstrated for many treatments, particularly those involving surgical techniques.

In addition to our internal efforts to measure clinical quality, Cleveland Clinic supports transparent public reporting of healthcare quality data and participates in the following public reporting initiatives:

- Joint Commission Performance Measurement Initiative (qualitycheck.org)
- Centers for Medicare & Medicaid (CMS) Hospital Compare (hospitalcompare.hhs.gov)
- Ohio Department of Health (ohiohospitalcompare.ohio.gov)
- Cleveland Clinic Quality Performance Report (clevelandclinic.org/QPR)

Our commitment to providing accurate, timely information about patient care also will help patients and referring physicians make informed healthcare decisions.

We hope you find these data valuable. To view all our Outcomes books, please visit Cleveland Clinic’s Quality and Patient Safety website at clevelandclinic.org/quality/outcomes.