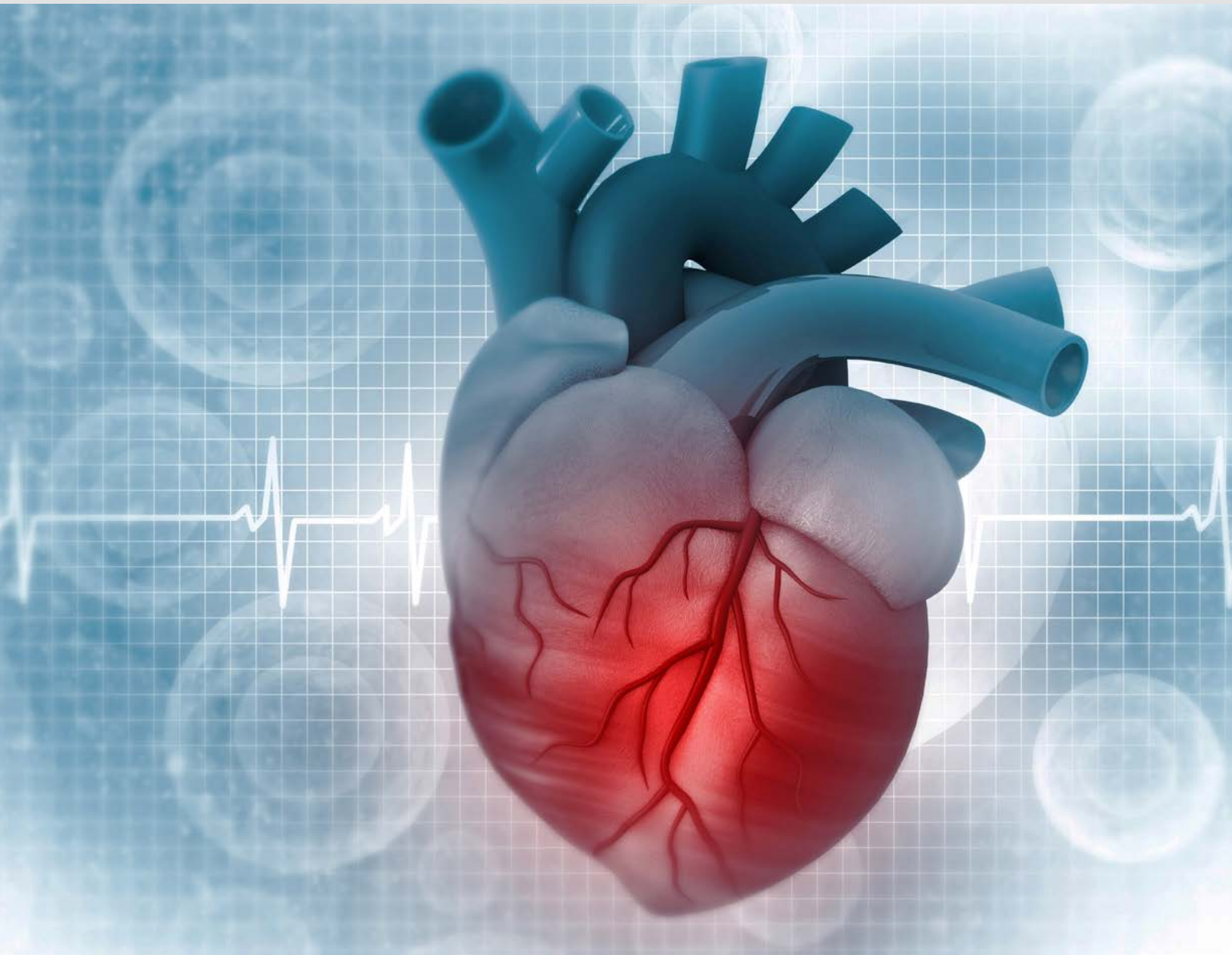


2020

OUTCOMES

Inova Heart and Vascular Institute



OUR MISSION



Our mission at Inova is to provide world-class healthcare – every time, every touch – to each person in every community we have the privilege to serve. IHVI embodies that mission as demonstrated in this report through its team approach to evidence-based cardiovascular care – bringing the best that this field of medicine has to offer to every patient.

Even in the face of the exceptional challenges posed by COVID-19, IHVI has continued to excel by contributing to the national body of knowledge on how to treat the cardiovascular and pulmonary consequences of this novel disease while remaining at the forefront of other advances in cardiovascular care. This drive for clinical excellence, made possible by highly skilled physicians and team members, effective communication, and a passion to create an exceptional patient experience, continues to benefit thousands of patients every year with complex heart, vascular and advanced pulmonary diseases.

J. Stephen Jones, MD, MBA, FACS
President and CEO, Inova



2020 has been a challenging year for our communities, patients, team members and families. It has been especially difficult for those on the front lines during the COVID-19 pandemic. The global crisis has impacted our lives in ways we could never have imagined. At Inova Heart and Vascular Institute (IHVI), our teams rose to the occasion, bending, but never breaking. We are enormously proud of and grateful to our superhero teams who have tirelessly provided excellent care to our patients, often putting the health of others above all else.

Through it all, our priority continues to be providing high-quality, compassionate care to IHVI patients while keeping everyone safe. While our world has been drastically altered by the profound effects of COVID-19, we have continued to forge ahead to advance clinical care, culture, research and innovation to become a top-tier cardiovascular institute.

As COVID-19 began spreading across the United States in late February and early March, several physicians from IHVI were at the forefront of developing guidance that is now in use nationwide to direct cardiac care. Our team's dedication to assuring that cardiovascular patients receive timely and high-quality care in a safe environment was readily apparent as the impact of the pandemic created major disruptions and uncertainty nationwide. We became a leading contributor to national care guidelines and helped to create a framework for hospitals nationwide to move forward in providing vital cardiac services. The continued broad and active participation of our faculty in clinical trials, outcomes research and academic publications demonstrates our commitment to excellence. This degree of involvement at a national level speaks to the caliber of talent on our team.

We are particularly proud of our commitment to patient safety and compassionate care. Our outstanding performance has been recognized by many measures, including U.S. News & World Report rankings as "High Performing" in five cardiac specialties: aortic valve surgery, heart bypass surgery, abdominal aortic aneurysm repair, heart failure and transcatheter aortic valve replacement (TAVR). We have also achieved recognition from the American College of Cardiology as a "Proven Quality Program" for our participation and performance in the National Cardiovascular Data Registry (NCDR) database, 3-star ratings from the Society of Thoracic Surgeons, and ratings from Healthgrades as one of "America's 100 Best Hospitals for Cardiac Care™" and "America's 50 Best Hospitals for Cardiac Surgery™." It is gratifying to see our efforts to provide an enhanced patient experience result in both improved care and higher patient satisfaction.

We want to personally thank all the physicians who entrust their patients' care to us and the patients who choose to come here to receive these vital services. We reaffirm our strong commitment to help everyone in our community and beyond to live stronger, healthier and more fulfilling lives. We are enormously proud of the outstanding achievements of our medical, nursing and professional staff, and we look forward to even greater success in the coming years.



**Christopher O'Connor, MD,
MACC, FESC, FHFSA, FHFA**
President
Inova Heart and Vascular Institute



Heather Russell, RN, MS, FABC
Vice President & Administrator
Inova Heart and Vascular Institute



Marissa Jamarik, DNP, RN, NEA-BC
Vice President of Nursing
Inova Heart and Vascular Institute

ABOUT IHVI – 2020



184,264

Patient Visits

6

Cardiac and Vascular
Surgery ORs/Hybrid ORs

23

Catheterization
EP/IR Labs

H

5

Hospitals



209

Dedicated
Cardiac Beds



35

Inova Cardiology, Arrhythmia, Vascular and
Cardiac Surgery outpatient practice locations
providing more than 128,200 appointments



23

Noninvasive Cardiac and Vascular
Imaging and Diagnostic
Service Locations



Patients treated from **45** states and
4 territories, countries and armed forces
locations worldwide



For a complete list of awards and
recognition, visit [inoa.org/awards](https://www.inova.org/awards)

IHVI's clinical capabilities cover the full spectrum of complex cardiovascular and pulmonary care from medical evaluation and diagnostic testing through the most innovative minimally invasive surgical techniques and complex open surgeries, including heart and lung transplantation.

A services grid beginning on page 28 highlights specific services available at each of the Inova hospitals.



Inova Fairfax Medical Campus
3300 Gallows Rd.
Falls Church, VA 22042

Inova Fairfax Medical Campus (IFMC), located just outside of Washington, DC, in Falls Church, VA, is home to IHVI's dedicated heart hospital, which serves as the hub of the system's cardiac, vascular and pulmonary services.

Centers for Medicare and Medicaid Services

5-Star Rated Hospital
(Highest Level of Performance)

American Nurses Credentialing Center
Magnet Recognition® for Nursing Excellence



Fortune/IBM Watson Health
Watson Health™ 100 Top Hospitals 2020



U.S. News and World Report – 2020-2021

1 Washington, DC Metro Area
3 in Virginia

High Performing for Aortic Valve Surgery
High Performing for Heart Bypass Surgery
High Performing for Heart Failure
High Performing for Abdominal Aortic Aneurysm (AAA) Repair
High Performing for Transcatheter Aortic Valve Replacement (TAVR)



The Leapfrog Group

“A” Hospital Safety Grade – 5 consecutive
reporting periods

Healthgrades

America's 100 Best Hospitals Award™ (2020)
Outstanding Patient Experience Award™ (2020, 2019)
America's 50 Best Hospitals for Cardiac Surgery Award™
(2020, 2019, 2018)
America's 100 Best Hospitals for Cardiac Care Award™
(2020, 2019, 2018)
Coronary Intervention Excellence Award™ (2020)
Critical Care Excellence Award™ (2020)
Pulmonary Care Excellence Award™ (2020, 2019)

IHVI HOSPITAL SERVICE SITES



**Inova Heart and Vascular Institute –
Inova Alexandria Hospital**
4320 Seminary Rd.
Alexandria, VA 22304

Centers for Medicare and Medicaid Services
5-Star Rated Hospital (Highest Level of Performance)

U.S. News & World Report – 2020-2021
4 in Washington, DC Metro Area
9 in Virginia
High Performing for Heart Failure



The Leapfrog Group
“A” Hospital Safety Grade – 5 consecutive reporting periods
“Top Hospital” – 2019, 2020



Healthgrades
America’s 250 Best Hospitals Award™ (2020)
Patient Safety Excellence Award™ (2020)
America’s 100 Best Hospitals for Critical Care Award™ (2020)
Pulmonary Care Excellence Award™ (2020)



**Inova Heart and Vascular Institute –
Inova Loudoun Hospital
Schaufeld Family Heart Center**
44045 Riverside Pkwy.
Leesburg, VA 20176

Centers for Medicare and Medicaid Services
5-Star Rated Hospital (Highest Level of Performance)

American Nurses Credentialing Center
Magnet Recognition® for Nursing Excellence



U.S. News & World Report – 2020-2021
High Performing for Heart Failure

The Leapfrog Group
“A” Hospital Safety Grade – 18 consecutive reporting periods
“Top Hospital” – 2020



Healthgrades
America’s 250 Best Hospitals Award™ (2020, 2019, 2018)
Patient Safety Excellence Award™ (2020, 2019, 2018, 2017)
Critical Care Excellence Award™ (2020, 2019, 2018)



**Inova Heart and Vascular Institute –
Inova Fair Oaks Hospital**
4320 Seminary Rd.
Alexandria, VA 22304

Centers for Medicare and Medicaid Services
5-Star Rated Hospital (Highest Level of Performance)

American Nurses Credentialing Center
Magnet Recognition® for Nursing Excellence



U.S. News & World Report – 2020-2021
7 in Washington, DC Metro Area
#12 in Virginia

The Leapfrog Group
“A” Hospital Safety Grade – 17 consecutive reporting periods
“Top Hospital” – 2020



Healthgrades
Patient Safety Excellence Award™ (2020, 2019, 2018, 2017)
Outstanding Patient Experience Award™ (2020, 2019, 2018)
America’s 100 Best Hospitals for Pulmonary Care Award (2020, 2019, 2018)



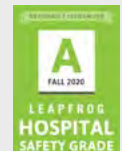
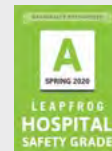
**Inova Heart and Vascular Institute –
Inova Mount Vernon Hospital**
2501 Parker Ln.
Alexandria, VA 22306

Centers for Medicare and Medicaid Services
5-Star Rated Hospital (Highest Level of Performance)

The Leapfrog Group
“A” Hospital Safety Grade – 13 consecutive reporting periods

Healthgrades
Outstanding Patient Experience Award™ (2020, 2019)

All Inova Hospitals




Inova is recognized by the American College of Cardiology as one of only 72 health systems nationwide to receive a Proven Quality Program designation.

Patient Transfers

One Call 24/7 | Adult: 703.776.5905 | Pediatric: 877.900.9543 | Direct admission • Transfer • Specialized transport

PATIENT EXPERIENCE

A close-up photograph of a healthcare worker in blue scrubs holding the hands of a patient. The worker's hands are positioned on top of the patient's hands, which are resting on their lap. The patient is wearing a white knitted sleeve. The background is softly blurred, showing the worker's torso and the patient's legs.

We make a conscious effort to integrate patients' and family members' perspectives to ensure we deliver patient-centered care every time, every touch.

An important component of being able to achieve consistently high patient experience ratings is the feedback we receive from patients and family members. We make a conscious effort to integrate their perspective to ensure we deliver patient-centered care every time, every touch.

We host monthly Patient and Family Advisory Council meetings where a group of former patients and family members provide feedback to our administrative, nursing, patient safety and patient experience leadership.

There is also a data-driven continuous monitoring process for quality indicators and patient safety metrics. We examine both our internal data and use national registries to provide benchmark comparisons.

- Every patient care unit has specific performance metrics.
- Progress and performance are displayed to keep staff focused on results.
- Multispecialty teams of nurses, physicians, IT specialists, finance and data analysts work to monitor performance and redesign processes to improve patient care.

CG CAHPS

Inova Cardiology Outpatient Physician Offices

 **91%** Likelihood to Recommend

The Clinician & Group Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS) is a standard survey developed by the Agency for Healthcare Research and Quality to assess patient perceptions of care provided by physicians and medical groups in doctors' offices.

IHVI survey period: 1/1/2020 – 11/19/2020

Benchmark period: 5/01/2020 – 10/31/2020

Results from Press Ganey, a national survey vendor

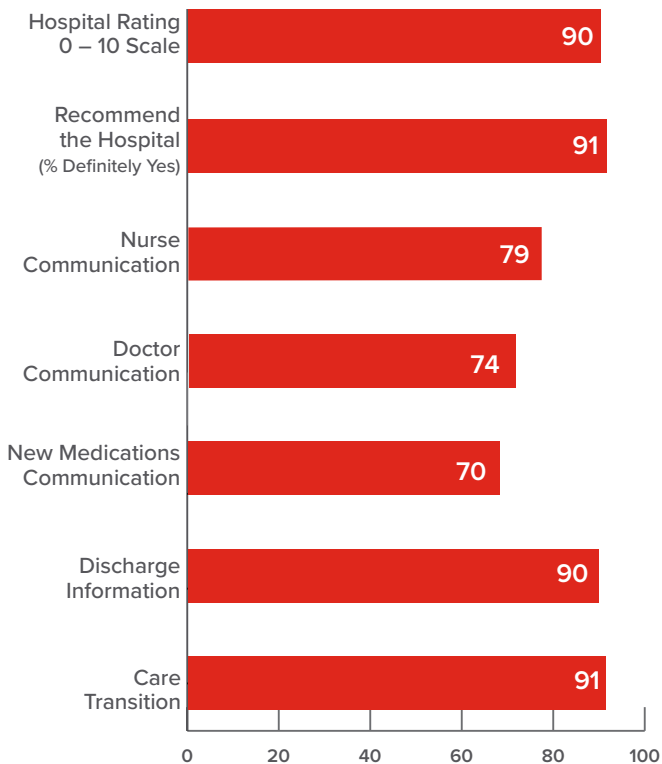
*Percentile ranking as determined by the Press Ganey Survey Vendor from the All Press Ganey Database of Care Sites in the United States.

Database contains n = ~28,000 care sites nationwide

HCAHPS

Hospital-Based Care

■ 2020* Percentile Rank



The Centers for Medicare and Medicaid Services require all U.S. hospitals that treat Medicare patients to participate in the national Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, a standardized tool that measures patients' perspectives of hospital care.

IHVI survey period showing 1/1/2020 – 11/19/2020

Benchmark period: 8/1/2020 – 10/31/2020

Results from Press Ganey, a national survey vendor

*Percentile ranking is determined from the "All Press Ganey Database" of Hospitals in the U.S.

Database contains n = ~2,700 hospitals nationwide

COVID-19 Research – Offering Hope for Treatment and Recovery

IHVI physicians are active in the academic world of cardiac, vascular and pulmonary research and are dedicated to staying on the cutting edge of new methods of diagnosis and treatment.

When COVID-19 enveloped the world in a pandemic, teams at IHVI quickly mobilized research efforts, helping to lead the way in diagnosing and treating this new patient population. These research projects include emergency use therapies, expanded access and treatment protocols, clinical trials, registries, biobanking, and COVID-19 testing.

“Having a diagnosis of COVID-19 can be a very frightening and isolating experience. Participating in research gives patients a feeling of hope and can help reduce anxiety through their connection with a research team that is checking in on them and offering reassurance.”

– Christopher deFilippi, MD, FACC, Vice Chairman, Academic Affairs, IHVI

Our research teams recognized that COVID-19 is the challenge of our time – years of training and education prepared them for this moment in history. Team members of all medical specialties felt the weight of responsibility, a responsibility which they took on with dedication, enthusiasm and confidence. At the height of the pandemic, they were diagnosing and treating some of the most acute cases of this new illness. They were aware of the importance of focusing research efforts on the long-term implications of COVID-19 on the cardiovascular and pulmonary systems.

“The COVID-19 studies that IHVI is involved in at the moment are not necessarily focused on cardiovascular disease, but this is likely to be a high-priority research area for years to come because of the strong possibility that COVID-19 will have profound and long-term cardiovascular implications,” said

Christopher deFilippi, MD, FACC, Vice Chairman, Academic Affairs, IHVI.

IHVI researchers conduct both inpatient and ambulatory clinical trials that are either Inova investigator-led or done in collaboration with organizations and research institutions such as the National Institutes of Health, George Mason University, the Virginia Department of Health, the University of Virginia, Carilion Clinic and the American Heart Association. They also collaborate with researchers at Johns Hopkins University and partner with researchers at the University of Maryland. These partnerships, in addition to the resources and personnel at all five Inova hospitals and affiliated physician offices, allow IHVI to deliver the critical components of a successful research enterprise: a well-trained, knowledgeable and facile team of researchers, biobanking capabilities, and a diverse patient population to facilitate high enrollment.

“We deliberately choose to participate only in those trials we believe are most likely to be successful and most likely to help our patients. We have a portfolio of clinical trials for patients at all stages of this disease, from prevention and surveillance to Inova investigator-led post-COVID clinical trials, thereby enabling Inova to offer patients cutting-edge therapeutics before they become widely available,” said Steven Nathan, MD, FCCP, Medical Director, Inova Advanced Lung Disease and Lung Transplant Program.

Inova’s ability to deliver cutting-edge investigational studies is exemplified by the organization’s participation in the Remdesivir study and Inova’s own convalescent plasma trial before the U.S. Food and Drug Administration granted emergency use for these interventions. Inova was also granted emergency use access for inhaled nitric oxide, which has now entered phase III clinical trials.

On the ambulatory side, in the early stages of the pandemic researchers began to conduct serology surveillance to identify and track the presence of COVID-19 antibodies in our health-care worker population. The serology study aims to make sense of what it means to have a positive antibody test result if you are asymptomatic; preliminary results have found that many antibodies are virucidal and maintain effectiveness for a few months. Inova researchers are investigating what it means to be immune from COVID-19 and if there are implications for asymptomatic seroconversion.



Another study is evaluating timely and simple methods of screening patients before they enter healthcare facilities for routine appointments or surgery to further reduce the risk of infection of healthcare workers. With this addition to Inova's research portfolio, investigators aim to make healthcare facilities as safe as possible using evidence-based practices to mitigate exposure of COVID-19 among healthcare workers and patients.

"IHVI includes cardiac and pulmonary research teams and is leading the charge for Inova's response in conducting comprehensive COVID-19 research. Because of our research infrastructure and our ability to quickly redirect teams, we have been able to quickly gear up to conduct research aimed at providing patients and healthcare workers the ability to fight back and stand strong against the disease," said Dr. Nathan.

Expertise Contributed to Care Guidelines Worldwide

During the COVID-19 pandemic, IHVI researchers have had the opportunity to speak about their research, including their COVID-19 experience, at major virtual national meetings with the Society of Critical Care Medicine, the American College of

Chest Physicians, the American Heart Association, American Thoracic Society, and the Heart Failure Society of America as well as through virtual meetings with international members of the scientific community. IHVI researchers have also submitted their COVID-19-related research to publications in top-tier peer-reviewed journals and through online features and panel discussions.

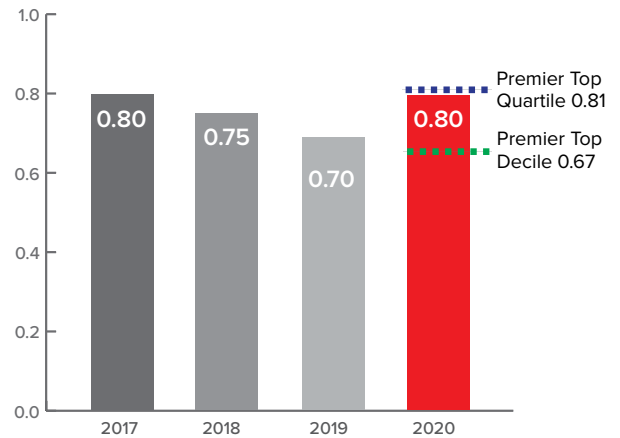
While IHVI has redirected research efforts toward COVID-19, research teams continue to focus on innovative studies for other diseases affecting the cardiovascular and pulmonary systems. Despite the pandemic, patients afflicted with other cardiac and pulmonary maladies continue to have the option of other innovative therapies through the IHVI research enterprise.

"Research is ingrained in our culture and enables us to provide the highest standard of care for our patients. We participate in the latest and most cutting-edge research in the cardiac, vascular and pulmonary field to allow us to offer our patients the newest devices and therapies, as well as contribute to the scientific community through publications and presentations at conferences," said Dr. deFilippi.

ACUTE MYOCARDIAL INFARCTION (AMI)

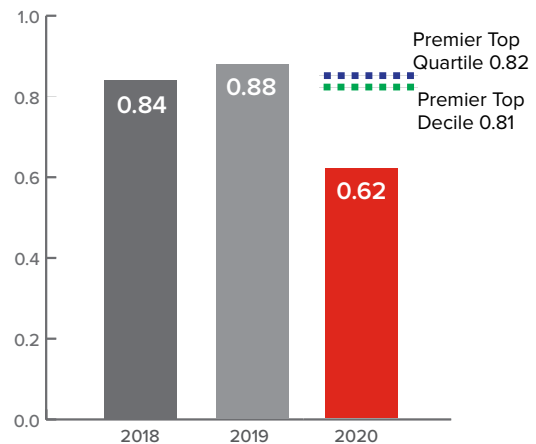


AMI 30-Day All-Cause Risk Adjusted Readmissions (Medicare 65+)



2020 = YTD January – October

AMI Mortality Performance



2020 = YTD January – October

Premier Healthcare Database is one of the most comprehensive electronic healthcare databases, which has been utilized by the pharmaceutical and device industries, academia, healthcare insurers and healthcare policy makers for clinical, financial and outcomes analyses. ("Expected readmissions" is based on Premier's Standard Practice Risk Methodology)



Patient Transfers

One Call 24/7 | Adult: 703.776.5905 | Pediatric: 877.900.9543 | Direct admission • Transfer • Specialized transport

DIAGNOSTIC CATHETERIZATION

Diagnostic Cardiac Catheterization

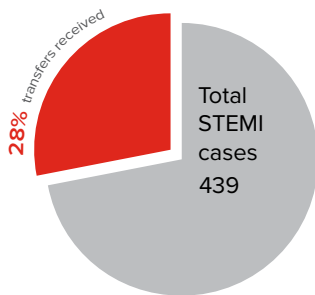
Facility	2020
IFMC	1,758
IAH	1,023
ILH	650
IHVI	3,431

Legend:
 IFMC – Inova Fairfax Medical Campus
 IAH – Inova Alexandria Hospital
 ILH – Inova Loudoun Hospital, Schaufeld Family Heart Center

2020 = rolling 4Q, ending Q2 2020

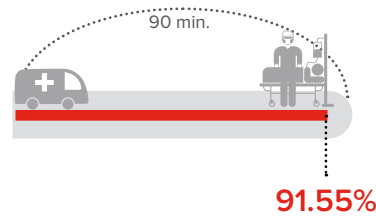
INTERVENTIONAL CARDIOLOGY

STEMI Volume and Transfers Received



2020 = rolling 4Q ending Q2 2020

Primary PCI Door-to-Balloon Within 90 Minutes



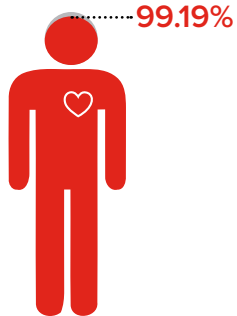
★★★★
4-Star rating
ACC/NCDR Cath/PCI Registry

Door-to-Balloon Time (in minutes)



2020 = rolling 4Q ending Q2 2020

PCI Success



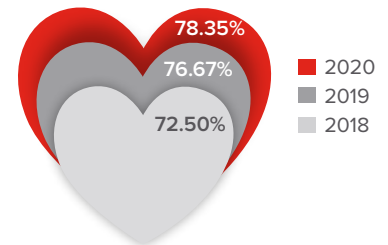
2020 = rolling 4Q ending Q2 2020

IHVI PCI Volume: 1,830



Gold Plus Receiving IFMC & IAH
Gold NSTEMI IAH
Silver NSTEMI ILH

Utilization of Radial Access for Catheterizations



2020 = rolling 4Q ending Q2 2020

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.

ELECTROPHYSIOLOGY



Ablation Volumes

	2020
SVT Ablation	574
VT (Endocardial and Epicardial) Ablation	137
Afib	590
Ablation Procedures (Total)	1,301

2020 = rolling 4Q, ending Q2 2020

Device Implant Volumes

	2020
Pacemakers	808
ICDs	432
Biventricular	167
Dual and Single Chamber	244
Subcutaneous	21
Watchman™	75

2020 = rolling 4Q, ending Q2 2020

**Lead Extraction for CIED
(Cardiovascular Implantable Electronic Devices): 52**



Accredited for

- Testing and Ablation
- Device Implantation
- Chronic Lead Extraction

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.



Refer a Patient

571.472.3270 | arrhythmia@inova.org
inovaheart.org/HR

CARDIAC SURGERY



Society of Thoracic Surgery
highest rating for quality of
Coronary Artery Bypass Surgery
2016, 2017, 2018, 2019, 2020

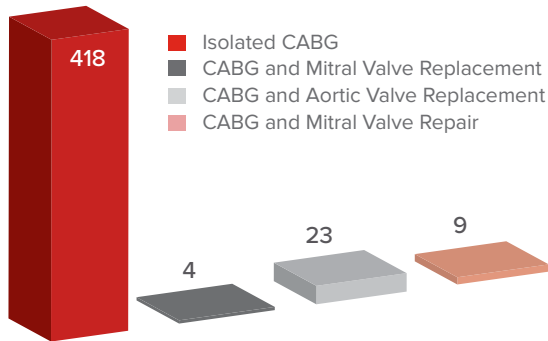


Society of Thoracic Surgery
highest rating for quality of
Aortic Valve Replacement + CABG
2017, 2018, 2019, 2020



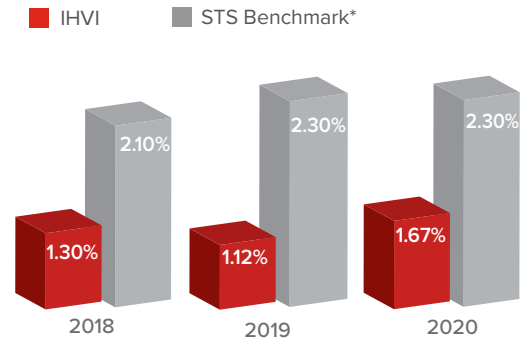
Society of Thoracic Surgery
highest rating for quality of
MVRR + CABG
2017-2019

CABG Combined Volume



2020 = rolling 4Q, ending Q2 2020

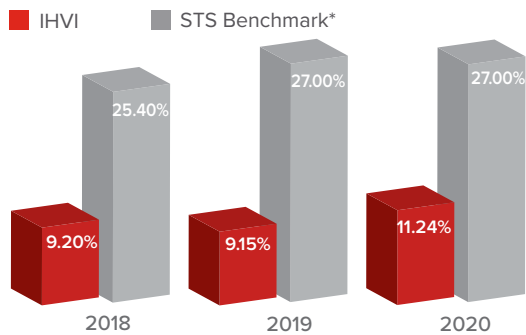
Pure CABG Mortality



2020 = rolling 4Q, ending Q2 2020

*2020 STS Benchmark unavailable – repeats 2019 STS Benchmark

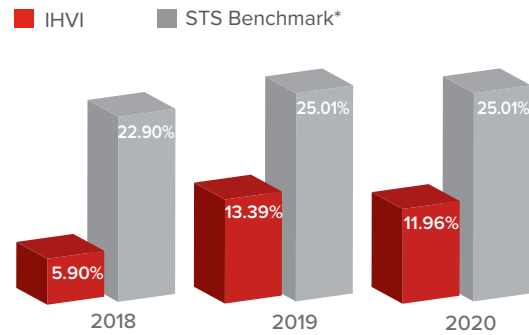
Post-Op Blood Products Used



2020 = rolling 4Q, ending Q2 2020

*2020 STS Benchmark unavailable – repeats 2019 STS Benchmark

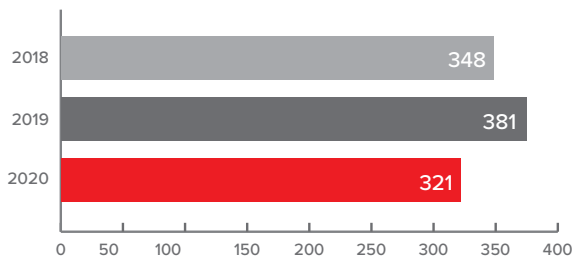
Intra-Op Blood Products Used



2020 = rolling 4Q, ending Q2 2020

*2020 STS Benchmark unavailable – repeats 2019 STS Benchmark

Total Surgical Valve Volumes



2020 = rolling 4Q, ending Q2 2020

Isolated Surgical Valve Procedures

	2018	2019	2020
Isolated Aortic Valve Replacement	51	46	38
Isolated Mitral Valve Replacement	37	37	30
Isolated Mitral Repair	37	48	46

2020 = rolling 4Q, ending Q2 2020

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.



Refer a Patient
703.280.5858
[inoaheart.org/CVSurg](https://www.inovaheart.org/CVSurg)

New Clinical Trial Offers Treatment for Tricuspid Valve Regurgitation

Tricuspid valve regurgitation (TR) is a relatively common problem. Millions of Americans have the condition, caused by a leaky tricuspid valve. But unlike problems in other valves, there have been few treatment options for faulty tricuspid valves.

That may be changing. IHVI is participating in a clinical trial to test a new, minimally invasive treatment for TR – a promising potential treatment that could be a major step forward in treating this disorder.

Without treatment, TR can significantly interfere with quality of life and ultimately result in heart failure and death if left untreated. Approximately one in 30 people over the age of 65 in the U.S. have moderate or severe TR. Until recently, surgery was the only definitive treatment. However, surgery is rarely performed due to the high mortality and morbidity rates associated with the procedure.

The potential to add a minimally invasive treatment option is what makes the TRILUMINATE Pivotal Trial so promising.

Triluminate: New Treatment for Tricuspid Regurgitation

“Tricuspid regurgitation is challenging to treat,” said Wayne Batchelor, MD, MHS, Director of Interventional Cardiology and Interventional Cardiology Research for IHVI. “Medications can control symptoms such as swelling, but the only real option to repair the leaky valve has traditionally been open heart surgery. Unfortunately, that option is too risky for many patients with tricuspid regurgitation, who tend to be older and often have other health problems.”

The potential to add a minimally invasive treatment option is what makes the TRILUMINATE Pivotal Trial so promising. A select team of interventional cardiologists who specialize

in structural heart disease maneuver special clips into the heart and place them in the valve to close the leak.

“There is a similar procedure for repairing leaks in the mitral valve,” Dr. Batchelor said. “But such an option hasn’t been available for the tricuspid valve. One reason for that is that the tricuspid valve has more leaflets, or flaps, making it more challenging to place the clips. Another is that its location makes it harder to get clear images of the valve and to place the clips in the right location. Thanks to new imaging techniques and new devices, we’re finally able to test a nonsurgical option for treating this disease.”

Leaders in Heart Valve Disease Treatment

Being one of only three hospitals in Virginia, and the only hospital in Northern Virginia, with access to this new technology, Inova is at the forefront of the TRILUMINATE Pivotal Trial. Along with a limited number of health systems across the country, IHVI will be evaluating patients to determine whether they might be good candidates for the procedure. Those selected will be randomly assigned to either undergo the procedure or receive medication as usual to demonstrate whether the procedure is safe and effective for treating TR.

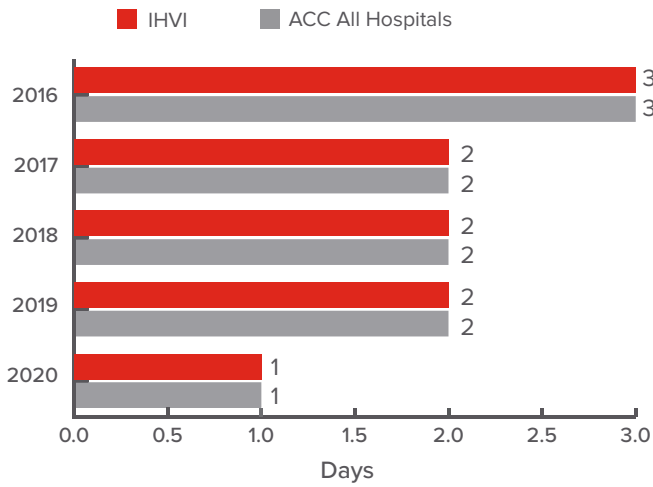
“IHVI’s participation in the study wouldn’t be possible without the strong multidisciplinary team we have in place,” said Batchelor. “This procedure requires experts in heart failure, imaging, cardiothoracic surgery and interventional cardiology, as well as skilled nurses, advanced practice providers and others experienced in structural heart disease. The breadth and depth of knowledge and teamwork at IHVI makes it possible for us to offer this exciting new treatment. And we’re excited to participate in a study that will help us continue to be leaders in innovation while providing the best care for patients.”

Principal Investigator: Wayne Batchelor, MD
Implanting Physicians: Wayne Batchelor, MD, Nadim Geloo, MD
Cardiac Imaging Expert: Abbas Emamina, MD
Cardiac Anesthesiologist: Samuel Lee, MD
Heart Failure Specialist: Mitchell Psozka, MD
Cardiothoracic Surgeon: Eric Sarin, MD
Research Coordinator: Tracy Plummer, RN

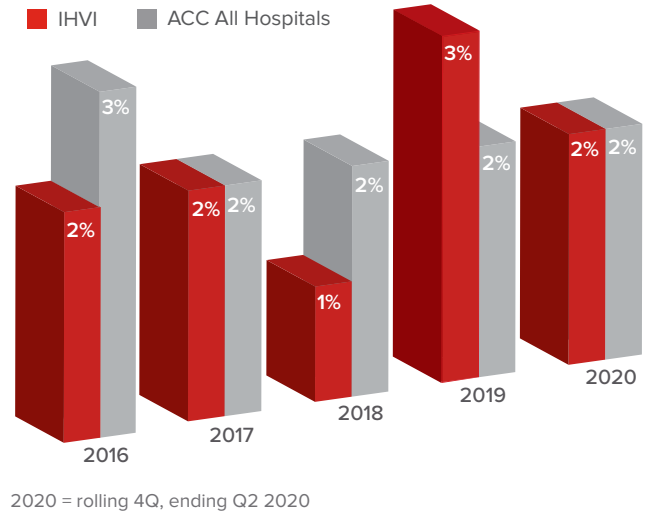


Refer a Patient
703.776.3135 | valve@inova.org
inovaheart.org/structuralheart

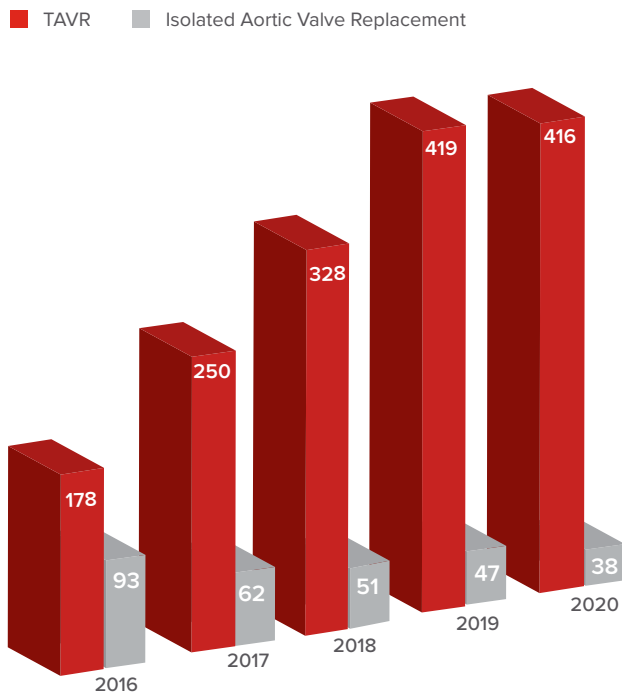
TAVR Median Postprocedure Length of Stay



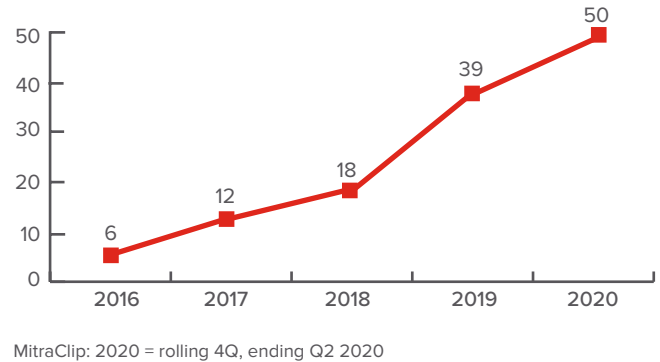
TAVR 30-Day Mortality



TAVR vs. Isolated AVR Cases



Mitral Valve Repair Procedures Using MitraClip®



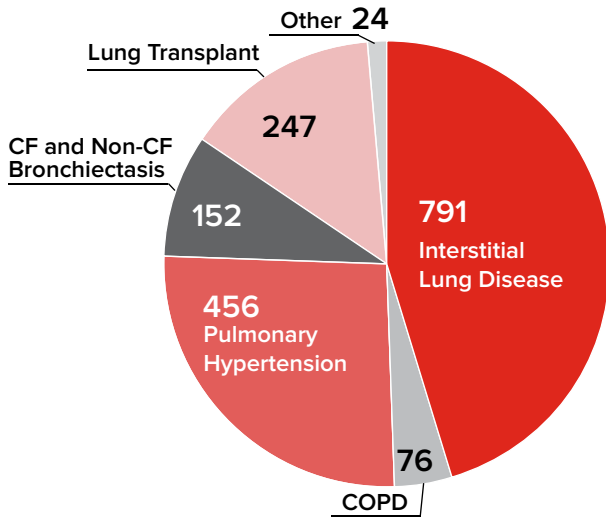
Minimally Invasive PFO Closure 2020: 83

2020 annualized from YTD January – October data

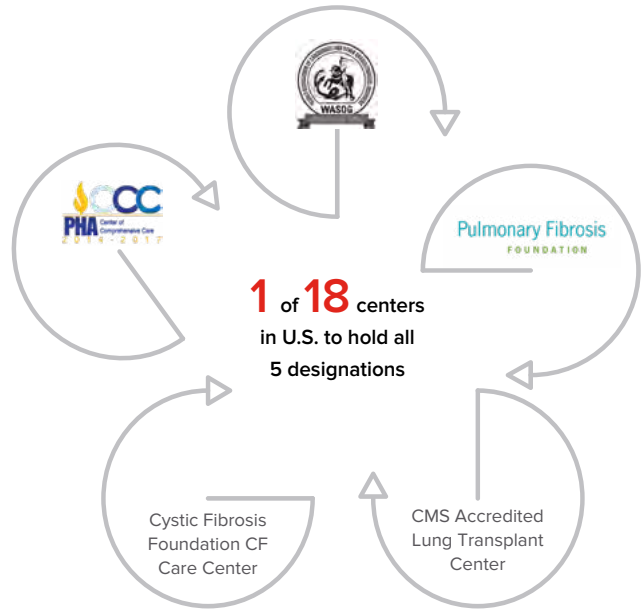
Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.

INOVA LUNG SERVICES

Patients Followed (n = 1,746)



November 2019 – November 2020



Additional special designation:



“COVID-19 is a challenge of a lifetime. No one expected it, no one wanted it. The training and background of researchers at Inova prepared us for this moment. It is a privilege to lead teams who have been primed to pivot and tackle this new disease the way Inova has.”

– Steven Nathan, MD, FCCP, Medical Director, Inova Advanced Lung Disease and Lung Transplant Program

Lung Transplant Volume: 24
Heart – Lung Transplant Volume: 1

2020 annualized from YTD January – October data

Lung Transplant Survival – Adult

	Observed	US Average
Adult Patient Survival (1 year)	89.75	88.89

SRTR August 2020 report

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.



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CARDIAC AND RESPIRATORY FAILURE



ECMO

	2016	2017	2018	2019	2020
Days of Support	616	740	848	1,047	1,485
Hours of Support	14,018	16,901	19,269	23,797	33,949
Pediatric ECMO Runs	9	12	8	20	18
Adult ECMO Runs	57	68	83	93	124
Total ECMO Runs	66	80	91	113	142

2020 = rolling 4Q, ending in Q2 2020

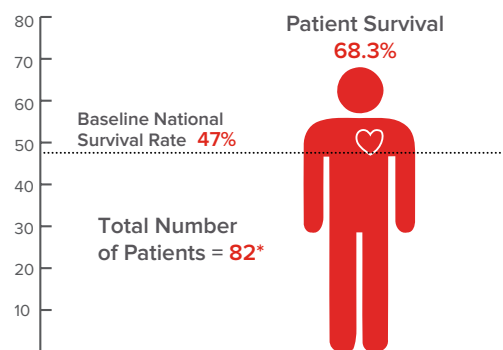
Impella® Volumes and Cardiogenic Shock Activations

	2018	2019	2020
Impella Volume	110	100	90
Shock Team Activations	158	222	216

2020 annualized from YTD January – July data

Due to COVID-19 demands and patient volume, some cardiogenic shock transfers were declined March – June 2020.

Cardiogenic Shock Patient Survival



Learn more about Inova's Cardiogenic Shock Program at inovaheart.org/CS

Patient Transfers

One Call 24/7

Adult: 703.776.5905 | Pediatric: 877.900.9543

Direct admission • Transfer • Specialized transport

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.

Inova Fairfax Medical Campus Receives ELSO Award for Excellence in Life Support



The Extracorporeal Life Support Organization (ELSO) designated Inova Fairfax Medical Campus a Gold Level Center of Excellence for extracorporeal membrane oxygenation – a therapy that has been successful in treating some of Inova’s most critically ill patients, including those with COVID-19.

Extracorporeal membrane oxygenation (ECMO) is a life support machine that is used during life-threatening, reversible conditions that stop the heart or lungs from working properly. This machine takes over the function of the heart and lungs by pumping blood from the patient’s body to an artificial lung that adds oxygen and removes carbon dioxide. The ECMO machine then sends the blood back to the patient via a pump with the same force as the heart. Taking blood from a patient’s body and passing it through a machine that can provide support for the heart and lungs is an invasive and risky process. It exposes patients to serious risks, including bleeding, infection and organ failure.

The Excellence in Life Support Award recognizes those centers that demonstrate an exceptional commitment to evidence-based processes and quality measures, staff training and continuing education, patient satisfaction, and ongoing clinical care.

An Expanding Range for Use of ECMO

ECMO can be used for weeks or months to support patients with failing lungs, heart or both. It can also be used as a bridge to recovery for organ transplants or durable devices, such as cardiac ventricular assist devices. When used in carefully selected patients with reversible conditions or those who are transplant candidates, ECMO can provide time for the body to heal or for patients to obtain the organs they need.

Over the last decade, advances in technology and critical care have aided the rapid growth of ECMO therapy in adults. Most recently, ECMO has been used as a life-sustaining treatment

for some of Inova Fairfax Medical Campus’s most critically ill COVID-19 patients.

“Over the past six years, ECMO has been an invaluable and necessary support modality for our patients in IHVI with failing cardiovascular and pulmonary diseases who are otherwise unable to be supported by more routine methodologies,” said Alan Speir, MD, ECMO Program Chief, Inova Health System. “We have assembled an excellent clinical team of cardiac surgeons, medical critical care pulmonary ECMO specialists, nurses with special expertise in this technology, respiratory therapists and ECMO technical support staff to provide care to our patients with outcomes that represent some of the best results in the United States. This was recently demonstrated by the exemplary results in supporting COVID-19 patients with end-stage respiratory failure. Inova is proud of our excellent clinicians and our ability to provide such treatment to patients throughout our region.”

IHVI’s ECMO Program also had the honor of presenting to an international audience during an ELSO webinar at the onset of the pandemic, allowing for the program’s successful management methods to be adopted at numerous ECMO centers in the U.S. and worldwide. Our program continues to assist other facilities in saving the most severely ill COVID-19 patients by organizing regional collaboration among major centers to share resources and provide access to ECMO experts.

“Initially, there were mixed reports about the efficacy of ECMO use in COVID-19 patients. Inova was one of the first large programs in the U.S. to use ECMO successfully on a large number of patients. These inspirational success stories helped provide hope in the face of much of the negative press regarding COVID-19 patient outcomes,” said Erik Osborn, MD, Medical Director, Adult ECMO Program, Inova Health System.

Inova Fairfax Medical Campus has expanded the ECMO Program since its founding in 2016. Eight years before developing a formal program, Inova offered ECMO only as a rescue therapy. The program has grown from fewer than 20 cases per year in 2015 to nearly 140 cases per year today, providing services to both pediatric and adult patients. The program includes a team of cardiac specialists from a variety of disciplines such as vascular surgeons, cardiologists, intensivists, ICU nurses, OR nurses, respiratory therapists, ECMO specialists from both critical care and lung services, advanced practice providers, and perfusionists.



ELSO Award Recognizes Commitment to Quality

In July of this year, ELSO designated Inova Fairfax Medical Campus a Gold Level Center of Excellence. ELSO is an international nonprofit consortium of healthcare centers and individuals who are dedicated to the development, evaluation and improvement of ECMO and other innovative therapies for support of failing organ systems in the neonate, child and adult.

The Excellence in Life Support Award recognizes those centers that demonstrate an exceptional commitment to evidence-based processes and quality measures, staff training and continuing education, patient satisfaction, and ongoing clinical care. As a designated Center of Excellence, Inova Fairfax Medical Campus has demonstrated extraordinary achievement in the following three categories:

- Excellence in promoting the mission, activities and vision of ELSO
- Excellence in patient care by using the highest quality measures, processes and structures based upon evidence
- Excellence in training, education, collaboration and communication supporting ELSO guidelines that contributes to a healing environment for families, patients and staff

The ELSO award demonstrates that Inova is one of the leading programs in the world, setting the standard for delivery of extracorporeal support. The ECMO Program at Inova has also rapidly become one of the highest volume programs. During the COVID-19 pandemic, ECMO volume doubled, even tripled, as Inova expanded to meet the demands of Northern Virginia and the Washington, DC region.

“ECMO is a multidisciplinary enterprise, and the ECMO Program’s success during COVID-19 demonstrated effective teamwork across the system. Inova rose to the occasion and met the demands of the population it serves. Inova now has an opportunity to expand its infrastructure, and ECMO will be a key component of Inova Health System’s growth and as a quaternary major healthcare leader. Currently, we are in the process of reevaluating the ECMO Program and will design a plan to continue to expand it in a safe and effective way,” Dr. Osborn said of the ECMO Program’s future.

A Dramatic Delivery Showcases Inova's Team Approach

When 8-months-pregnant Jihye Ha needed emergency care, the situation turned critical for her and the baby.

Throughout her pregnancy, Jihye seemed to be sailing through it without much difficulty or discomfort. But then, at 32 weeks, she began noticing a strange development. Her fingernails were turning blue.

Jihye also started feeling shortness of breath, sometimes so severe that she had to sleep in a chair, because lying down made it worse. When she went in for a prenatal checkup, it turned out her oxygen levels were alarmingly low. She went to the ER immediately, where she was diagnosed with severe pulmonary hypertension and right-side heart failure. This was caused by a hole in her heart, which hadn't been detected before.

Immediately, the staff at Inova Fairfax Medical Campus put together a team to decide on the best course of action, bringing together specialists from pulmonary hypertension, cardiac surgery, cardiovascular ICU nursing, critical care, interventional radiology, labor and delivery, obstetrics, congenital cardiology, and respiratory therapy.

"It does not get any more serious than this," said Oksana Shlobin, MD, Medical Director of Inova's Pulmonary Hypertension Program. "Women who are diagnosed with the kind of condition that Jihye has are usually advised not to get pregnant, because there can be a 50-percent mortality rate for mother and baby. We all knew this needed to be handled with a lot of care, because the risks were incredibly high."



Going on ECMO

The Inova team decided that the baby needed to be delivered immediately, but Jihye's heart was so weak they feared she wouldn't survive it, even with a cesarean section. That's when they proposed placing her on ECMO as a way to support her heart and lungs and significantly lower the risk of going into cardiac arrest during delivery. This would be the first time the team had ever placed a pregnant woman on ECMO to safely deliver a baby.

“It was definitely a very special moment for all of us to see the baby delivered safely.”

– Mehul Desai, MD
Medical Co-Director, Adult ECMO

ECMO uses a pump to circulate blood out of the body and into an artificial lung, where the blood is oxygenated and pumped back into the patient. It provides a way to replicate heart and lung function for people like Jihye, whose own organs can't get enough oxygen into the bloodstream.

Although she was partially sedated, Jihye remembers feeling the tube in her mouth and could hear the concern of everyone around her, including her husband, J.D. The events of that day were such a whirlwind she barely registered what was happening, she recalled, but one moment stood out clearly.

“I thought I was going to die,” she remembered. “I prayed for God to give me just one more day to see my baby.”

Dramatic Delivery

Working quickly, the Inova team delivered Noah, a healthy baby boy. The relief felt by the Ha family and everyone involved was incredible, said Mehul Desai, MD, Medical Director, Critical Care, Inova Health System.

“It was definitely a very special moment for all of us to see the baby delivered safely,” Dr. Desai said, but “we knew Jihye still needed a great deal of care before we felt that kind of relief about her health.”

Jihye went through weeks of difficulty, including bleeding in her lungs, severe pneumonia and resistance to all but the strongest antibiotics. Her respiratory system took longer to heal due to the bleeding and infections, said Erik Osborn, MD, a pulmonary critical care physician and Medical Director, Adult ECMO Program, Inova Health System.

“It seemed like one life-threatening issue after another,” Dr. Osborn said. “And when we would take her off the breathing machine, her oxygen levels would drop back down, but putting her back on sedation and a breathing machine risked causing her heart to stop. It was very tricky and complex. Jihye was able to text complex sentences on her iPhone despite incredibly low oxygen levels, which helped reassure us that she was getting enough oxygen from ECMO.”

On the Road to Recovery

Little by little, Jihye improved, and baby Noah thrived during the two months she remained in the hospital. Everyone rallied around them – the nurses even threw her a baby shower. All the time, Jihye maintained her positive attitude and composure, which was so admirable, according to Dr. Shlobin.

“She's extraordinary, and we all marveled at how she always maintained a great attitude and greeted everyone with a smile, no matter what she was going through,” Dr. Shlobin said. “This was a remarkable situation made even more notable because Jihye has a remarkable spirit.”

The delivery also showcased how adept Inova is at bringing in multiple specialists and departments to handle complicated cases like Jihye's.

“Every ECMO case requires significant collaboration,” Dr. Desai said. “Every decision has to be made as a group, and the goal is always to get the patient headed toward recovery. We knew that despite a successful delivery, she still needed a great deal of support before her heart could fully support her.”

Following several months in the hospital, Jihye was discharged home.

“Jihye has continued to improve. Although she remains on a continuous prostanoid infusion to decrease pulmonary pressure and improve right ventricular function, she is now fully functional and is able to take care of Noah, who is a delightful toddler full of smiles,” said Dr. Shlobin, who is responsible for Jihye's follow-up care.

“When I went back to see them, some of the doctors and nurses cried when they saw me,” Jihye said. “I feel lucky and happy to have them, and they all worked so hard for Noah and me. We are all so deeply grateful.”

ADVANCED HEART FAILURE

VAD and Heart Transplant Volumes

	2020
VAD Volume – Durable Devices	19
Heart Transplant Volume	43
Heart - Lung Transplant	1

2020 annualized from YTD January – November data



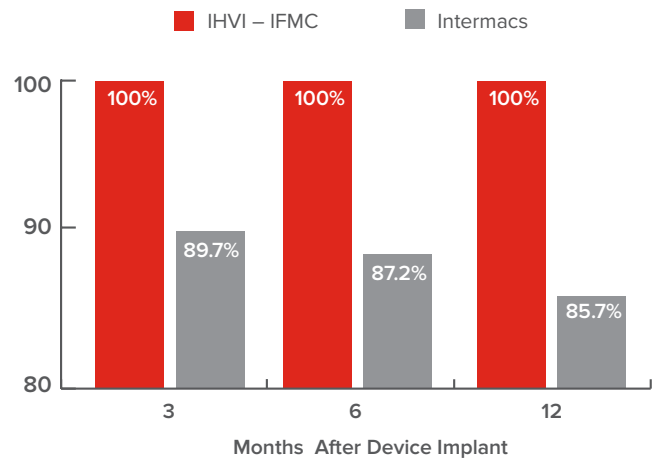
The Joint Commission Gold Seal of Approval® for Ventricular Assist Device

Heart Transplant Survival

2020	Expected	Observed	HR Index
Graft Survival (1 year)	90.20%	92.74%	.77
Patient Survival (1 year)	90.45%	92.74%	.79

SRTR August 2020 Report

Post-Implant Survival



Intermacs Q2 2020 Primary Overall Survival

PYP Imaging Reveals Cardiac Amyloidosis as a More Prevalent Cause of Heart Failure

Cardiac amyloidosis, which is due to the deposition of abnormal proteins in the heart, is an under-recognized cause of heart failure. The two most common variants involving the heart are light-chain amyloidosis (AL) and transthyretin amyloidosis (ATTR). Once thought to be a rare disease, more recent experience has shown that 13 percent of patients admitted with heart failure with preserved ejection fraction (HFpEF) and 16 to 20 percent of patients with severe aortic stenosis (AS) have ATTR cardiac amyloidosis.

“We now diagnose ATTR cardiac amyloidosis using technetium pyrophosphate (PYP) imaging, which has 97-percent sensitivity and 100-percent specificity,” said Abbas Emamina, MD, an Inova cardiologist with specialized training in advanced cardiac imaging. “This avoids the need for an invasive endomyocardial biopsy and has furthered our understanding of cardiac amyloidosis, opening avenues that help us provide earlier intervention to improve patients’ quality of life and outcomes.”

With early diagnosis of ATTR cardiac amyloidosis, patients can be treated with oral agents, including tafamidis, which results in fewer heart failure hospitalizations and a reduction in all-cause mortality.

Specialized care for cardiac amyloidosis is available through the Inova Cardiology – Fairfax practice, located in the Inova Specialty Center.

Recent Case Illustrates Familial Benefits

An elderly patient recently referred to Inova Cardiology for management of heart failure illustrates the familial benefits of advanced cardiac imaging and genetic testing.

The patient’s echocardiogram was suggestive of an infiltrative cardiomyopathy. As a result, PYP scintigraphy was performed, confirming a diagnosis of ATTR cardiac amyloidosis. After genetic testing, the patient was found to have V122I mutation, which is the most common mutation in the U.S. He was started on tafamidis, and his family was screened for the pathogenic genes. His daughter was noted to have the same gene; however, she did not have any cardiac manifestations and had normal imaging. She will follow up with annual imaging, and therapy will be initiated with the first imaging manifestations of disease, before cardiac damage is irreversible.

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.



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CONGENITAL HEART DISEASE

Neonatal Procedures

	2020
Complex Cardiac Repairs	26
PDA Ligations – Premature Infant	3
Total	29

2020 annualized = rolling 4Q, ending Q2 2020

Pediatric Congenital Heart Surgery

	2020
ASD	6
VSD	11
TOF	9
ASO	3
AVC (Complete, Partial)	7
PAPVR	1
TAPVR	1
COA (nonpump)	6
COA/Hypoarch	8
Glenn/Fontan	8
Systemic Pulmonary Shunt	4
Pacer/ICD	18
PVR/Conduit/RVOT procedure	9
AVR/Supra and Sub Valvar	2
MV Repair/Replacement	3
Tricuspid Valve	0
ECMO Cannulation	9
ECMO Procedures	13
PDA	3
NORWOOD/STAT 5	2
Thoracic Procedure	5
Anomalous Coronary Surgery	5
Other STAT Categories	8
Other Cardiac Nonpump	57
Total	198

2020 annualized = rolling 4Q, ending Q2 2020

For more information about the Pediatric Heart Center at Inova Children’s Hospital, visit: inovachildrens.org/heart

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.

Thanks to advances in pediatric cardiac care, there is a growing population of adults with congenital heart disease who previously might not have survived childhood. Established in 1994 as a partnership between Inova Children’s Hospital and IHVI, Inova’s Adult Congenital Heart Disease (ACHD) Program was one of the first such programs in the country. Today, the ACHD Program provides complete continuity of care for patients with a variety of congenital heart defects, including those complicated by heart rhythm problems, heart failure and pulmonary hypertension. The ACHD Program also partners with Inova Women’s Hospital to achieve the safest delivery possible for mothers with congenital heart defects and their babies.

The ACHD Clinic is located in the Advanced Disease Management Clinic, on the Inova Fairfax Medical Campus. This provides patients seamless access to the collective expertise of Inova’s highly skilled pediatric and adult specialists in a single location.

Areas of specialization cover the full range of IHVI’s advanced cardiac therapies.

- Adult Congenital Cardiac Catheterization
- Adult Congenital Electrophysiology
- Adult Congenital Surgery
- Proactive Evaluation of Tetralogy Patients
- Maternal-Fetal Medicine

Adult Congenital Heart Surgery

	2020
ASD	4
AVR/ASAA/Sub AS	3
MVR	2
PVR	2
PAPVR	2
VSD	0
AVC (Partial, Transitional)	0
Anomalous Coronary Surgery	4
Other	11
Total	28

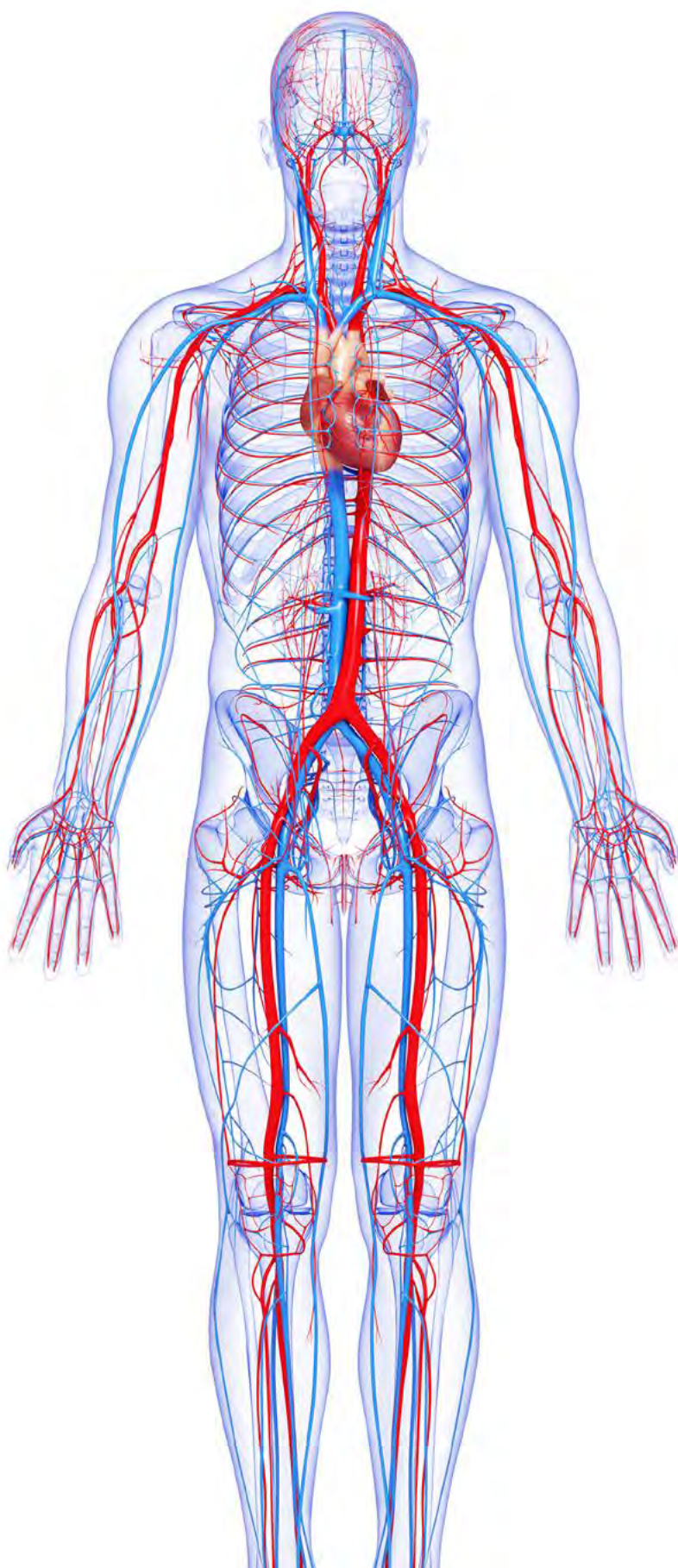
2020 annualized = rolling 4Q, ending Q2 2020



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Adult Congenital Heart Program | 703.776.3599
 Pediatric Congenital Heart Program | 703.776.4428
 Fetal Congenital Heart Program | 703.776.6371
inovaheart.org/CHD

VASCULAR SERVICES



Vascular Procedure Volumes

	2020
Carotid Endarterectomy	171
Carotid Artery Stent	6
TCAR	26
Carotid Total	203
EVAR	77
TEVAR	37
Open AAA	10
Aneurysm Total	124
PVI	225
Bypass	117
Lower Extremity Total	342

2020 = rolling 4Q, ending Q2 2020

Patient and procedural volumes for 2020 were impacted by a temporary suspension of elective procedures due to COVID-19 beginning in March through the end of May and the nationwide trend of decreased demand for services throughout the pandemic.

Transforming Abdominal Aortic Aneurysm Care with the Alto™ Abdominal Stent Graft System

With the commercial release of the Alto™ Abdominal Stent Graft System, Inova's vascular surgeons are helping ensure the best possible outcomes for patients with abdominal aortic aneurysms (AAA). This recently FDA-approved stent graft device has expanded the number of patients who can be offered minimally invasive endovascular repair. Until now, some patients were not able to be treated using other endovascular stent devices.

AAA is among the leading causes of death in the U.S. According to the Centers for Disease Control and Prevention, the condition is more prevalent among men and people age 65 and older, with 75 percent of patients reporting a history of smoking. Patients do not typically have symptoms, although pain in the back, side, buttocks, groin or legs is sometimes reported. Common causes of AAA are a family history and risk factors such as peripheral arterial disease, high cholesterol and high blood pressure. Some infections and injuries can also cause AAA.

Both the Society for Vascular Surgery and the U.S. Preventative Services Task Force recommend a one-time AAA screening using ultrasound imaging for men age 65 years or older, particularly those with a history of smoking or a family history of AAA. An indication for routine screening in women is not as strong but can be considered if the same risk factors are present.

Implantation of the Alto device, completed for the first time at IHVI in August 2020, was the first implant surgery performed in the Washington, DC region. Inova is one of the first centers in the U.S. to offer this procedure for AAA patients. The new device differs from traditional approaches used for endovascular repair through the use of a conformable liquid polymer, which allows for the graft design to be a durable, customizable and anatomically adaptive aortic seal.

Inova's vascular program is a recognized leader in the treatment of aneurysms and amputation prevention. In the recently released *U.S. News & World Report* 2020-21 ratings, the AAA program was one of three in Virginia rated "High Performing," and the only program rated as such in the DC metropolitan area.

"We have an outstanding faculty and a supportive team that offers open and endovascular aneurysm repair. The Alto program keeps us at the forefront of clinical care and research in the management of aneurysmal disease," said Richard Neville, MD, Medical Director of Inova Vascular Services, Associate Director of IHVI and Chairman of the Department of Surgery.

"Inova offers the entire gamut of treatment options for AAA," according to Dipankar Mukherjee, MD, Section Chief of Vascular

Surgery for Inova Fairfax Hospital, who served as the lead investigator for Inova's clinical trial on the device. "Inova's treatment options include endovascular aortic repair (EVAR) as well as open surgical repair when that may be more appropriate. We are fortunate to have available the latest in endovascular stent graft repair technology by virtue of participating in clinical trials evaluating the next generation of ever-improving endovascular stents. As such, we are able to offer the best repair using the optimal stent based on patient's specific aneurysm anatomy."

Inova's AAA repair program has been rated as "high performing" for the fourth consecutive year by *U.S. News & World Report*.

Expanding Range of Treatable AAA Patients

The Alto implant uses polymer sealing technology to obtain the proximal seal to eliminate pressurization of the AAA sac. This is a unique concept as far as EVAR is concerned and may prove to be a more durable treatment for the long term. There is modest early evidence to suggest that such may be the case. This implant has the ability to treat more patients with AAA, including those with short neck of the aneurysm.

"The success rate for AAA repair is excellent," said Dr. Mukherjee. "We are able to accomplish minimally invasive repair most often without the need for even a groin incision. Patients are usually discharged from the hospital the next day. They are closely followed in the office with ultrasound examinations of the repair, and with CT angiography if there are any concerns. The mortality and morbidity of endovascular repair is superior when compared to open repair. The quality of life following endovascular repair is also superior."

In the ELEVATE trial, treatment success was 96.7 percent at one year. The type I endoleak rate was 1.4 percent with 100-percent freedom from type III endoleak, device migration, device fracture, stent occlusion or AAA rupture. The device-related secondary intervention rate was 2.7 percent.

Transcarotid Artery Revascularization for High-Risk Patients with Carotid Artery Disease

Carotid artery disease is estimated to be the source of stroke in up to one-third of all cases, and there are 400,000 new diagnoses of carotid artery disease made every year in the U.S.

Most cases of carotid artery disease, similar to other vascular diseases caused by atherosclerosis, are medically managed. Carotid intervention is indicated for:

- Symptomatic patients with stenosis > 50%
- Asymptomatic patients with stenosis > 80%

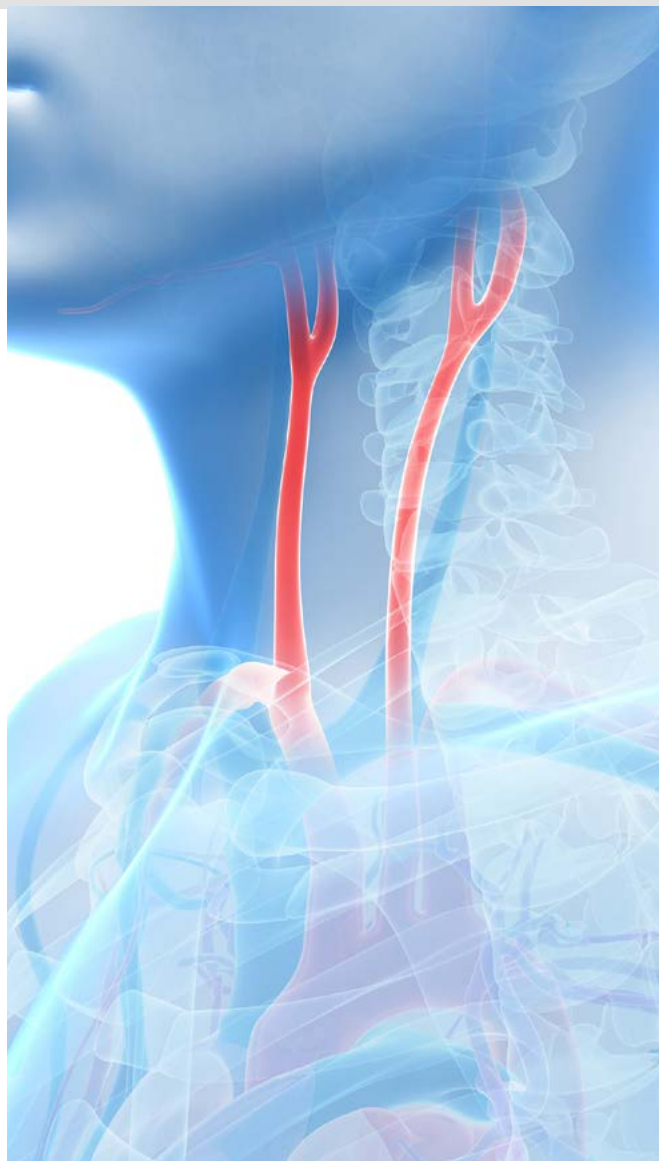
One out of three strokes originates in the carotid arteries.

Carotid endarterectomy (CEA) has long been considered the gold standard treatment because of its low procedural stroke rate. Transcarotid artery revascularization (TCAR) is a less-invasive procedure and has demonstrated a lower stroke rate.

TCAR is a minimally invasive, endovascular procedure that has demonstrated advantages compared to standard carotid stenting, especially for patients at higher risk of surgical complications, due to age, medical comorbidities or anatomical issues.

“Our experience with TCAR leads the region and closely emulates the findings from the clinical trials comparing the safety of TCAR to CEA,” according to Richard Neville, MD, Medical Director of Inova Vascular Services, Associate Director of IHVI and Chairman of the Department of Surgery. “It is an effective technique that helps to further minimize the risk of stroke and delivers excellent patient outcomes.”

The procedure utilizes a special neuroprotection system to temporarily reverse blood flow away from the brain, collecting any potential debris in a device filter before returning the



blood to a vessel in the leg. Because the flow reversal method does not rely on a distally placed filter to capture emboli before they reach the brain, it collects both small and large debris. Once the blockage has been treated, normal blood flow is reestablished.

Approved by the FDA in 2016, TCAR is less invasive than CEA and performed using a smaller incision. As such, it also carries a lower risk of myocardial infarction and cranial nerve damage.

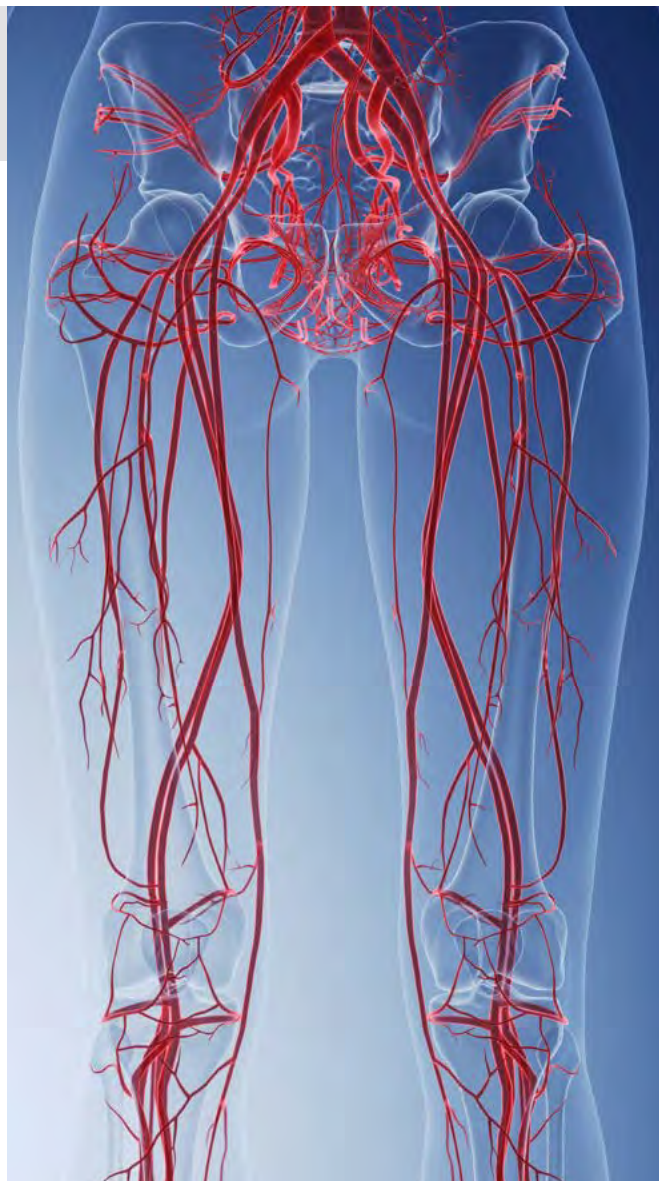
Venous Arterialization Offers Limb-Saving Treatment for CLI

An increasing number of patients with critical limb ischemia (CLI) are not suited for standard distal arterial reconstruction. However, limb amputation is no longer the only option for these patients.

Advances in percutaneous endovascular techniques have greatly improved the capability to successfully treat CLI and avoid amputation. This is true even for older patients and those with severe comorbidities, including diabetes, renal failure and failed prior interventions. The sooner patients can be evaluated, the better chance there is to save the limb.

Inova's vascular surgeons are among the first in the world to demonstrate that distal venous arterialization (DVA) can be a successful intervention for patients with CLI, in what otherwise have been viewed as unsalvageable "no-option" limbs. IHVI is one of just a few institutions performing this intricate procedure.

DVA establishes blood flow into the deep veins of the lower leg and foot to get blood to the tissues in a retrograde manner. Valves in the veins have to be disrupted so the blood flowing in a "reverse" direction is not stopped and can reach tissue through the capillary bed. This is accomplished using a bypass technique – distal vein bypass (DVP) – developed by Richard Neville, MD, Medical Director of Inova Vascular Services, Associate Director of IHVI and Chairman of the Department of Surgery.

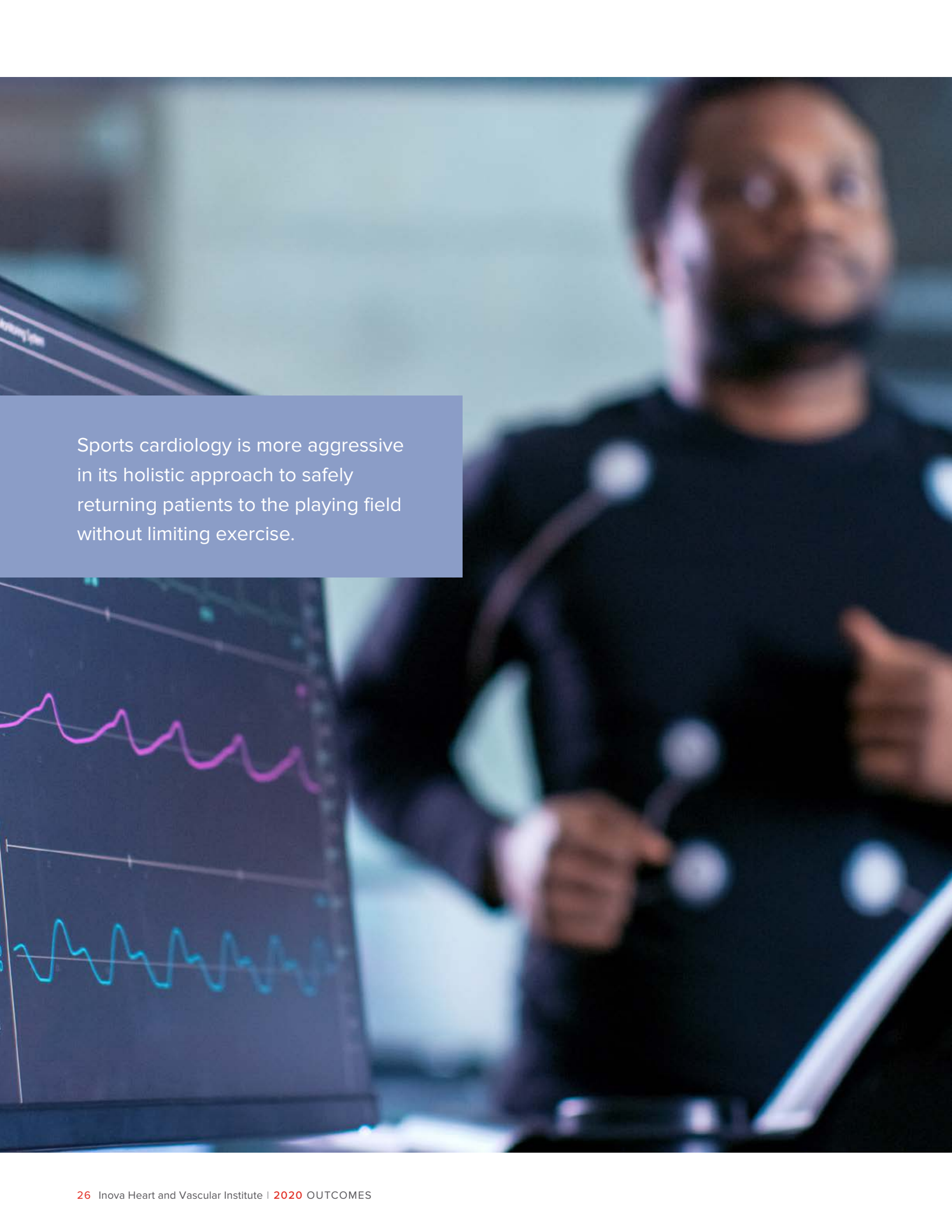


As limb loss has profound implications for quality of life and long-term survival, it is worth exploring DVA as an alternative prior to amputation. Patients with ischemic rest pain, non-healing wounds or gangrene, who have been told they have limited options for revascularization, are potential candidates for the procedure.



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Sports cardiology is more aggressive in its holistic approach to safely returning patients to the playing field without limiting exercise.

Sports Cardiology Program for All Levels of Athletes

This new program is aimed at answering a common question posed by many who have had cardiac events or interventions: “How do I get back to exercising?”

After serving nearly two decades in the U.S. Navy helping to return soldiers, sailors, airmen and marines to active duty following cardiac procedures, M. Casey Flanagan, MD, FACC, established Inova’s Sports Cardiology Program to better serve a wide range of athletes and physically active individuals of all ages and skill levels, with and without cardiovascular disease, with a goal of maximizing their performance.

“Sports cardiology is more aggressive in its holistic approach to safely returning patients to the playing field without limiting exercise. We place an emphasis on the mental and physical upsides to exercise, which allows patients to have a more active role in their treatment and training plan,” said Dr. Flanagan, Medical Director, Inova Sports Cardiology Program.

The program is dedicated to evaluating, diagnosing and treating young, master, recreational or professional athletes, enhancing their level of fitness and ensuring healthy exercise and competition. Program services include:

- Cardiac evaluation for participation clearance
- Risk assessment
- Cardiovascular examination
- Lab tests
- Diagnostic cardiac tests
- Electrocardiogram
- Guidance for athletic participation after cardiac procedures or limitations
- Treatment of chest pain, shortness of breath, dizziness, palpitations or fainting
- Evaluations for diminished athletic performance due to cardiovascular offsets of medications

Inova’s Sports Cardiology Program collaborates closely with the Inova Sports Medicine Program to create a unique treatment and training plan for each patient based on sport and lifestyle.

After an initial consultation, the program takes a team approach, incorporating experts from a variety of specialties based on the patient’s symptoms and pathology. These experts practice in areas such as cardiology, cardiovascular disease, structural heart disease, cardiogenetics, cardiac imaging, adult and pediatric electrophysiology, and exercise physiology.

Inova’s Sports Cardiology Program also works with the Washington Football Team and the Washington Nationals

to implement thorough cardiovascular screening to all athletes and club members. In particular, the program has extensive experience working with athletes who have tested positive for COVID-19, ensuring a safe return to the playing field.

“As athletes of all levels return to play following a COVID-19 infection or prolonged quarantine, consultation with Sports Cardiology can ensure safe exercise at peak performance. We follow the return-to-play algorithm developed by the National Football League and Major League Baseball, which can be adapted and tailored to fit the strategy for return to exercise for patients of all ages and skill levels,” said Dr. Flanagan. “These partnerships also enable our sports cardiology program to adapt strategies and apply them to recreational and master athletes, all the way down to college and high school athletes, so that they can get back to the game at peak performance.”

Get Them Back in the Game

Inova’s Sports Cardiology Program can create a unique treatment and training plan for individuals of all ages and skill levels, with or without cardiovascular-related concerns. Many people can benefit from the program’s services, including:

- Athletes who have had cardiovascular surgery and want to get back to exercising, but are afraid to stress their hearts
- Athletes who experience cardiovascular issues during exercise
- Athletes who received abnormal or a variance of normal test result and wish to explore these findings through further testing
- High school or college athletes who want to improve their performance through further evaluation and testing to overcome limitations
- Previously diagnosed COVID-19 patients who are experiencing post-COVID syndrome and/or who wish to return to exercise safely following infection and prolonged quarantine



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INOVA HEART AND VASCULAR INSTITUTE SERVICES

Inova Heart and Vascular Institute	IFMC	IAH	IFOH	ILH	IMVH
Adult Congenital Heart Clinic	●				
Advanced Heart Failure Program	●				
Heart Transplantation Medical Management	●				
Mechanical Circulatory Support – VAD/LVAD	●				
Remote Home-Based Monitoring	●				
Cardiac and Respiratory Failure	●				
Cardiogenic Shock Team	●				
Extracorporeal Membrane Oxygenation (ECMO)	●				
Impella®	●			●	
Pulmonary Embolism Response Team (PERT)	●	●		●	
Cardiac Catheterization	●	●		●	
AMI	●	●		●	
Chronic Total Occlusion Program	●	●			
PCI	●	●		●	
Cardiac Rehabilitation	●	●		●	●
Cardiac Rhythm Disorders/Electrophysiology	●	●		●	
AFib Ablation	●				
AV Node Ablations	●	●		●	
PVC Ablations	●				
SVT and VT Ablation	●	●		●	
Cryoballoon and Radiofrequency Ablation	●	●		●	
FIRM Mapping and Ablation	●				
Fluoroless EP Studies	●	●		●	
ICD	●	●		●	
Implantable Loop Recorders	●	●		●	
Laser Lead Extraction	●				
Pacemakers	●	●		●	
Conventional	●	●		●	
Leadless	●	●		●	
Cardio-Oncology Program	●				
Cardiac Surgery	●				
Adult Congenital Surgery	●				
AFib Surgery	●				
Aortic Surgery	●				
Heart and Lung Transplantation	●				
Minimally Invasive Coronary Artery Bypass Grafting (CABG)	●				
Open and Minimally Invasive Valve Replacement Surgery and Repair	●				
Open CABG	●				
Cardiovascular Genomics Center	●				
Lung Services	●	●		●	●
Alpha-1 Antitrypsin Deficiency Clinical Resource Center	●				
Cystic Fibrosis Care Center	●				
Interventional Pulmonology	●				
Lung Transplantation Medical Management	●				

Inova Heart and Vascular Institute	IFMC	IAH	IFOH	ILH	IMVH
Lung Services, cont.					
Pulmonary Embolism Response Team (PERT)	•	•		•	
Pulmonary Fibrosis Foundation Care Center	•				
Pulmonary Hypertension Comprehensive Care Center	•				
Pulmonary Rehabilitation	•	•		•	•
WASOG Sarcoidosis Clinic	•				
Noninvasive Cardiovascular Diagnostics					
Cardiac MRI	•	•*			
Cardiac Stress Testing (Nuclear Cardiology, Pharmacologic)	•	•	•	•	•
CT Angiography	•	•		•	•
CT Calcium Scoring	•	•		•	•
Echocardiography (Stress Echo)	•	•	•	•	•
Peripheral Vascular Ultrasound (Venous, Arterial)	•	•	•	•	•
Pediatric Cardiovascular Services					
Catheterization	•				
Cardiac Electrophysiology	•				
Cardiac Surgery	•				
Congenital Heart Disease Program	•				
Genomics Testing and Counseling	•				
Structural Heart Disease Program					
PFO Closure	•				
Stroke Risk Reduction – WATCHMAN™	•				
Transcatheter Aortic Valve Replacement (TAVR)	•				
Transcatheter Mitral Valve Repair – MitraClip®	•				
Transcatheter Mitral Valve Replacement (TMVR)	•				
Transcatheter Tricuspid Valve Replacement	•				
Thoracic Surgery					
•	•				
Vascular Services					
Endovascular and Open Surgical Procedures	•	•	•	•	•
Hyperbaric Oxygen Therapy			•		•
Limb Preservation Program	•	•	•	•	•
Lower Limb Revascularization	•	•	•	•	•
Peripheral Arterial Disease Treatment	•	•	•	•	•
Vascular and Interventional Radiology	•	•	•	•	•
Wound Care	•	•	•	•	•

* Inpatient only

LEGEND

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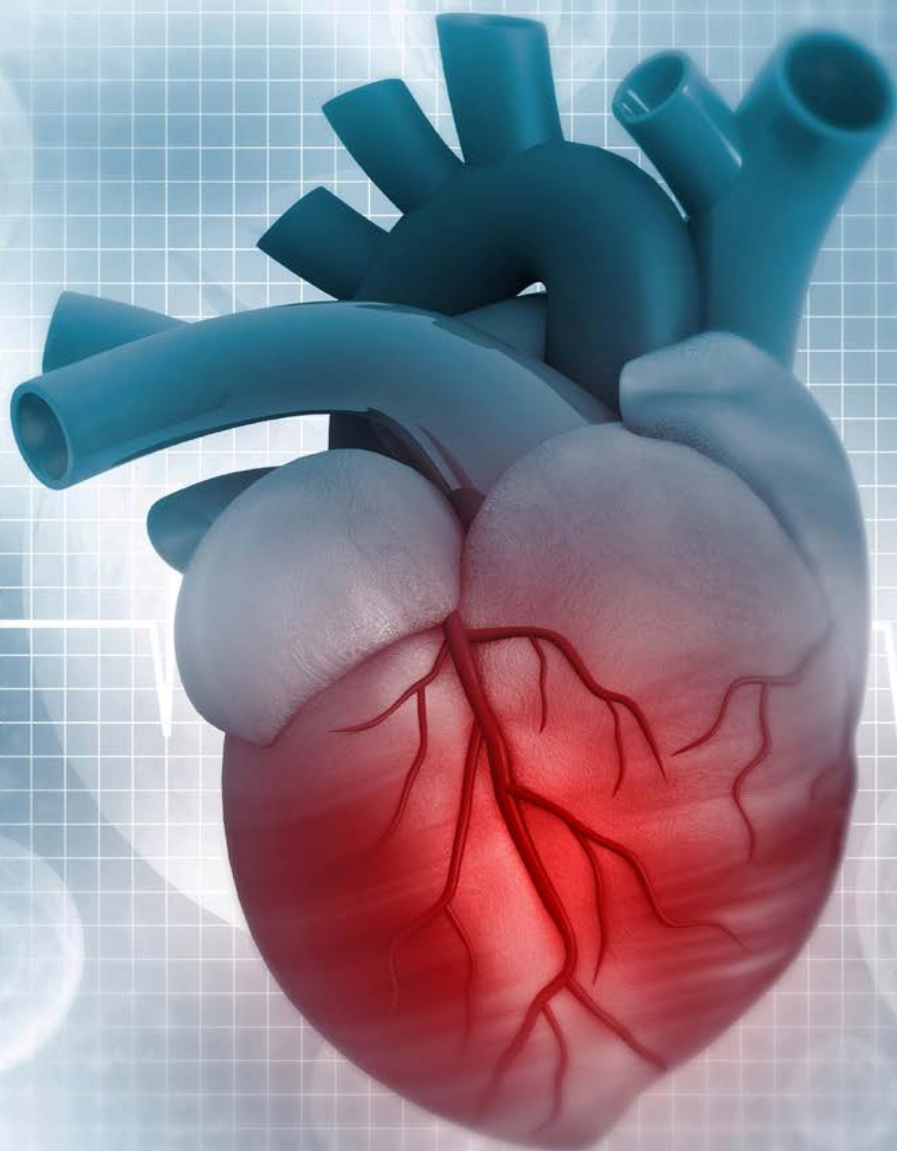
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