VOLUME AND 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. Included is the data for the more common cardiac surgery procedures. Often there is a relationship between higher volumes and favorable outcomes. The ratings produced by The Society of Thoracic Surgeons (STS) attest to both the breadth and the quality of care our patients receive. These ratings incorporate the full range of factors that influence outcomes and are risk-adjusted, reflecting the severity of patients’ illnesses.

TRANSPARENCY
We are transparent in our outcomes and discuss the outcomes regularly at the Quality Support Team meetings. Cardiac, vascular, thoracic, heart failure and advanced valve multidisciplinary teams meet once a month to continuously evaluate outcomes data. The teams are focused on data-driven, evidence-based improvements. This collaborative approach places the patient at the center of our quality initiatives.

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On behalf of the Divisions of Cardiac, Thoracic, and Vascular Surgery at the University of Virginia Heart and Vascular Center, we are pleased to share our latest Activity Report, outlining another year of achievements and milestones. We hope this information will help our partnering physicians and their patients accurately evaluate the quality of care we provide.

We are grateful for the partnerships we have been forming across Virginia. The increasing challenges and demands of healthcare delivery require us to collaborate in ways unimaginable even a decade ago. We are proud of what has been accomplished by our divisions and by the University of Virginia Medical Center. However, we are keenly aware that these advances would not be possible without the trust of our referring physicians and our patients.

The expertise of our care providers, our determination to offer the latest advances in treatment and our focus on quality are some of the reasons for the continued success of our programs. We have built upon a strong foundation of innovation, groundbreaking research and a tradition of excellence. We have strengthened our culture of collaboration, expanding our relationships within our multidisciplinary teams and with our referring physicians. This collaboration and teamwork have created an environment that enables the development of innovative treatments, the introduction of state-of-the-art technology and our participation in game-changing clinical trials.

Recently, the University of Virginia was recognized in the US News and World Reports as the #1 hospital in Virginia. UVA was also recognized as a nationally ranked hospital in three adult specialties and four children's specialities, placing us among the top 3 percent of hospitals in the nation. Five UVA specialties are honored as high performing, placing them among the top 10 percent in the U.S. We are also proud of our Magnet recognition from the American Nurses Credentialing Center for quality patient care, excellence in nursing care and innovative nursing practices. This award reflects the level of dedication and expertise of our nurses and the support of medical center leadership.

We would like to thank you for continuing to consider UVA for the care of your patients. Your confidence in us and our devotion to the treatment of each individual patient have enabled us to achieve these outcomes. We are grateful for and honored by the opportunity to care for your patients. We will do our best to uphold our commitment to patient safety and to the highest standards of patient care.

Sincerely,

John A. Kern, MD  Gilbert R. Upchurch Jr., MD  Christine Lau, MD
As cardiovascular and thoracic surgeons, our services are aligned around UVA Heath System’s six goals:

- To become the safest place to receive care
- To be the healthiest work environment
- To provide exceptional clinical care
- To generate biomedical discovery that better the human condition
- To train the healthcare workforce of the future in teams
- To ensure value-driven and efficient stewardship of resources

We achieve these goals by the following:

- Participating in daily, unit-based leadership huddles and activities, which focus on safety and improving the patient care experience, outcomes and clinical care
- Remaining actively involved in the Virginia Cardiac Surgery Quality Initiative, the West Virginia and Virginia Vascular Quality Initiative and the Virginia Vascular Study Group
- Integrating clinical research programs into practice, which allows us to bring novel therapies to patients
- Participating in 14 registries, including The Society of Thoracic Surgeons National Database and the Society of Vascular Surgery’s Vascular Quality Initiative
- Dedicating our Quality Support Teams (QSTs) to continuously evaluating registry outcome data and focusing on evidence-based improvements for our patients
- Ensuring our clinical teams keep the patient at the center, developing interdisciplinary partnerships that strengthen collaboration to define and improve the care each patient receives

### Patient Centered Focus on Quality

U.S. News & World Report

Recognized as the #1 hospital in Virginia.

UVA was recognized as a **nationally-ranked** hospital in three adult specialties and four children's specialties, placing us among the top 50 for these specialties. Included in the national ranking:

**Pediatric Cardiology & Heart Surgery**

UVA was honored in five specialties as **high performing**, placing these specialties among the top 10 percent in the U.S. included as one of the five specialties honored:

**Cardiology & Heart Surgery**

UVA also received **high performing marks** in nine adult procedures / conditions. Five of the adult procedures / conditions included are

- Abdominal Aortic Aneurysm Repair
- Aortic Valve Surgery
- Heart Bypass Surgery
- Heart Failure
- Lung Cancer Surgery

Source: 2016 U.S. News and World Report
Patient Centered Focus on Quality (continued)

**COMPLEX PATIENTS, COMPLEX CARE**

We offer our patients:

- Access to the latest clinical trials
- Regional and national leaders in reoperative and complex surgery
- Full-spectrum care, including minimally invasive surgeries, catheter-based techniques, hybrid procedures and robotics
- Recognized clinical expertise in percutaneous heart valve and hybrid vascular procedures, as well as advanced heart failure therapies such as left ventricular assist devices (LVADs)
- Dedicated multidisciplinary teams

**DEDICATED TEAMS**

Our Cardiac Anesthesiology and Intensivist teams staff the Thoracic and Cardiovascular Intensive Care Unit, manage cardiovascular, thoracic operating rooms and hybrid ORs. These experts have:

- Advanced fellowship training in cardiothoracic anesthesiology and critical care
- Specialized training in intraoperative transesophageal echocardiogram, single-lung ventilation, advanced hemodynamic monitoring and invasive monitoring techniques

**CARDIAC SURGERY QUALITY INITIATIVE**

UVA is one of the original three founding hospitals of the Virginia Cardiac Surgery Quality Initiative (VCSQI), a voluntary consortium of 18 hospitals and 14 cardiac surgical practices in Virginia, founded in 1996. VCSQI members:

- Exchange information to improve the quality of care
- Develop and implement protocols to reduce complications.
- Adopt quality measures in cardiac surgery - National Quality Forum (NQF)
- Formulate policies on pay-for-performance programs

**VASCULAR QUALITY INITIATIVE**

The Society for Vascular Surgery’s Vascular Quality Initiative (SVS VQI) is designed to improve the quality, safety, effectiveness and cost of vascular healthcare by collecting and exchanging information. UVA is an active member of the Vascular Quality Initiative (VQI).
QUALITY OUTCOMES

Our team is committed to continuing to improve our outcomes. Our dedication is reflected in achieving three-star ratings from the STS in 2013 and 2014 for isolated CABG and isolated AVR. UVA received a three star rating for AVR in 2015 and has maintained a three star rating in isolated AVR since 2009.

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

- AVR and CAGB operative mortality
- Mitral valve repair or replacement operative mortality

MAJOR PROCEDURES

STS defines major procedures to include isolated CABG, valve, and combined valve and CABG procedures.

PRIOR CARDIAC SURGERY

UVA performs reoperative surgery, which contributes to the complexity of our cases.

Percentage of Patients Who Have Undergone Previous Cardiac Surgery | 2015

<table>
<thead>
<tr>
<th>Procedure</th>
<th>UVA</th>
<th>STS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated CABG</td>
<td>2.5%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Isolated AVR</td>
<td>18.0%</td>
<td>11.7%</td>
</tr>
<tr>
<td>AVR/CABG</td>
<td>5.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td>MV Repair</td>
<td>9.1%</td>
<td>5.2%</td>
</tr>
<tr>
<td>MV Replacement</td>
<td>44.4%</td>
<td>29.4%</td>
</tr>
<tr>
<td>CAGB MVR Repair</td>
<td>16.7%</td>
<td>4.8%</td>
</tr>
<tr>
<td>CAGB MVR Replace</td>
<td>28.6%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>

Source: 2015 STS National Adult Cardiac Surgery Database Report

THE O/E MORTALITY RATIO

The observed to expected (O/E) risk-adjusted mortality (death) rate measures how we are performing in relation to what is expected given our patient population. The O/E takes into account how sick the patients are before surgery.

- A low O/E ratio indicates a better-than-expected outcome and a high O/E ratio indicates a poorer-than-expected outcome.
- A ratio of less than 1.0 means that fewer patients died than expected based on the performance of other hospitals, as adjusted for patients with the same types and severity of medical problems.

The Cardiac Surgery STS report provides reports on “Like Group” and the STS national average. “Like Group” refers to hospitals similar to UVA in respect to annual case volume and presence or absence of a surgical residency program.

Major Procedures Risk-Adjusted O/E | 2015

<table>
<thead>
<tr>
<th>Procedure</th>
<th>UVA</th>
<th>LIKE GROUP</th>
<th>STS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Mortality</td>
<td>0.53</td>
<td>0.88</td>
<td>1.0</td>
</tr>
<tr>
<td>In-Hospital Mortality</td>
<td>0.57</td>
<td>0.93</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: 2015 STS National Adult Cardiac Surgery Database Report

* Comparison of STS mean is all STS Hospitals
Source: 2015 STS National Adult Cardiac Surgery Database Report
Coronary Artery Bypass Grafting

UVA surgeons performed 798 isolated coronary artery bypass grafting (CABG) procedures over the past three years.

Isolated CABG Operative Mortality
Comparison of UVA’s Risk-Adjusted Operative Mortality to STS Mean* 

Source: 2015 STS National Adult Cardiac Surgery Database Report

OBSERVED/EXPECTED (O/E)
In-hospital and operative mortality risk-adjusted rates remain below the national benchmark set by the STS.

Isolated CABG Risk-Adjusted O/E | 2015

<table>
<thead>
<tr>
<th></th>
<th>UVA</th>
<th>LIKE GROUP</th>
<th>STS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Mortality</td>
<td>0.75</td>
<td>0.82</td>
<td>1.0</td>
</tr>
<tr>
<td>In-Hospital Mortality</td>
<td>0.74</td>
<td>0.87</td>
<td>1.0</td>
</tr>
<tr>
<td>Major Complications or Op Mortality</td>
<td>1.07</td>
<td>1.01</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: 2015 STS National Adult Cardiac Surgery Database Report

EXCEEDING STANDARDS
UVA Heart and Vascular Center exceeds National Quality Forum (NQF) standards for isolated CABG. These standards include:

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

Our patients have a higher-than-average incidence of co-morbidities such as diabetes, congestive heart failure, arrhythmia, prior myocardial infarction, low ejection fraction of < 40%, chronic lung disease, cerebral vascular disease and peripheral artery disease. Despite our high-risk patient populations, our risk-adjusted mortality is less than expected, with a rate of 0.74 for in-hospital and 0.75 for operative mortality in 2015.

Source: 2015 STS National Adult Cardiac Surgery Database Report

Isolated CABG Risk-Adjusted Complications | 2015

<table>
<thead>
<tr>
<th></th>
<th>UVA</th>
<th>STS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged Ventilation</td>
<td>8.1%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>3.0%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Permanent Stroke</td>
<td>1.4%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Any Reoperations</td>
<td>4.8%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Deep Sternal Wounds</td>
<td>0.3%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Source: 2015 STS National Adult Cardiac Surgery Database Report
Dr. Irving Kron was honored as one of UVA’s distinguished Scientists in 2016. Dr. Kron received his medical degree in 1975 from the Medical College of Wisconsin. Dr. Kron came to UVA in 1980 to receive his thoracic cardiovascular surgery training. In 1982 he became a professor in the School of Medicine. He since has held several positions at the University, including president of the clinical staff, chief of vascular surgery, co-director of cardiopulmonary transplantation, chief of thoracic cardiovascular surgery, and, his current position, chair of the Department of Surgery.

Dr. Kron was nominated for the Distinguished Scientist Award for his preeminence as a cardiovascular surgeon and his leadership, skill and reputation as a cardiovascular researcher. The recipient of numerous awards in his field, Kron has written 450 publications, including 160 articles in The Annals of Thoracic Surgery – making him the most prolific author in that journal’s 50-year history.

His laboratory research focuses on the particular injuries to tissue that affect the outcomes of lung transplantation and cardiac surgery, and he investigates ways to mitigate such injury and improve long-term outcomes. Kron has investigated therapies in a clinical trial and is researching, with funding from the National Institutes of Health, a novel technique to recondition injured donor lungs, and thereby increase the availability of donor lungs for waiting patients. His other work includes playing a leading role in the creation of a multi-institutional cooperative for clinical trials in cardiothoracic surgery, which has resulted in studies that provide practice-changing insight in cardiovascular medicine.

“Dr. Kron epitomizes the surgeon-scientist in that he has made major contributions both in basic sciences and clinical research, while remaining a highly respected clinician and educator,” his nominators wrote.

Source: www.news.virginia.edu
EXPRESSION OF GRATITUDE

“(Dr.) is my hero. I entered the hospital knowing that a second heart valve surgery in seven months was risky. Now I am at the end of rehab and feel strong and well. Everyone, from receptionists to the entire medical staff, took outstanding care of a "sick old woman." “The care shown to my husband and me was above and beyond the call of duty - Thanks to everyone, beginning with the valets, who made it possible for me to survive.”

“(Dr.) and staff literally saved my life. I would not be here today if not for (their) exceptional skills and care.”

"Amazing staff at UVA...Worth the drive for Exceptional Quality of Care we have received."

“We were very impressed with the warmth of those who helped us thought the steps.”

Visits in (the) office is like going to visit a good friend. They make you feel comfortable and cared about. Never rushed. Always talked to with respect. Wonderful doctor and staff.”

“At UVA, if all staff; medical, customer service, office personnel and hospital staff; can be evaluated by services recieved...You 'guys' get an A+ in my book. Thank you..."

“The staff is courteous, the facilities are excellent, I would recommend it to anybody.”
Heart Valve Repair and Replacement

In 2015, UVA surgeons performed 530 total valve surgeries. UVA offers a full range of treatment options for valve patients including:

• Traditional open repair and replacement procedures for all valves
• Minimally invasive surgical repair and replacement program for aortic, mitral and tricuspid valves
• High proportion of complex reoperations
• Percutaneous options, including transcatheter aortic valve replacements (TAVR) through clinical trials and FDA-approved devices
• Percutaneous mitral repair (MitraClip®) and pulmonary valve implantation

Valve Procedures 2013-2015 (n=1221)

Source: UVA Heart and Vascular Center Quality Office

CLINICAL TRIAL HIGHLIGHTS

We are active in clinical research for valve disease. We are participating in multiple trials for traditional valve replacement, transcatheter valve and neuroprotection.

Open valve replacement trials
• Sorin Mitroflow™ Aortic Valve trial
  John Kern, MD, National Principal Investigator
• CardioThoracic Surgical Trials Network Tricuspid trial – concomitant repair of tricuspid valve during mitral surgery
• CardioThoracic Surgical Trials Network - neuroprotection trial for patients undergoing aortic valve surgery

Transcatheter valve trials
• Partner III™ TAVR trial
• Direct Flow™ for TAVR patients
  D. Scott Lim, MD, National Principal Investigator
• Scout - Mitralign™ trial for percutaneous tricuspid repair

Dr. Gorav Allawadi, Adult Cardiovascular and Cardiac Transplant Surgeon

Stroke prevention trials
• Sentinel trial for TAVR patients
Aortic Valve Surgery

UVA has been instrumental in the development of various open surgical, minimally invasive and percutaneous techniques for the treatment of valve disease.

Over the past three years, UVA surgeons performed 948 aortic valve surgeries; 740 isolated and combination surgical AVRIs and 208 transcatheter AVRs.

UVA is among the top 7% of hospitals nationally that achieved an overall three-star rating - the highest possible - from The Society of Thoracic Surgeons (STS) for aortic valve replacement surgery.*

* There is no comparable rating system for mitral valve replacement or tricuspid valve surgery.

Based on data comparisons from January 2013 through December 2015. Source: 2015 STS National Adult Cardiac Surgery Database Report

UVA has maintained the prestigious three-star rating for AVR surgeries since 2009 - 7 years running.

Source: 2009-2015 STS National Adult Cardiac Surgery Database Report
TRANSCATHETER AORTIC VALVE REPLACEMENT

UVA was the first transcatheter aortic valve replacement (TAVR) center in Virginia. Our team has performed 400 TAVR procedures. UVA's Advanced Cardiac Valve Center is a national leader in the latest TAVR trials.

Patients referred for TAVR are complex. UVA offers TAVR to four groups of patients: inoperable, high risk, intermediate risk and low risk.

- Inoperable – Clinical trials and FDA-approved options available
- High risk – Clinical trials and FDA-approved options available
- Intermediate risk – FDA-approved options available
- Low risk – Clinical trial available randomizing patients to surgical AVR vs. TAVR

Source: 2014 STS National Adult Cardiac Surgery Database Report

*STS mean is all STS Hospitals

Source: UVA Heart and Vascular Center Quality Office

**Mitral Clips**

TAVR / Mitral Clips 2013-2015 (n = 297)

Source: UVA Heart and Vascular Center Quality Office

**Thoracic Surgery**

TAVR Totals by Access per Year

Source: UVA Heart and Vascular Center Quality Office

Members of UVA's Structural Heart Team - Dr. Scott Lim, Dr. Michael Ragosta, Dr. Gorav Ailawadi and Dr. John Kern
Mitral Valve Surgery

Our surgeons have a long history of expertise in mitral valve surgery and have developed techniques now used across the country. While UVA cares for extremely high-risk patients, our risk-adjusted, in-hospital and operative mortality is less than national average.

UVA surgeons performed 284 isolated mitral valve surgeries over the past three years, with exceptionally low mortality rates.

REPAIR VS. REPLACEMENT
UVA surgeons have a wealth of experience repairing and replacing the mitral valve. Repair is often associated with better survival and improved lifestyle, as well as preserved heart function. There are fewer complications associated with a mitral repair. Our surgeons are also experts in the latest techniques in mitral replacement.

MINIMALLY INVASIVE SURGERY
UVA has performed over 170 minimally invasive surgeries for aortic valve, mitral valve and tricuspid valve repairs and replacements.

Our minimally invasive program is known throughout the region with excellent repair rates and low mortality. Our dedicated team has worked together closely since the program’s inception in 2012.

ZERO MORTALITY
In both 2014 and 2015, despite operating on many complex patients, UVA had zero in-hospital or operative mortalitites in patients undergoing isolated mitral valve replacement or repair.
Arrhythmia Surgery

UVA offers comprehensive and aggressive treatment strategies for patients with refractory atrial fibrillation.

- A leader in developing surgical approaches for atrial fibrillation and ventricular tachycardia
- 240 surgical procedures performed for arrhythmia management over the past three years, including minimally invasive, sternal sparing off-pump, thoracoscopic and concomitant MAZE procedures.
- The first in the nation to perform dual endocardial and epicardial hybrid ablation for atrial fibrillation (2008).
- One of the national leaders in a clinical trial for concomitant MAZE during valve surgery

LEAD EXTRACTION

- Regional center for complex laser lead extractions
- Hybrid procedure with cardiac surgeons and electrophysiologists working in tandem to maximize patient safety, while minimizing risk of complications

CLINICAL TRIAL HIGHLIGHTS

- Cardiothoracic Surgical Trials Network Afib rate vs. rhythm trial for atrial fibrillation or flutter after cardiac surgery
- PREVAIL trial, a continued-access protocol study of the Watchman™ device, now FDA approved
- Participated in the AtriClip®/stroke trial for left atrial appendage occlusion and was the lead enrolling site

Atrial Fibrillation Correction Surgery | 2013–2015 (n = 240)

Source: UVA Heart and Vascular Center Quality Office

MINIMALLY INVASIVE OPTIONS TO REDUCE STROKE RISKS

UVA is one of the only medical centers in Virginia offering three minimally invasive options for occluding the left atrial appendage (LAA).

- The LAA is the source of clots that can cause the majority of strokes in atrial fibrillation patients after heart surgery.
- By occluding the LAA, physicians could eliminate the need for patient to take blood thinners.

"With expertise with each of these procedures, our left atrial appendage team decides together the optimal approach for each individual patient."

- Gorav Ailawadi, MD, UVA Cardiothoracic Surgeon

For more information: uvaphysicianresource.com/watchmans-fdaapproval-gives-atrial-fibrillation-patients-further-protection-from-stroke/
Extracorporeal Membrane Oxygenation

The UVA Extracorporeal Life Support Program is honored to be designated as an Extracorporeal Life Support Organization (ELSO) Center of Excellence. This award recognizes ECLS programs worldwide that distinguish themselves by having processes, procedures and systems in place that promote excellence and exceptional care in extracorporeal membrane oxygenation.

Source: ELSO.org

Extracorporeal Membrane Oxygenation (ECMO) uses a modified heart-lung machine to support patients with the severest form of lung and/or heart failure. Support can range from a few days to several weeks in length depending on the severity of the disease process.

- Venovenous (VV) ECMO for respiratory support
- Venoarterial (VA) ECMO for cardiac and respiratory support

ADULT ECMO PROGRAM

- Dedicated team on call 24/7 to respond to ECMO emergencies in hospital
- Transport team available for adult ECMO patient transfers

### Adult Support Survival Data

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>64% (11)</td>
<td>79% (14)</td>
<td>66%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>100% (2)</td>
<td>43% (7)</td>
<td>40%</td>
</tr>
<tr>
<td>ECPR</td>
<td>43% (7)</td>
<td>56% (9)</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: ELSO National Registry

### Adult Survival to Discharge

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>55% (11)</td>
<td>57% (14)</td>
<td>56%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>60% (2)</td>
<td>43% (7)</td>
<td>40%</td>
</tr>
<tr>
<td>ECPR</td>
<td>14% (7)</td>
<td>33% (9)</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: ELSO National Registry

### Adult ECMO Volume Fiscal Year 2013-2016

Source: UVA Perfusion Quality Team
PEDIATRIC ECMO TEAM
Urgent support for patients to help them recover of to bridge to other therapy recover

- Emergent support for patients in cardiac or respiratory arrest or near-arrest
- Support for patients recovering from heart/lung failure or heart surgery
- VV ECMO for pulmonary support
- VA ECMO for cardiac and pulmonary support

PEDIATRIC ECMO PROGRAM GROWTH
The Pediatric ECMO Team is a dedicated group of ECMO specialist and perfusionists, available in-house for any emergency that could require ECMO support, 24 hours a day, seven days a week.

ECMO Volume Fiscal Year 2013-2016

Neonatal Support Survival Data

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>100% (4*)</td>
<td>50% (5)</td>
<td>68%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>100% (7)</td>
<td>100% (2)</td>
<td>81%</td>
</tr>
<tr>
<td>ECPR</td>
<td>n/a</td>
<td>0% (1)</td>
<td>68%</td>
</tr>
</tbody>
</table>

Source: ELSO National Registry

Neonatal Survival to Discharge

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>50% (4*)</td>
<td>40% (5)</td>
<td>43%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>85% (7)</td>
<td>100% (2)</td>
<td>66%</td>
</tr>
<tr>
<td>ECPR</td>
<td>n/a</td>
<td>0% (1)</td>
<td>42%</td>
</tr>
</tbody>
</table>

*Patient with multiple ECMO runs Source: ELSO National Registry

Pediatric Support Survival Data

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>60% (5)</td>
<td>75% (4)</td>
<td>74%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>33% (3)</td>
<td>100% (3)</td>
<td>69%</td>
</tr>
<tr>
<td>ECPR</td>
<td>75% (4)</td>
<td>20% (5)</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: ELSO National Registry

Pediatric Survival to Discharge

<table>
<thead>
<tr>
<th>SUPPORT TYPE</th>
<th>FY 2015</th>
<th>FY 2016</th>
<th>ELSO NATIONAL REGISTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>20% (5)</td>
<td>25-50%** (4)</td>
<td>56%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>33% (3)</td>
<td>66% (3)</td>
<td>50%</td>
</tr>
<tr>
<td>ECPR</td>
<td>25% (4)</td>
<td>0% (5)</td>
<td>42%</td>
</tr>
</tbody>
</table>

**Patient remains in hospital Source: ELSO National Registry
Mechanical Circulatory Support for Patients with Advanced Heart Failure

The field of heart failure medicine has advanced tremendously over the past two decades. Mechanical support devices, in particular, have proven to be a safe and durable solution for patients with end-stage heart failure. UVA offers a diverse array of FDA approved mechanical circulatory support devices, which enable us to meet the individual needs of our patients. This includes the Total Artificial Heart (TAH) as well as the newest Left Ventricular Assist Devices (LVADs).

- Our heart failure team continues to grow with the addition of inpatient and outpatient nurse practitioners who specialize in the treatment of advanced heart failure.
- UVA is a national leader in ventricular assist device (VAD) technologies, providing therapy for both adults and children. This life-saving technology has been used to successfully support patients as they await heart transplantation.


Source: Heart and Vascular MCS Office

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.

PATIENT CENTERED CARE

UVA is committed to helping our VAD patients return home. We partner closely with referring physicians and the community to ensure successful follow-up care. Additionally, our team provides ongoing education for first responders, emergency rooms and rehabilitation centers across Virginia.

Our team works closely with emergency rooms at local hospitals, rescue squads, home health agencies, rehabilitation centers, long term nursing facilities, and cardiac rehab centers, providing the training needed to care for patients with a LVAD.

Where Our Patients Live

Source: Heart and Vascular MCS Office

Post-implant survival includes long-term, FDA-approved mechanical circulatory support devices for patients on the heart transplant list, as well as individuals that desire extended survival and are not heart transplant candidates.


Source: Intermacs Report
CLINICAL TRIAL HIGHLIGHTS

• As one of 60 centers participating in the MOMENTUM 3 clinical trial, the UVA heart failure team will evaluate the safety and efficacy of the latest generation of LVAD, the HeartMate 3®™. This device is completely magnetically levitated, removing the need for mechanical bearings. This device should result in improved hemocompatibility and minimize late thrombotic and bleeding complications.

• UVA was the first to enroll nationally in the Cardiothoracic Surgical Trials Network VAD Stem Cell trial evaluating the efficacy of stem cell injection at the time of LVAD implant. The study determines the impact of stem cells on the recovery of heart function.

EXPRESSIONS OF GRATITUDE

"I am in heart failure - I have received always excellent care from your UVA physicians, nurses, and staff."

"I have been a patient of (Dr.) for 16 years now and I can't say enough about how he has always taken such wonderful care of me. He is not just my doctor; we consider him a part of our family."

"(Dr.) and (nurse) are always attentive and listen to all my concerns. They ask questions and allow my questions to raise more questions, which are always addressed. The office staff are always prompt in their care and responsibilities."
Transplantation

One of the pioneers in heart and lung transplant in the state, UVA performed its first heart transplant in 1989 and its first lung transplant in 1990. With over 45 years of experience in organ transplant our medical teams are some of the most experienced in the country. As part of the only Comprehensive Transplant Center in Virginia, our lung and heart programs have achieved the highest survival rates in the country.

LUNG TRANSPLANTATION
First in the state, our Lung Transplant Program is in its 26th year and has performed more than 480 transplants. The goal of our expert, multidisciplinary team is to improve the quality of life of our patients and to extend their lives either through transplant or other innovative surgical and/or medical therapies.

HEART TRANSPLANTATION
UVA is a leading heart transplant center in Virginia, having performed 470 transplants. It is this experience that has allowed us to transplant patients as young as 6 days old to our oldest patient of 73 years. Our experience is also reflected in our heart transplant survival statistics, which exceed national averages.

CLINICAL TRIAL HIGHLIGHTS
- Fibrocyte and lung transplantation study that looks at the level of fibrocytes in transplant recipients to see if it correlates with the development of chronic lung rejection.
- A true bench-to-bedside study utilizing novel compounds developed at UVA that show great promise to decrease acute lung transplant injury.
- Dr. Lau has received NHLB RO1 funding for clinical trial in lung transplantation.

<table>
<thead>
<tr>
<th>SRTR SPRING 2016 RELEASE</th>
<th>UVA</th>
<th>NATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung Transplant</td>
<td>96.3%</td>
<td>87.24%</td>
</tr>
<tr>
<td>Adult Heart Transplant</td>
<td>90.91%</td>
<td>90.36%</td>
</tr>
<tr>
<td>Pediatric Heart Transplant</td>
<td>91.3%</td>
<td>92.39%</td>
</tr>
</tbody>
</table>

Source: Scientific Registry of Transplant Recipients

EX-VIVO AND ECMO SIMULATION TRAINING

The perfusion and ECMO team has incorporated simulation training into the initial and continuing education processes. Simulations allow health care givers to create real-world clinical scenarios which can then be used as a teaching tool: a means to learn new skills and prepare clinicians for critical situations.

Ex-Vivo technology is only offered by a handful of centers in the world and is a part of the solution to the donor shortage problem. Ex-vivo lung perfusion allows for the rehabilitation of lungs that would otherwise be unsuitable for transplant.

Dr. Christine Lau received Buchanan Funding for development of the EVLP program.
**LUNG TRANSPLANTATION**

In 2016, Dr. Sasha Krupnick accepted the leadership role of Surgical Director Lung Transplantation. Dr. Krupnick joins the Thoracic team of Drs. Lau, Martin, and Walters. He has vast experience in lung transplantation, having trained at Washington University in St. Louis, and is NIH funded in transplant immunology.

- UVA performed 34 lung transplants from 1/2013-6/2015 (SRTR.org)
- In 2016, UVA has successfully transplanted lungs utilizing the EVLP - Ex-vivo lung perfusion technology to rehabilitate the lungs prior to transplant.

**ADULT HEART TRANSPLANTATION**

In addition to transplantation, UVA offers a full spectrum of temporary and durable mechanical support devices.

- UVA performed 22 transplants from 1/2013-6/2015 (SRTR.org)

**PEDIATRIC HEART TRANSPLANTATION**

UVA is Virginia’s only comprehensive pediatric heart transplant and pediatric mechanical circulatory support program.

- UVA performed its first pediatric heart transplant in 1991
- UVA performed 23 transplants from 1/2013-6/2015 (SRTR.org)

**BERLIN HEART®**

UVA is a pioneer in the use of VAD in children who are awaiting heart transplantation. UVA performed the last four pediatric heart transplants following successful placement of Berlin Heart® Pediatric VADs.

The Berlin Heart® is a mechanical device that assists the patient's heart pump blood and is used in babies and small children with serious heart failure. The device is an effective therapy as a bridge to heart transplantation in these young patients whose hearts are no longer strong enough to pump blood through their bodies.

The device can be used in the left ventricle and/or the right ventricle. The VAD functions as a single-ventricle or double-ventricle support. Small tubes are inserted in the body to connect the pump located outside of the body. Computerized units, along with the pump, maintain blood flow.

The Berlin Heart® provides support, and hope, to patients and their families as they await heart transplantation.

*James Gangemi, MD, with friend and mentor John Kern, MD, during a pediatric heart transplant.*
Congenital Heart Surgery

Nationally Ranked by U.S. News and World Report
• Ranked #37 in Pediatrics: Cardiology & Heart Surgery
• UVA is the only nationally ranked team in the State of Virginia

Optum Center of Excellence
One of 20 programs in the United States.

Source: US News and World Reports and Optum Health

At UVA, we have experience in the diagnosis and treatment of the full range of congenital heart and vascular defects. Surgeries we perform include:

• 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
• Heterotaxy syndrome
• Adult congenital

Norwood Procedure Volume

Postoperative Median Length of Stay
January 2012- December 2015

Source: 2015 STS Congenital Database Report

86% – One-year survival rate for Norwood surgery compared to the national average of 74%, according to the Pediatric Heart Network Single Ventricle Trial.
UVA CHILDREN’S HOSPITAL HEART CENTER

Our pediatric heart center offers:

- The most comprehensive congenital heart center in Virginia
- The largest fetal heart program in Virginia treating high-risk infants
- The largest pediatric pulmonary hypertension clinic and the only Hypertrophic Cardiomyopathy Association Center of Excellence in Virginia
- The Cardiovascular Genetics Clinic, which tests for risks of inherited heart or vascular disease
- An expanded program with a formal collaboration with Kings Daughters Children’s Hospital in Norfolk, Virginia - providing care closer to the patient’s home.

EXPRESSIONS OF GRATITUDE

“I was an ordinary patient of ordinary means, but your team took care of me as if I was the most important person on earth. Thank you for your services.”

"Without a doubt, hands down, the best. Thank you for your skilled hands, caring heart and brilliant mind."

"Open heart surgery was life-changing for our family and we cannot thank you enough! Your gave (patient’s name) the opportunity to heal, grow, and thrive, and we honestly would not have wanted anyone else to be at the helm in surgery that day."

"Without you, there would be no first birthdays. There would be no family photos. There would be no first words, first steps or first anything. Without you, holidays would be hard, daily life would be a struggle and heart ache would be a daily battle to get through. For all of your sleepless nights, missed vacations, skipped meals and pure mental and physical exhaustion, thank you for fighting for our kids. Thank you for showing us how it’s a battle worth fighting for.”
Congenital Heart Surgery (continued)

DEDICATED TEAMS
An integrated team of experts in all aspects of congenital heart surgery is the key to our low operative mortality and quality outcomes. Our dedicated pediatric congenital team includes:

- Pediatric Cardiac Intensive Care Unit (PCICU) staffed with nurses and intensivists, which includes two intensivists who are double board-certified in pediatric cardiology and pediatric intensive care. The team focuses on the postoperative care of babies and children undergoing congenital heart surgery
- Pediatric cardiac step-down unit with specialized nursing and therapists, in an effort to improve care and provide earlier discharges
- Pediatric operating room team, staffed by pediatric specialists, including pediatric cardiac anesthesiologists and cardiac perfusionists
- Pediatric ECMO Team for 24/7 care with neonatal and pediatric transport teams capable of pre-ECMO and ECMO transport

CLINICAL TRIAL HIGHLIGHTS
- On-X 17mm Aortic Prosthetic Heart Valve and 23mm Mitral Prosthetic Heart Valve – Investigating safety and efficacy of a smaller-sized prosthetic valve. UVA is one of 15 centers in the world investigating the On-X valves.
- St. Jude’s HALO valve trial – A 15mm, rotatable mechanical heart valve, the world’s smallest pediatric mechanical heart valve

STAT MORTALITY CATEGORY
The STS and European Association for Cardiothoracic Surgery (EACTS) Congenital Heart Surgery Mortality Categories (STS-EACTS STAT Mortality Category) system is an objective, empirically based index that can be used to estimate the risk of in-hospital mortality by procedure and measure the complexity of patients. The greater the risk category, the more complex the case and the risk of mortality.

Pediatric Heart Surgery Survival
STS-EACTS STAT Mortality Category | 2012-2015

Source: 2015 STS Congenital Database Report

Comparing Complexity
UVA to STS Congenital Database 2012–2015

Source: 2015 STS Congenital Database Report
**Complex Aortic Disease**

UVA is a regional referral center for all aspects of aortic and vascular diseases, with more than four decades of experience. Our cardiac and vascular surgeons performed 3,173 major vascular procedures and 541 complex aortic procedures over the past three years.

- Treatment options include participation in clinical trials and genetic screening.
- Surgical options range from minimally invasive or percutaneous endovascular aneurysm repair to complex, staged hybrid total aortic replacement of the ascending aorta, aortic arch, descending thoracic aorta and abdominal aorta.
- Our team has extensive experience in treating aortic dissection, thoracoabdominal aneurysms and connective tissue disorders.

**Aortic Procedures | FY 2014–2016**

Source: UVA Heart and Vascular Center Quality Office

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**CLINICAL TRIAL HIGHLIGHTS**

The Aortic Aneurysm Research Laboratory, led by Gilbert R. Upchurch Jr., MD, and Gorav Ailawadi, MD, is dedicated to pioneering research and discovering the mechanisms of aneurysm formation and prevention.

- Research funding totaling $8.2 million
- 4 NIH R01 grants to study aneurysms
- 4 ongoing IRB-approved clinical trials involving abdominal aortic aneurysm/thoracic aortic aneurysm disease

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**AORTIC ALERT**

*Prompt, accessible care for aortic emergencies*

In an effort to improve patient outcomes and build community partnerships, we created the Aortic Alert process in 2014. This provides a second opinion to providers and early access to patients for complex aortic care.

The aortic alert process, enables emergency rooms and referring physicians to rapidly expedite a transfer for anyone with acute aortic disaster.

- System puts referring physicians in touch with a UVA attending cardiac or vascular surgeon any time, day or night.
- Operator connects both the cardiac and vascular attending triage officers on the call in order to decide the best treatment option for the patient.
- If determined to be an emergency, teams are alerted and ready for the arrival of the patient. This ensures the right team is available for the right patient at the right time with the right equipment, resources and expertise.

For a consult on aortic emergencies, please call the Aortic Alert line: 844.933.7882
Vascular Surgery

HYBRID OPERATING SUITE
The hybrid OR is used for a multidisciplinary approach, allowing for real-time collaboration, combining medical and surgical expertise with the most advanced technology available. UVA is fortunate to offer technically advanced facilities, including four state-of-the-art hybrid operating rooms, allowing for less invasive procedures.

• Equipped with the most advanced imaging technology
• Enables simultaneous performance of percutaneous and open procedures
• Reduces the risk of complications and length of stay associated with multiple procedures
• Teams work closely together to offer complex treatments and surgeries for patients requiring more in-depth procedures
• Increases efficacy and success of complex procedures

EXPRESSIONS OF GRATITUDE
"I was very impressed with the time I spent with (doctor) and her staff. They could not be more helpful. I would recommend them for any vascular needs. They put you at ease from the time you enter their office until the time you leave. I got an answer to my problem before I left her office on the day of my visit....I am really impressed with her and her staff."

"The doctors, nurses and staff were very professional, compassionate, extremely competent and took care of me. I have nothing but praise for the entire process. THANK YOU."

"From the time I first contacted the Heart & Vascular Center, I felt as though I was dealing with people who cared about me as a person not just as another patient."

Rate of Major Complications After Infrainguinal Bypass
January 2014–May 2015

<table>
<thead>
<tr>
<th></th>
<th>UVA</th>
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<tbody>
<tr>
<td>Complication Rate</td>
<td>0%</td>
</tr>
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</table>

Source: 2015 SVS VQI Regional Report

Nonruptured Open AAA In-Hospital Mortality
January 2014–May 2015

<table>
<thead>
<tr>
<th></th>
<th>UVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Rate</td>
<td>0.0%</td>
</tr>
<tr>
<td>Expected Rate</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Source: 2015 SVS VQI Regional Report

UVA was awarded top honors by The Society of Vascular Surgery Patient Safety Organization (SVS PSO). UVA was recognized with being in the top 10% of Vascular Quality Initiative (VQI) centers and received a 3 star rating (highest level) for participation in quality improvement.

This inaugural award recognizes the importance of active participation in the VQI as a critical component of the quality improvement mission.

Source: 2015 VQI Participation Awards

Members of the Vascular team from left to right: Dr. Aditya Sharma, Dr. Gilbert Upchurch, Michael Gyampoh, and Dr. Megan Tracci
QUALITY IMPROVEMENT
Our complex aortic disease program provides comprehensive care, including:

- Smoking cessation
- Optimizing glucose control to reduce risk of wound infection
- Physical therapy consulted on every post-op lower extremity surgical revascularization
- Discharged vascular patients on antiplatelet and statin

PARTNERS IN CARE
Complex aortic disease care at UVA features a multidisciplinary team of experts, including:

- An outstanding genetics program to evaluate patients with aortic pathologies and connective tissue disorders, such as bicuspid aortic valve, Marfan syndrome and Loeys Dietz syndrome. The program also offers the ability to screen at-risk family members
- An anesthesia team dedicated to the use of techniques designed to minimize complications of aneurysm repairs
- Endovascular specialists dedicated and skilled in angioplasty, atherectomy, stenting, thrombectomy and thrombolysis techniques

PATIENT FOCUSED CARE: CLOSER TO HOME
The UVA Vascular team offers care closer to home utilizing clinic facilities in Culpepper, Lexington, Lewisburg, Augusta, and Zions Crossroads.

Dr. William Robinson, MD, is the medical director of the Virginias Vascular Study Group — a group of hospitals and vascular specialists committed to analyzing data related to vascular interventions and outcomes in Virginia and West Virginia.
Thoracic Surgery

The University of Virginia’s thoracic surgery program provides care to patients with lung and esophageal disease. We offer a comprehensive assessment and provide close collaboration with multiple subspecialists in order to decide on the best treatment option for the patient.

We have established ourselves as leaders in the Southeast and nationally. We provide care here at UVA and have partnered with other facilities in the area in order to provide care to patients closer to their homes.

- Patients considered inoperable or too high risk for a thoracic surgical procedure are often referred to UVA for a second opinion.
- The thoracic surgery program provide state-of-the-art treatment options, advanced technology and multidisciplinary treatment strategies.
- Thoracic surgeons are a part of a growing thoracic oncology team at UVA Cancer Center.


Source: UVA Heart and Vascular Center Quality Office

AREA OF EXPERTISE

UVA thoracic surgeons provide consultation and care for patients with:

- Lung cancer
- Esophageal cancer
- Benign esophageal diseases (e.g., hiatal hernia and gastroesophageal reflux disease)
- Malignant mesothelioma
- Lung volume reduction surgery (emphysema surgery)
- Pulmonary metastases
- Mediastinal adenopathy (enlarged lymph nodes)
- Pleural effusions (fluid around the lungs)
- Achalasia, and other motor disorders of the esophagus
- Small, indeterminate lung nodules
- Chest wall tumors
- Chest wall deformities (i.e., pectus excavatum)
- Mediastinal tumors (e.g., thymomas and myasthenia gravis)
- Tracheal tumors and strictures
- Photodynamic therapy for lung and esophageal cancers
- Lung transplantation, including a robust EVLP program

UVA is one of just over a dozen hospital nationwide using ex vivo lung perfusion (EVLP).
To learn more visit www.uvaphysicianresource.com/with-ex-vivo-lung-perfusion
THORACIC SURGERY OUTCOMES

UVA is committed to advancing the database and improving the reporting process that drives quality improvement and patient safety strategies.

- Our efforts have produced remarkable results in the improvement of care and are reflected in our discharge mortality and 30-day mortality results.

Thoracic: 30-Day Mortality (%) | 2013–2015

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>UVA Discharge Mortality</td>
<td>0.3%</td>
<td>0.5%</td>
</tr>
<tr>
<td>STS Discharge Mortality</td>
<td>1.6%</td>
<td>1.6%</td>
</tr>
<tr>
<td>UVA 30-Day Mortality</td>
<td>0.8%</td>
<td>1.2%</td>
</tr>
<tr>
<td>STS 30-Day Mortality</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Source: 2015 STS General Thoracic Report

EXPRESSION OF GRATITUDE

"This was my second visit to UVA for myself, plus I've had two family members cared for there in the past. Job well done! Now it's my turn and I think I'm in the best hands as far as health care in the State of Virginia. Thanks (to) UVA doctors and staff."

"The hospital and staff were very friendly and helpful during my stay at UVA. The hospital is a great place."

Multidisciplinary team from Emily Couric Cancer Center for Thoracic Malignancies
Thoracic Surgery (continued)

LUNG SURGERY

For the treatment of stage I lung cancer, minimally invasive surgery is utilized in 70.4% of the cases. Our 30-day operative mortality is below national benchmarks, despite the complexity of the patients.

Lung Surgery  UVA 30-Day Mortality (%)  2013–2015

Note: Year represents “end year” of STS’s rolling 3 years.
Source: UVA Heart and Vascular Center Quality Office

CLINICAL TRIAL HIGHLIGHTS

- Lobectomy vs. sublobar resection for small peripheral non-small cell lung cancer (CALGB14503) – Ongoing trial at multiple sites looking at early lung cancers in comparing outcomes with lobectomies versus lesser resections

- Tissue procurement protocol for development therapeutics – Multi-institutional trial, of which UVA is a participant, collecting lung cancer specimens from patients in the hope of providing future benefits and improvement in lung cancer survival

- STABLE-mates Trial - a randomized phase II study of sublobal resection (SR) vs Stereotactic Ablative Radiotherapy (SAbR) in High Risk Patients with Stage I Non-Small Cell Lung Cancer (NSCLC).

- Adenosine lung transplant trial – Study looking at patients who undergo lung transplantation to see if the use of adenosine derivatives decrease inflammation and prevent ischemia reperfusion injury in lung transplantation

EXCEEDING STANDARDS

UVA Thoracic Surgery Program exceeds the STS Composite Quality Rating January 2013 - December 2015 in Lobectomy for Lung Cancer. These standards include:

- Overall score
- Absence of Mortality
- Absence of Major Complications

Source: STS General Thoracic Surgery Database STS Period Ending 12/31/15

UVA's Thoracic Surgery Program also exceeds the STS benchmark for combined morbidity / mortality for Pulmonary Resections January 2013 - December 2015.

Source: STS General Thoracic Surgery Database STS Period Ending 12/31/15

EXPRESSIONS OF GRATITUDE

"The care of the nurses and medical staff was excellent. I particularly want to thank the operating room staff, the ICU nurses, and (the team)"

"Always a great experience."

"I had an excellent experience. My nurses were fabulous, my pain managed well, and overall treated with kindness and respect."
ESOPHAGEAL SURGERY
Esophageal surgery at UVA involves the treatment of complex paraesophageal hernias, esophageal cancer and esophageal reconstruction. UVA surgeons provide a variety of open and minimally invasive approaches to optimize outcomes.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>UVA</th>
<th>STS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagectomy Median Length of Stay</td>
<td>10 days</td>
<td>10 days</td>
</tr>
</tbody>
</table>

Source: Heart and Vascular Center Quality Office

Esophageal Surgery UVA 30-Day Mortality (%)

BENIGN ESOPHAGEAL DISEASE
In addition to procedures for esophageal cancers, our thoracic surgeons perform a large number of operations for benign (noncancerous) diseases of the esophagus, including hiatal hernias, gastroesophageal reflux disease (GERD), achalasia and esophageal diverticuli.

- The majority of the benign esophageal surgeries at UVA are performed laparoscopically or robotically (minimally invasive approach).
- Minimally invasive approach reduces pain, the length of stay and time away from work.
- UVA’s median length of stay for benign esophageal disease surgery is two days.

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVA</td>
<td>0.92%</td>
<td>0.97%</td>
<td>1.35%</td>
</tr>
</tbody>
</table>

Source: Heart and Vascular Center Quality Office

CLINICAL TRIAL HIGHLIGHTS
- Patient-reported outcomes for patients with lung and esophageal cancer – Study funded by the Patient-Centered Outcomes Research Institute (PCORI) that evaluates the impact of surgery on patient-reported outcomes and their relationship to procedure type.
EXPRESSIONS OF GRATITUDE

"Prior to selecting the surgeon who would perform my procedure, I asked several knowledgeable people to recommend a good surgeon. Three of them hold important positions in the medical field. They all said (Dr.) I thought he was a good surgeon but came to find out he is more than that, he is an EXCELLENT HUMAN BEING."

"Thank you (Dr.) and team for being the best at what you do!!"

"Very satisfied - everyone treats me with respect & friendliness. My doctor is the BEST!!"

"(My doctor) is a great physician and is very good at talking and explaining procedures at a level that you can understand."

"I would recommend (my doctor) with enthusiasm to any one of my family, friends or acquaintances. May well be the best doctor I've ever come across and having lived world-wide...that's saying something."

"I have in the past 15 years seen several doctors at UVA and always the service has been excellent!"

"Wonderful nurses, nurse practitioner and (doctor) is wonderful, knowledgeable and really took the time to listen and answer questions and concerns."

"From arrival to exit, I was treated with highly professional care."
Advancing Knowledge

Leaders in research, dedicated to defining the future

As a member of the Cardiothoracic Surgical Trials Network, UVA has taken a lead role in improving the surgical treatment for cardiovascular disease.

- Designated as 1 of 10 core clinical centers for Cardiothoracic Clinical trials by the National Institutes of Health.
- Clinical trials enable us to offer patients options not yet available at other centers.

| 27 | IRB protocols for retrospective medical record reviews |
| 25 | Actively recruiting prospective interventional clinical trials |
| 6  | Trials within the start-up phase |
| 14 | Trials with patients in follow up |

Source: Surgical Therapeutic Advancement Center Office

RESEARCH HIGHLIGHTS

National principal investigator (PI) for multicenter, industry-sponsored clinical trials
- Gilbert R. Upchurch Jr., MD – Endurant EVO AAA stent trial (Medtronic)
- John Kern, MD – Mitroflow Aortic Valve trial (Sorin)

National Institute of Health (NIH) CT Surgery Network
- Irving Kron, MD - First site with IRB approval and First center to enroll- LVAD stem cell trial
- Gorav Ailawadi, MD - Tricuspid trial

ACADEMIC PUBLICATIONS AND NATIONAL PROMINENCE:
Cardiac Surgery, Thoracic Surgery and Vascular Surgery

| 160 | Articles in peer-reviewed journal listed in authorship (FY 16) |
| 96  | Unique publications (FY 16) |
| 6   | Books or book chapters |
| 77  | Study Sections or National Committees |
| 73  | Memberships on editorial boards, past and present |

Source: UVA Department of Surgery

PUBLICATION HIGHLIGHTS

- Gorav Ailawadi, MD: "Initial Experience with Commercial Transcatheter Mitral Valve Repair in the United States" - Journal of the American College of Cardiology
- Irving Kron, MD, and Gorav Ailawadi, MD: "Impact of Left Ventricular to Mitral Valve Ring Mismatch on Recurrent Ischemic Mitral Regurgitation After Ring Annuloplasty" - Circulation
- Irving Kron, MD, and Gorav Ailawadi, MD: "Two-Year Outcomes of Surgical Treatment of Severe Ischemic Mitral Regurgitation" - New England Journal of Medicine
Recognition & Leadership

Nationally recognized for innovation and dedication to advancing cardiovascular care

2015 AWARD RECIPIENTS

Gorav Ailawadi, MD
Dean's Award for Clinic Excellence

Emily Downs, MD
Hawley Seiler, MD Residents Award STSA

Robert Hawkins, MD
CardioVascular Clinical Trialist Forum Young Trialist Grant Winner ASMBS

Irving Kron, MD
Earl Bakken Scientific Achievement Award Society of Thoracic Surgeons Annual Meeting Recognized outstanding scientific contribution in cardiothoracic surgery

Damien LaPar, MD
Benson R. Wilcox Award Thoracic Surgery Directors Association Award Society of Thoracic Surgeons Annual Meeting Faculty Mentor: Gorav Ailawadi, MD Best scientific abstract submitted by a cardiothoracic surgery resident

David Strider, ACNP
Excellence in Clinical Practice Award Society of Vascular Nursing

Gilbert Upchurch, MD and Gorav Ailawadi, MD
Dean’s Award for Excellence in Team Science Research

Kenan Yount, MD
President's Award Society of Thoracic Surgeons Annual Meeting Faculty mentor: Gorav Ailawadi, MD Best scientific abstract by resident or young investigator

2016 AWARD RECIPIENTS

Lily Johnston, MD
Critical Care Poster Award Society of Thoracic Surgeons Annual Meeting Faculty Mentor: Jay Isbell, MD

Irving Kron, MD
UVA Distinguished Scientist Award

Damien LaPar, MD
Richard E. Clark Memorial Paper Society of Thoracic Surgeons Annual Meeting Faculty Mentor: Gorav Ailawadi, MD Outstanding STS database paper
NATIONAL AND REGIONAL LEADERS

Gorav Ailawadi, MD
Cardiac Chair, Society of Thoracic Surgeons  TechCon Annual Meeting
Research Chair, Virginia Cardiac Surgery Quality Initiative
Feature Editor, Annals of Thoracic Surgery

James Gangemi, MD
Program Committee, Society of Thoracic Surgeons
Faculty Instructor, TRSA Boot Camp

Lily Johnston, MD
Appointed by the Resident & Associate Society of the American College of Surgeons to sit as the RAS liaison on the Vascular Surgery Advisory Council

John Kern, MD
Deputy Editor, Annals of Thoracic Surgery
Associate Editor, Operation Technique in Thoracic and Cardiovascular Surgery

Irving Kron, MD
Past President, American Association for Thoracic Surgery
Past Program Director, Thoracic Surgery residency Program
Program Director, the Cardiothoracic Surgery Network

Christine Lau, MD
Director, American Board of Thoracic Surgery (ABTS)
AATS Councilor
Research Scholarship Committee, American Association for Thoracic Surgery
Scientific Affairs and Government Relations Committee, American Association for Thoracic Surgery
Centennial Committee, American Association for Thoracic Surgery
Curriculum Editor, Joint Council on Thoracic Surgery Education, Cardiothoracic Counselor, Southern Thoracic Surgical Association Past President, Virginia Surgical Society

Linda Martin, MD
STS Workforce on Media Relations & Communication
Thoracic Symposium Program Committee, Speaker, Moderator
Reviewer: Annals of Thoracic Surgery, JTCVS, Journal of Clinical Oncology, Up to Date, American Journal of Surgery, Journal of Surgical Oncology American Board of Surgery In Training Exam Committee / Author

William Robinson, MD
Co-Chair, “Top Gun” Residents and Fellows Simulation Program, Society of Clinical Vascular Surgery Annual Meeting
Society of Vascular Surgery Quality and Performance Measures Committee

Margaret Tracci, MD
Past President, Virginia Vascular Society
Chapter Delegate, Medical Society of Virginia

Curtis Tribble, MD
Committee on Resident Education, American College of Surgeons
Membership Committee, Southern Thoracic Surgical Association

Gilbert R. Upchurch Jr., MD
President Elect, Virginia Vascular Society
Board Member, Vascular Surgery Board, American Board of Surgery
Advisory Council for Vascular Surgery, American College of Surgeons
Chair, Publications Committee, Society for Vascular Surgery

Dustin Walters, MD
Thoracic Surgery Residents Association (TSRA), President (2015-2016)
UVA Cardiovascular and Thoracic Surgeons

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KENNETH CHERRY, MD
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