



UVA Cardiac Surgery

---

2013

---

Outcomes Report

---



Letter from John A. Kern, MD  
Chief, Division of Cardiothoracic Surgery



John A. Kern, MD

On behalf of the Divisions of Cardiothoracic and Vascular Surgery at University of Virginia Heart and Vascular Center, I am pleased to share our Outcomes Report for 2013. We hope this information will help our partnering physicians and their patients more accurately evaluate the quality of cardiovascular care we provide. We are grateful for the opportunity to care for your patients and will do our best to honor our commitment to patient safety and the highest standards of care.

The ratings produced by The Society of Thoracic Surgeons (STS) attest to both the breadth and quality of our care. These ratings incorporate the full range of factors that influence outcomes and are risk-adjusted, reflecting the severity of patients' illnesses. UVA is one of only 31 hospitals of more than 1,000 heart surgery programs reporting to the STS to achieve the highest, three-star rating for both Coronary Artery Bypass Grafting (CABG) and Aortic Valve Replacement (AVR).

The expertise of our care providers, our determination to offer the latest advances in treatment and our focus on quality are reasons for this achievement. These factors are critical in delivering outstanding care, but it is our culture of collaboration — with our multidisciplinary partners and with referring physicians — that enables us to reach our potential.

I would like to thank you for considering UVA Heart and Vascular Center for your patients. It is by devoting ourselves to the treatment of each individual that we achieve these cumulative outcomes.

Sincerely,

John A. Kern, MD, Stanton P. Nolan Professor of Thoracic and Cardiovascular Surgery  
Chief, Division of Cardiothoracic Surgery  
Surgical Director, Heart Transplantation/Mechanical Circulatory Support

UVA is among the top 3% of hospitals nationally that achieved an overall three-star rating — the highest available — from The Society of Thoracic Surgeons (STS) for both isolated CABG and AVR surgeries.







# The Heart Team

## **Collaboration defines the care of each patient.**

- Cardiac surgeons, vascular surgeons, cardiologists and interventionalists work together to provide each patient with an individualized care plan based on the most current medical literature and research available today.
- Multidisciplinary teams meet regularly to discuss each patient and refine their plans as conditions evolve.
- Specialists including cardiothoracic critical care physicians, nephrologists, pulmonologists, gerontologists, geneticists and endocrinologists take part in pre- and postoperative care and decision-making.
- Our highly skilled team, which includes nurses, technicians, physician assistants, nurse practitioners, therapists, perfusionists and other healthcare providers, makes a valued contribution to the care of each patient.
- Collaboration with referring physicians is a critical element in our efforts to ensure that each patient receives the best care while they are with us and when they return to their communities.

## **Collaboration is a key element in our strategy to elevate quality of care.**

- Our Quality Support Teams (QSTs) continuously evaluate our outcomes data.
- The teams have recently focused on data-driven, evidence-based improvements in intraoperative and postoperative blood use and fluid management, improved glucose control and acute kidney injury prevention.
- Additional teams are focused on improving patient education and decreasing hospital readmissions.

This collaborative approach with a relentless focus on quality patient care will continue to drive UVA's tradition of innovation.

## High-Volume and High-Quality Care

Over the last three years, the number of patients treated by our team has steadily increased. **In 2013, we performed over 1,000 cardiac operations.**

There are many reasons for this growth.

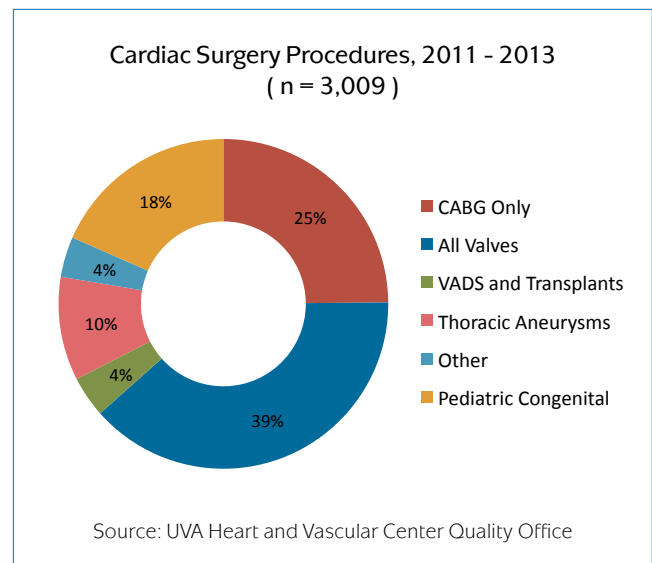
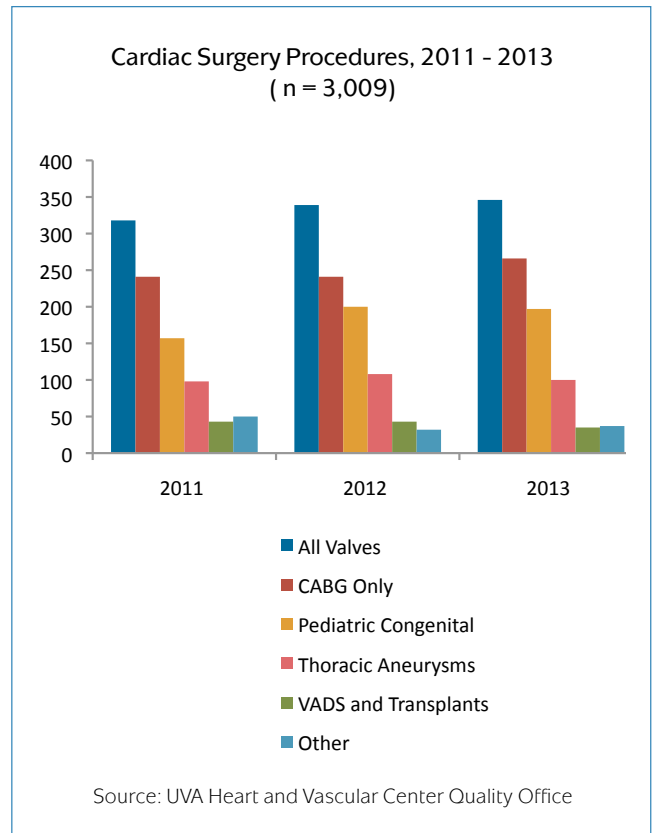
UVA offers patients:

- A full spectrum of care, including minimally invasive and catheter-based techniques, enabling us to select the most appropriate treatment plan for each patient
- Access to a large number of clinical trials in all disciplines, providing them the opportunity to receive treatments unavailable at many medical centers
- The resources of a regional and national leader in reoperative and complex cardiac surgery
- Recognized clinical expertise in such areas as percutaneous heart valve and left ventricular assist device (LVAD) therapies
- State-of-the-art facilities including four hybrid operating rooms, facilitating less invasive procedures as well as hybrid procedures that combine complex open surgery with endovascular procedures

Our cardiac surgery team treats extremely complex patients deemed inoperable by other institutions, while achieving excellent outcomes.

### Reoperative Surgery

We also perform a significant number of reoperations. Overall, 20% of our cardiac surgery patients have had previous cardiac surgery, and many have had more than one previous heart operation. We have developed a protocol-driven approach to cardiac reoperation that reduces morbidity and mortality in these very high-risk patients.



## Advancing Knowledge in Cardiac Surgery

As a member of the Cardiothoracic Surgical Trials Network, UVA is taking a leading role improving the surgical treatment for cardiovascular disease. We have been designated one of 10 core clinical centers for Cardiothoracic Clinical Trials by the National Institutes of Health. Participation in clinical trials enables us to offer patients options not yet available at other medical centers.

# 40

*Institutional Review Board protocols underway for retrospective medical records reviews*

# 13

*Prospective interventional clinical trials for cardiac surgery*

# 8

*Trials in the start-up phase*

# 7

*Trials with patients in follow-up*

## Publications

The University of Virginia Division of Cardiothoracic Surgery published 55 original scientific articles in peer-reviewed journals in 2013.

Recent publications include:

**Article:** Orthotopic heart transplant versus left ventricular assist device: A national comparison of cost and survival

**Publication:** *The Journal of Thoracic and Cardiovascular Surgery*, 2013 Feb; 145(2):566-73

**Senior Author:** John Kern, MD

**Award:** HCUP (Healthcare Cost and Utilization Project), Outstanding Article of the Year, 2013

**Article:** Mitral-valve repair versus replacement for severe ischemic mitral regurgitation

**Publication:** *The Annals of Thoracic Surgery*, 2013 Nov; 96(5):1539-44;

**Senior Author:** Gorav Ailawadi, MD

**Award:** The Society of Thoracic Surgeons, Richard E. Clark Award, 2013

**Article:** Mitral-valve repair versus replacement for severe ischemic mitral regurgitation

**Publication:** *The New England Journal of Medicine*, 2014 Jan; 370:23-32

**Senior Author:** Irving Kron, MD



## Surgical Outcomes Data

This report uses data compiled by The Society of Thoracic Surgeons (STS), which collects cardiac surgery outcomes from more than 1,000 medical centers in the United States. The data is risk-adjusted, reflecting the complexity of cases seen at each center. We have included data for only the more common cardiac surgery procedures.

### Coronary Artery Bypass Grafting (CABG)

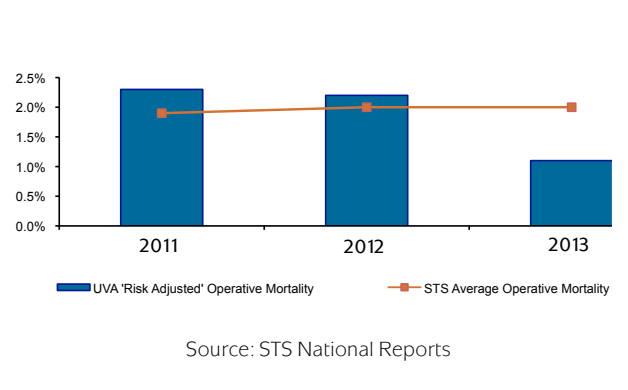
UVA surgeons performed 748 isolated coronary artery bypass grafting (CABG) procedures over the past three years. Of these patients:

- 35% of patients had congestive heart failure vs. STS benchmark of 18.1%
- 21.8% had an ejection fraction of less than 40% vs. STS benchmark of 15.8%
- 61.3% had a prior myocardial infarction (MI) vs. STS benchmark of 51.9%;
  - 33.8% within seven days of surgery vs. STS benchmark of 29%

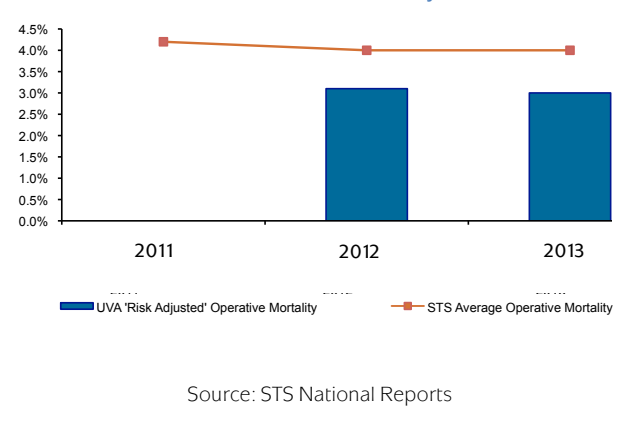
### Clinical Trial Highlights

- Clinical trials available to patients regardless of the severity of their illness
- The second-highest enrollment in the country in the EXCEL trial, which compares the use of a novel stent system for left main coronary artery disease versus traditional CABG surgery

Comparison of UVA's Risk Adj. Oper. Mortality to STS Average\*  
(\* STS Average is all STS Hospitals)  
Isolated CABG



Comparison of UVA's Risk Adj. Oper. Mortality to STS Average\*  
(\* STS Average is all STS Hospitals)  
AVR / CABG Combo Only



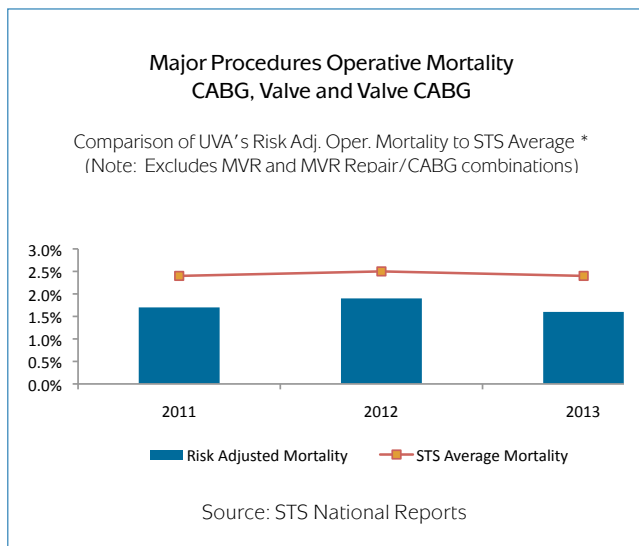


While UVA cares for patients who are extremely high risk, our operative mortality is less than expected (risk-adjusted rate of 1.1%).

*Based on data comparisons from January 2013 through December 2013. Source: STS National Reports*

### Quality Outcomes

UVA is among the 15% of hospitals nationally that achieved an overall three-star rating —the highest possible — from The Society of Thoracic Surgeons (STS) for coronary artery bypass grafting surgery.\*



### Exceeding NOF Standards

UVA Heart and Vascular Center exceeds National Quality Forum (NOF) standards for isolated CABG. This includes:

- Preoperative antibiotics and beta-blockers
- Use of internal mammary arteries
- Postoperative medications administration
- Operative mortality

UVA exceeds NOF benchmarks for three-year outcomes associated with the following:

- AVR Operative Mortality
- AVR and CABG Operative Mortality
- MVR Operative Mortality
- MVR and CABG Operative Mortality

## Valve Repair and Replacement

**UVA is one of the few centers in the nation capable of offering the full breadth of treatment for valve disease, spanning percutaneous and minimally invasive procedures to complex open valve surgery and reoperations.**

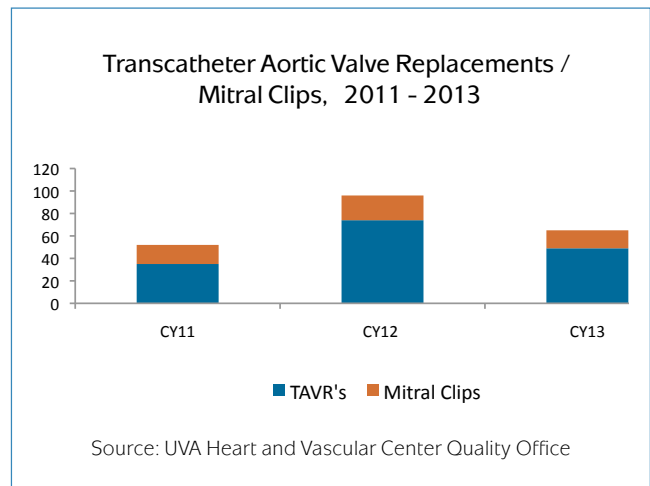
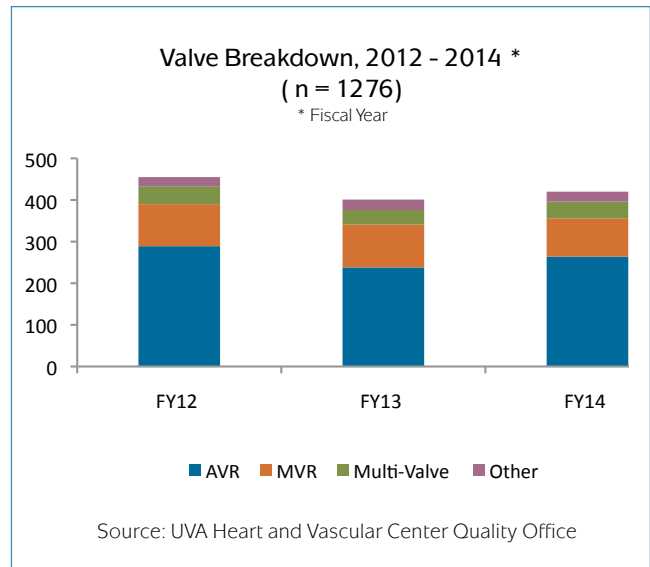
Our valve repair and replacement program offers patients:

- Percutaneous options including transcatheter aortic valve replacement (TAVR), the MitraClip® mitral repair system and pulmonary valve implantation
- A rapidly growing minimally invasive repair and replacement program for aortic, mitral and tricuspid valves is recognized across the region
- A full range of traditional repair and replacement procedures for all valves, including a high proportion of complex reoperations, as well as valve surgery combined with other cardiac procedures

**In fiscal year 2013, UVA surgeons performed 420 valve surgeries, exceeding the average volume at medical centers reporting to STS.**

- In calendar year 2013, we also performed 49 TAVRs and 16 MitraClip procedures.
- Despite performing increasingly complex surgeries, our mortality rates for all types of valve surgery are below average.

Much of this success can be attributed to our collaborative approach, which integrates care from cardiologists, radiologists, anesthesiologists, intensivists and other specialists to determine the optimum course of care for each patient. It also reflects the experience of our surgeons, who have been performing valve surgery for decades.



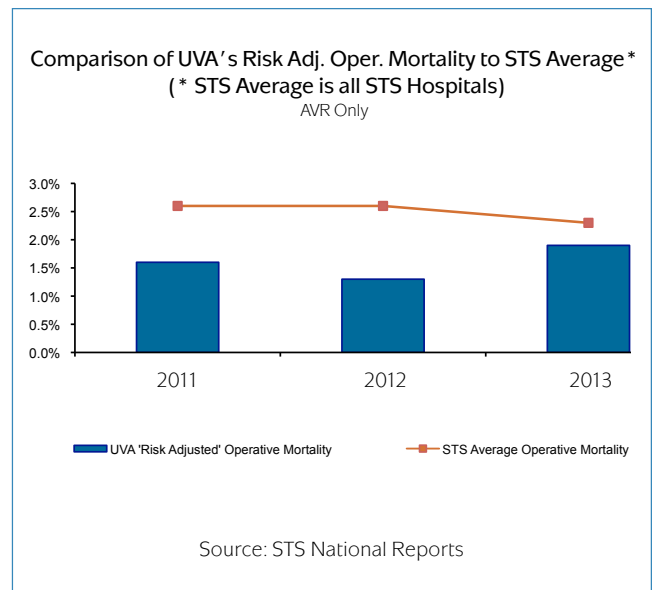
We have established partnerships with other hospitals to facilitate the introduction of new valve technology to other communities and to set the stage for outstanding valve surgery outcomes across the state.

## Aortic Valve Surgery

UVA offers every form of aortic valve replacement or repair and has been instrumental in the development of minimally invasive and percutaneous techniques.

- UVA surgeons performed 791 aortic valve surgeries over the past three fiscal years, with a mortality and morbidity rate below our STS peers.
- We offer patients every form of aortic valve replacement.
- UVA was the first transcatheter aortic valve replacement (TAVR) site in Virginia.
- We are one of 26 sites — and the only site in Virginia — selected for the PARTNER Trial.

Thanks to our expertise in aortic valve surgery, we have been repeatedly selected to participate in clinical trials of both next-generation transcatheter devices and sutureless valves for traditional procedures. Participation in these trials enables us to offer patients options that are available at very few medical centers in the United States.



## Clinical Trial Highlights

- Participating in clinical trials of the INTUITY® Elite Valve system and the Perceval® S valve, both sutureless aortic valves. Among other benefits, sutureless valves shorten the amount of time patients are on a cardiopulmonary bypass machine.
- Taking part in a trial investigating the use of SAPIEN 3 for intermediate risk patients. This allows us to offer TAVR therapy to a greater range of patients.

UVA is among the top 8% of hospitals that achieved an overall three-star rating — the highest possible — from The Society of Thoracic Surgeons (STS) for aortic valve replacement surgery.

*Based on data comparisons from January 2011 through December 2013.  
There is no comparable rating system for mitral valve replacement or tricuspid valve surgery.*





“To provide optimal patient care, the Advanced Cardiac Valve Center uses a collaborative approach that integrates care from cardiologists, radiologists, anesthesiologists, intensivists and other specialties.”

*Co-directors of the Advanced Cardiac Valve Center: Gorav Ailawadi, MD, Thoracic and Cardiovascular Surgery, and Scott Lim, MD, Interventional Cardiology*

## Mitral Valve Surgery

UVA surgeons have a long history of expertise in mitral valve repair and replacement and have developed many valve repair techniques now used across the country. Our surgeons were the first in the U.S. to perform MitraClip repair. Mitral surgery outcomes have remained excellent with an observed-to-expected mortality of 0.6 in 2013.

Surgical achievements include:

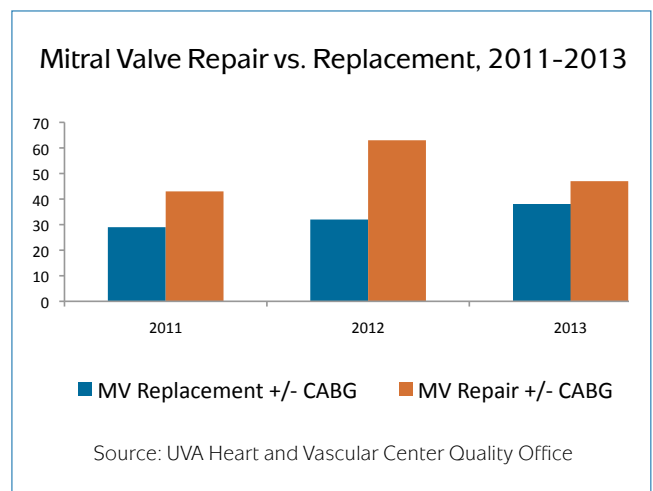
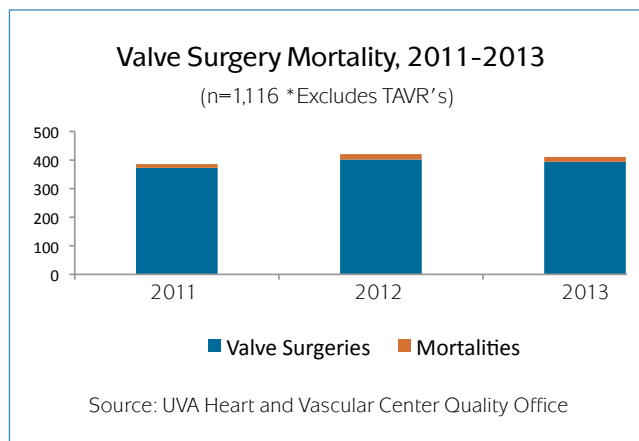
- Established high volume minimally invasive mitral surgery program
- Significant expertise with complex and reoperative valve surgery. Over 35% of our valve cases have undergone previous heart surgery.

## Volume

- 16 MitraClip procedures in 2013
- 92 mitral valve operations in 2013
- 68 isolated mitral valve repair or replacements

## Clinical Trial Highlights

- One of 22 clinical centers in North America to participate in NIH-sponsored clinical trials to determine optimal mitral surgery (repair or replacement) to treat patients with severe or moderate ischemic mitral regurgitation



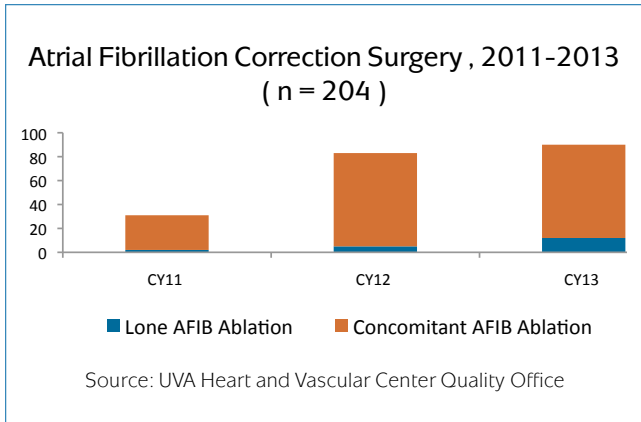
## Arrhythmia

UVA is a leader in developing surgical approaches for both atrial fibrillation and ventricular tachycardia.

Our program accomplishments include:

- A nationally recognized Atrial Fibrillation Center with a referral region spanning the Southeast
- 204 procedures for atrial fibrillation performed over the past three years, including minimally invasive, sternal sparing off-pump thoracoscopic procedures and concomitant MAZE procedures
- Comprehensive and aggressive strategies to treating difficult cases, in collaboration with UVA electrophysiologists
- Development of epicardial ablation techniques for ventricular tachycardia, in partnership with UVA cardiologists

**UVA was the first in the nation, in 2008, to perform a dual endocardial and epicardial hybrid ablation for atrial fibrillation,** combining minimally invasive surgical ablation with catheter-based approaches. This hybrid approach has success rate above 85% — much higher than electrophysiological approaches alone.



Whenever advisable, we ablate atrial fibrillation when performing other cardiac procedures as a way of minimizing long-term stroke risk. This practice is unusual; nationally, less than 40% of patients who are eligible for ablation at the time of open heart surgery receive this treatment. In cases where atrial fibrillation cannot be eliminated, we frequently excise or exclude the left atrial appendage to potentially reduce stroke risk.

### Lead Extraction

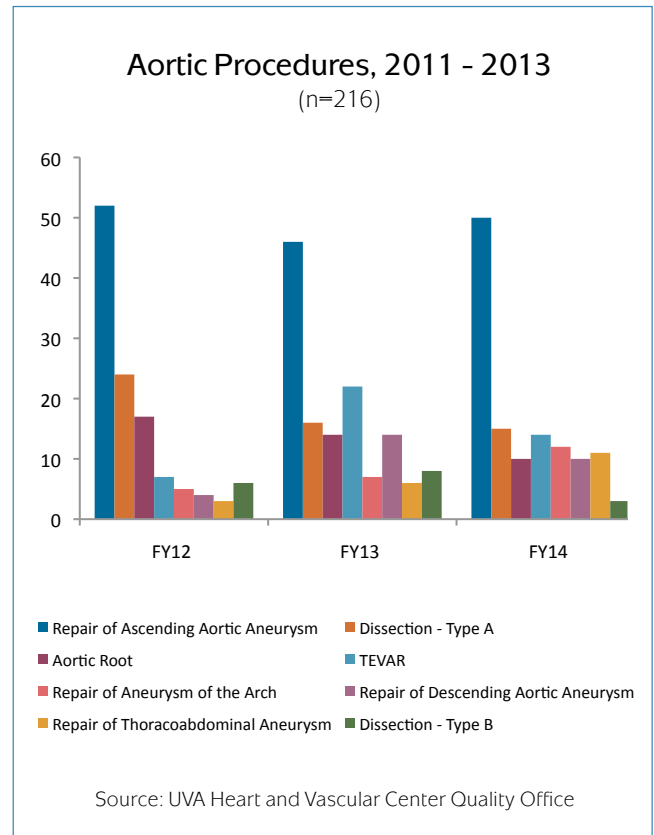
Our close partnership with UVA cardiologists has also led to UVA becoming a regional center for lead extractions. We employ laser techniques in our hybrid operating rooms, with cardiac surgeons working side by side with electrophysiologists. This multidisciplinary approach maximizes patient safety while minimizing risk of complications.

### Clinical Trial Highlights

- One of seven sites assessing the safety of using minimally invasive techniques to exclude the left atrial appendage (using the AtriClip® device) to reduce stroke risk for atrial fibrillation patients who cannot tolerate anticoagulants
- Involved in a multicenter, NIH-sponsored trial of ablating atrial fibrillation at the time of mitral valve surgery to study long-term outcomes of various lesion patterns

## UVA Program for Complex Aortic Disease

The University of Virginia is a regional referral center for all aspects of aortic and vascular diseases. Our cardiac and vascular surgeons have performed more than 2,500 major vascular procedures and more than 200 complex aortic procedures over the last three years. These have ranged from minimally invasive or percutaneous endovascular aneurysm repair to complex staged total aortic replacement of the ascending aorta, aortic arch, descending thoracic aorta and abdominal aorta.





Aortic and vascular surgical achievements at UVA include:

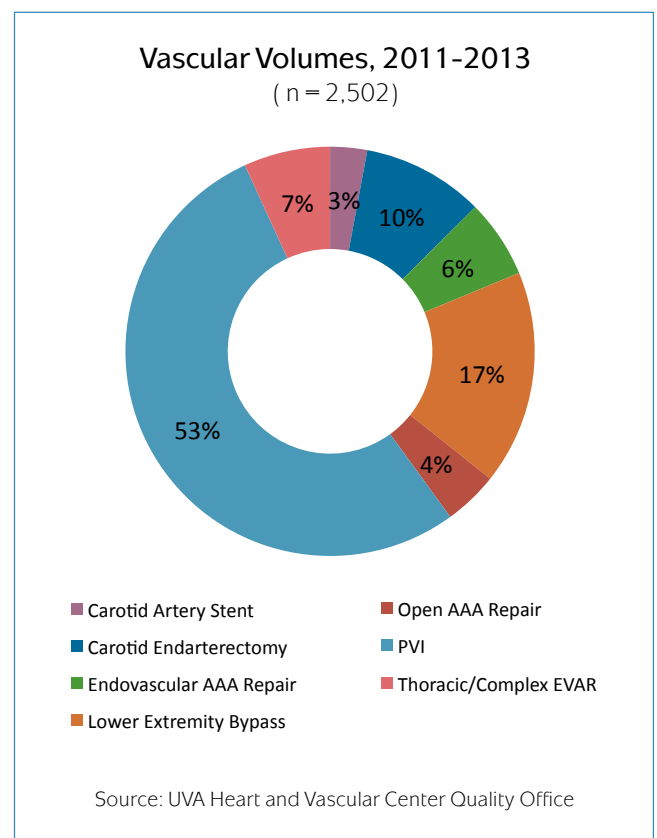
- **An aortic surgery team with the region's most extensive experience treating aortic dissection, thoracoabdominal aneurysms and connective tissue disorders, such as Marfan syndrome**
- The first hospital in Virginia to perform FDA-approved thoracic endovascular aortic aneurysm repair (TEVAR)
- Development of treatments such as hybrid thoraco-abdominal and arch aneurysm repairs, which combine open and endovascular procedures. These techniques reduce the extent of open surgery and, we believe, significantly improve outcomes for patients
- Successful maintenance of low rates of mortality and morbidity for both elective and emergency procedures when compared to STS averages, despite the complexity of the cases we treat

### Genetics

In addition, we have a world-class genetics program to evaluate patients with aortic pathologies and connective tissue disorders and screen their at-risk family members. Our anesthesia team uses the latest techniques to minimize complications of aneurysm repairs through the use of spinal drains and neurological monitoring to reduce the risk of stroke and paralysis.

### Research

- The Vascular Surgery Research Laboratory, led by Dr. Gilbert Upchurch Jr. and Dr. Gorav Ailawadi, conducts a wide range of research projects sponsored by the National Institutes of Health and other organizations.
- The lab is exploring such issues as the molecular and cellular causes of aneurysm formation, the application of novel treatments like stem cells and the identity of targets for drug discovery.

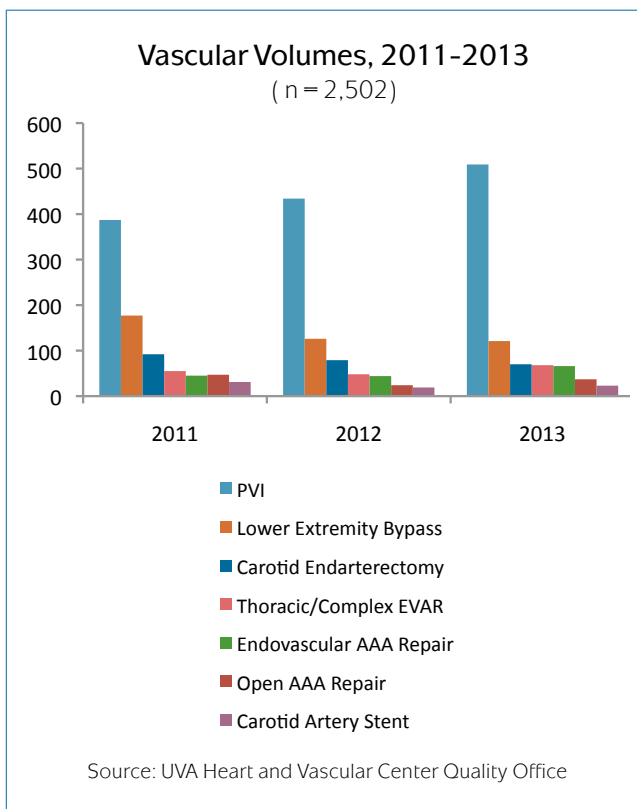


## Clinical Trial Highlights

- Numerous clinical trials of new treatments for aneurysms and aortic disease, including new stent grafts
- Active participation in the International Registry of Acute Aortic Dissection (IRAD), a consortium of research centers examining data on all reported cases of acute aortic dissection and identifying breakthroughs in diagnosis and treatment
- The only IRAD site in Virginia

## Community Outreach

UVA has recently established an aortic alert process, enabling emergency rooms and referring physicians to rapidly affect a transfer for anyone with newly diagnosed acute aortic disaster.



## Heart Failure and Transplant

At UVA, we provide care across the full spectrum of heart failure treatment, from ventricular assist devices to heart transplantation. **UVA is the only adult and pediatric heart transplant program in Virginia and the only program associated with a Comprehensive Transplant Center.**

- We have performed 426 heart transplants since 1989, making us one of the most experienced heart transplant centers in Virginia.
- Our survival statistics for heart transplant meet or exceed national averages.

We are also widely recognized for our expertise with left ventricular assist devices (LVADs). **UVA offers the latest LVAD technology as a bridge to transplant or as a destination therapy, for children as well as adults.**

Our LVAD program highlights include:

- Development of a novel technique to minimize the incidence of driveline infection after LVAD therapy, yielding one of the lowest driveline infection rates in the country
- Postoperative in-house length of stay after LVAD implantation that is one of the lowest in the country
- Readmission rate after LVAD that is also one of the lowest in the country
- One of the best survival rates as measured in observed-to-expected survival after LVAD therapy
- 90% to 95% of adult heart transplants for the last three years have been in patients who have been saved with an LVAD and who have recovered well enough to receive a heart transplant.



“I consider myself extraordinarily lucky to have lived in this era of medicine, and also lucky to have been a beneficiary of UVA’s broad spectrum of cardiac care.”

*Mark Wolf, LVAD (left ventricular assist device) patient*

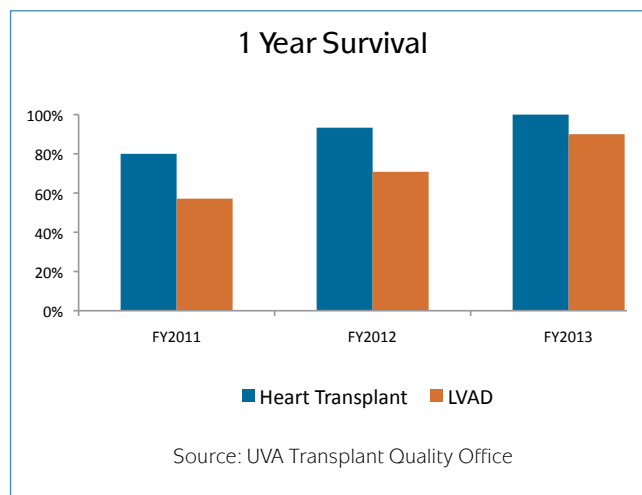


## Heart Failure and Transplant

(Continued)

### Clinical Trial Highlights

- Drug studies designed to reduce and better manage the effects of organ transplant rejection and reduce complications
- One of the few centers participating as a site for the latest release of LVAD technology
- Participation in new trials that will utilize stem cells, extracellular matrix and other novel medical therapies to repair the hearts of patients with LVAD implants



### Collaboration

We partner closely with referring physicians, providing consultation as necessary to ensure successful follow-up care. We also work closely with emergency rooms at local hospitals and rescue squads, providing the training they need to care for people with LVAD implants in their communities.

### Joint Commission Certification

UVA is one of the few facilities in the region with Advanced Certification from the Joint Commission for Heart Failure and Ventricular Assist Devices.

### Award-Winning ECMO Service

- UVA offers extracorporeal membrane oxygenation (ECMO) therapy to patients with failing hearts and lungs.
- Patients with severe respiratory failure — including those with acute respiratory distress syndrome, pulmonary embolism, pneumonia and acute exacerbations of chronic lung disease (COPD, asthma and cystic fibrosis) — who are failing on conventional mechanical ventilatory support can often be rescued with this life-saving technology.
- UVA's survival among this group is over 80%, well surpassing the national average of 56% survival to hospital discharge.

In 2014, the UVA Extracorporeal Life Support Program was honored by the Extracorporeal Life Support Organization (ELSO) with the Award of Excellence and was designated an ELSO Center of Excellence.

## Pediatric Congenital Heart Surgery

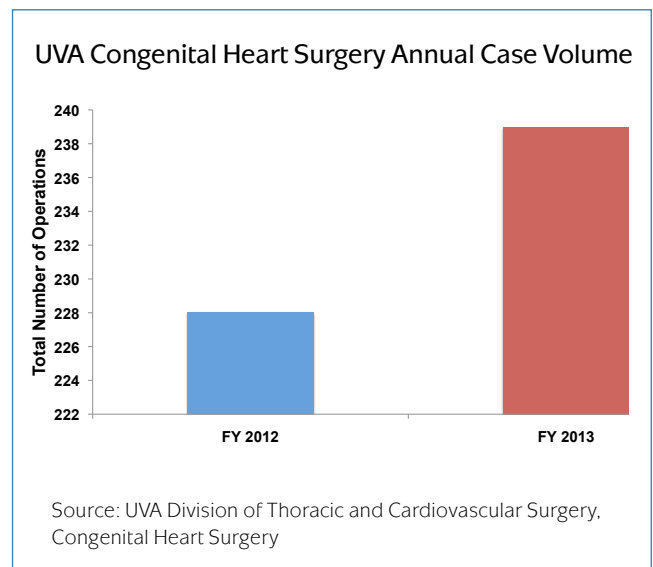
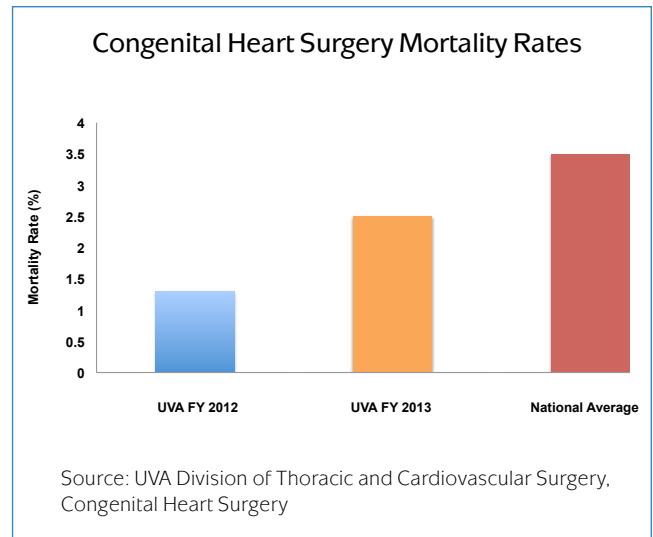
- Over the last two years, UVA Pediatric Congenital Heart Surgery Program performed almost 500 surgeries.
- Our operative mortality rate was 2%, well below the national average despite a complex case mix index.

### UVA is Virginia's only pediatric heart transplant program.

In the last 20 months, UVA performed 14 pediatric heart transplants, including our first ABO-incompatible heart transplant and two instances in which a ventricular assist device was used as a bridge to transplantation.

We also treat the full range of congenital heart and vascular defects. We perform:

- Single ventricle palliation surgeries, including the Norwood procedure
- Arterial switches
- Truncus arteriosus repairs
- Total anomalous pulmonary venous return repairs
- Interrupted aortic arch repairs
- Complex aortic arch reconstructions
- Complex valve repairs, among a host of complicated procedures
- A high percentage of reoperations





“He’s doing spectacularly.  
This is absolutely what we hope for.”

*Thomas L’Ecuyer, MD, with Dylan Willis, peds heart transplant patient*

## Pediatric Congenital Heart Surgery (Continued)

The key to our ability to perform a broad range of procedures with low operative mortality is the caliber of the team we have assembled and the ease with which team members work together.

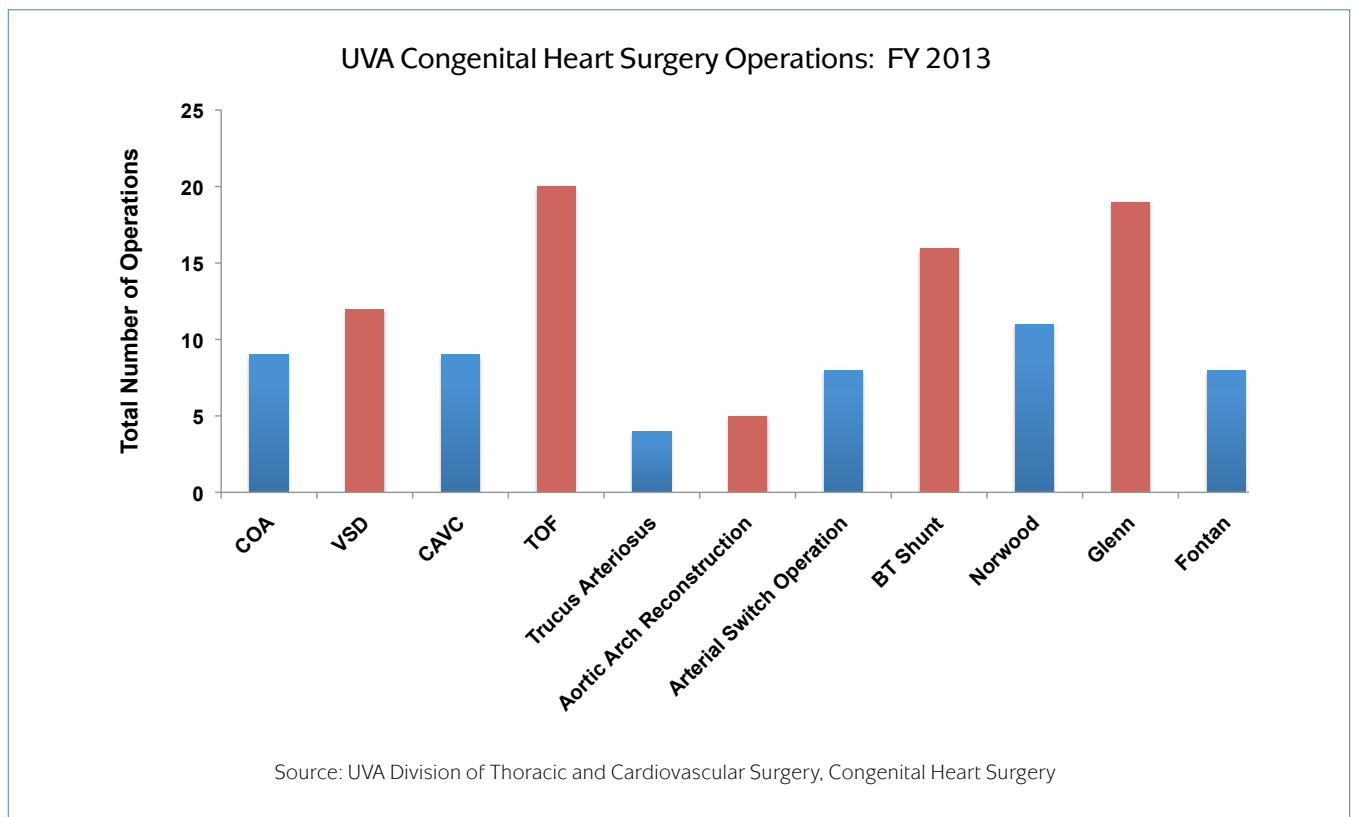
In the last 18 months, we have added several new pediatric specialists, including:

- A new chief of pediatric cardiology
- A pediatric interventionalist
- Two pediatric cardiologists specializing in echocardiography and fetal echocardiography

Our operating room is staffed by dedicated pediatric specialists, including pediatric cardiac anesthesiologists and cardiac perfusionists.

### Most recently, we have opened a dedicated Pediatric Cardiac Intensive Care Unit (PICU)

staffed with nurses and intensivists focusing on the postoperative care of babies and children undergoing congenital heart surgery. Our recently hired pediatric intensivists, who are doubly boarded in pediatric cardiology and pediatric intensive care, lead this team.







# Our Surgical Team



## **Gorav Ailawadi, MD**

Thoracic and  
Cardiovascular Surgery  
434.924.5052  
gorav@virginia.edu



## **John Kern, MD**

Cardiothoracic and  
Vascular Surgery  
434.982.4301  
jkern@virginia.edu



## **Kenneth Cherry, MD**

Vascular and  
Endovascular Surgery  
434.243.7052  
kjc5kh@virginia.edu



## **Irving Kron, MD**

Cardiothoracic and  
Vascular Surgery  
434.924.2158  
ilk@virginia.edu



## **James Gangemi, MD**

Adult and Pediatric Congenital  
Heart Surgery, Pediatric Cardiac  
Transplantation  
434.243.6828  
jgangemi@virginia.edu



## **Margaret Tracci, MD**

Vascular and  
Endovascular Surgery  
434.243.9493  
msc7s@virginia.edu



## **Ravi Ghanta, MD**

Thoracic and  
Cardiovascular Surgery  
434.924.5052  
rghanta@virginia.edu



## **Curtis Tribble, MD**

Thoracic and  
Cardiovascular Surgery  
434.243.9250  
ctribble@virginia.edu



## **James Isbell, MD**

Thoracic and  
Cardiovascular Surgery  
434.243.6443  
james.isbell@virginia.edu



## **Gilbert Upchurch Jr., MD**

Vascular and  
Endovascular Surgery  
434.243.6333  
gru6n@virginia.edu



## **Leora Yarboro, MD**

Thoracic and  
Cardiovascular Surgery  
434.243.6828  
ljt9r@virginia.edu

Refer a patient

**800.552.3723**

