



 **WVU** Heart & Vascular Institute

2022

Annual Report

A trusted national leader

WVU Heart & Vascular Institute is home to groundbreaking and innovative procedures using cutting-edge techniques and technology.

WVUMedicine.org/Heart

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Cardiology

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Research

Message from our Chair


On behalf of the WVU Heart and Vascular Institute, I have the pleasure of sharing this update of our team's outstanding accomplishments and innovations in 2022. As always, we stand ready to collaborate with you in the name of enhanced patient outcomes and access to state-of-the-art therapy.

Together, more than 100 cardiovascular-focused faculty and 1,500 affiliated team members serve all 55 counties of West Virginia and all its neighboring states through our main location within WVU Medicine's academic medical center in Morgantown, West Virginia, and 32 off-campus clinics across a five-state geographical area of service.

As an integrated team of teams, we believe that great care can be provided close to the home of our patients and their families, while keeping unique quaternary services a phone call away.

Our faculty in Morgantown continues its leadership as our multistate region's premier quaternary institution, providing nation-leading innovations in advanced cardiology, thoracic, and vascular services, complex valve therapy, robotic surgery, extracorporeal membrane oxygenation, and transplantation.

Throughout this report, you will find additional information about the WVU Heart and Vascular Institute. Our team of national experts stand ready to serve your needs by providing the most advanced evidence-based therapy available, but with a uniquely personal touch.



Vinay Badhwar, MD, FACS, FACC
Executive Chair
WVU Heart and Vascular Institute



2022

Awards and Distinctions

We are leading the way – from advancements in patient care to academic excellence in teaching future specialists.



U.S. News & World Report

- #1 in West Virginia: Cardiology, Heart Surgery, and Lung Surgery

U.S. News High Performing

- Heart Failure
- Heart Bypass Surgery
- Aortic Valve Surgery
- Heart Attack
- Lung Cancer Surgery

Vascular Quality Initiative Registry

- Participation Awards 3-Star Center

The Society of Thoracic Surgeons

- Distinguished 3-Star Rating

Extracorporeal Life Support Organization

- Nationally Recognized Center of Excellence – Gold Life Support Award

World's first Robotic Aortic Valve Replacement Program

IC-OS Gold Center of Excellence in Cardio-Oncology

Healthgrades

- American's 50 Best Hospitals for Cardiac Surgery Award

American Nurses Credentialing Center

- Magnet Recognition Program hospital since 2009

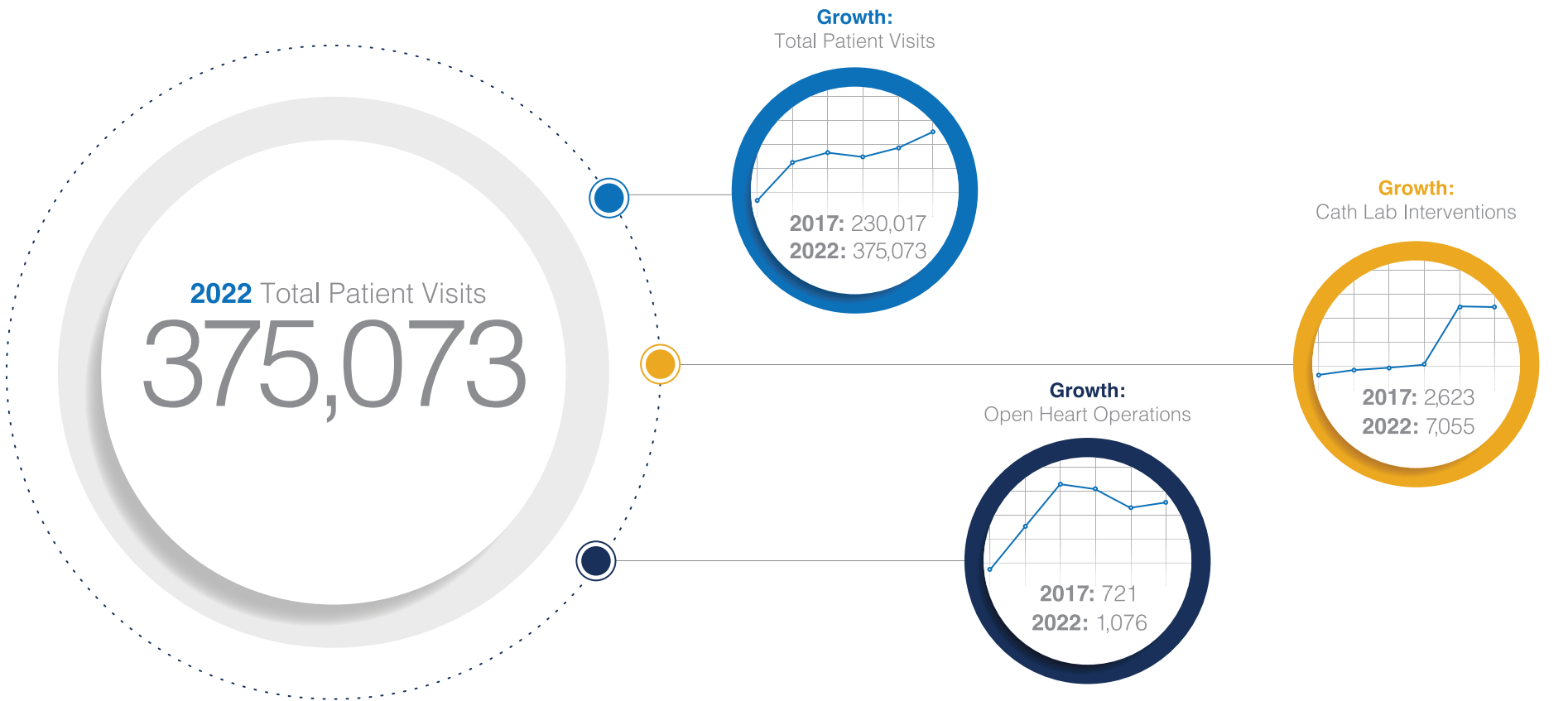
Intersocietal Accreditation Commission (IAC)

Recognized since 2003

First in West Virginia

- Transplant, including First Dual Organ Transplant
- LVAD
- Comprehensive Advanced Heart Failure Program
- Center for Advanced Robotic Surgery (CARS)
- Comprehensive Atrial Fibrillation Center
- Comprehensive Aortic Program

2022 BY THE NUMBERS



7,055
Cath Lab
Interventions

1,076
Open Heart
Operations

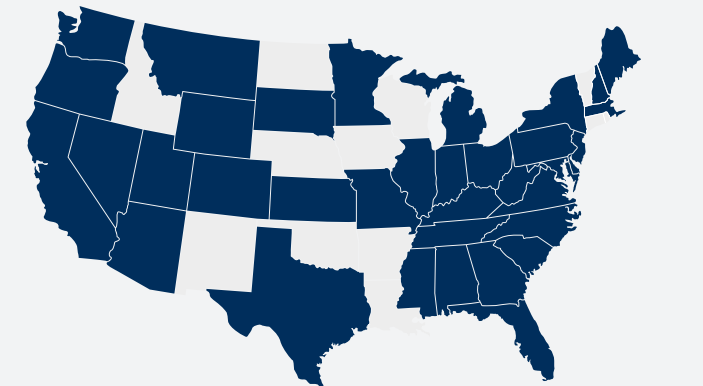
195,883
Cardiac Diagnostic
Tests Performed

2,643
Thoracic
Operations

3,041
Vascular
Operations

856
Electrophysiology
Procedures

At the WVU Heart and Vascular Institute, our patients come from all over the country. Highlighted in blue are the states from where they have traveled to seek treatment here.



Division of

Cardiology

The Division of Cardiology at the WVU Heart and Vascular Institute is at the forefront of interventional and medical cardiology care. We cater to the high-risk and most acutely ill with an emphasis on prevention of heart disease.

4.3

Through a statewide collaboration, the team significantly reduced stroke rates and in-hospital mortality rates among patients with ST-elevation myocardial infarction (STEMI) to 4.3 percent, well below the national average.

900

The number of times annually we perform cardiac magnetic resonance imaging (MRI) for advanced quantitative perfusion mapping, tissue mapping, and quantification of four-dimensional flow

1,200

Our multidisciplinary team performs more than 1,200 cardiac computed tomography (CT) studies, including 3mensio, CT-guided fractional flow reserve for coronary blood flow, annually.

Interventional Cardiology and Cardiac Imaging

We doubled our number of clinics, routinely offer genetic testing for hereditary conditions, and stratify high-risk patients using advanced CT techniques.

“We offer several interventional and structural procedures that are not available anywhere else in West Virginia,” **Bryan Raybuck, MD**, director of the Cardiac Catheterization Laboratory, said. “We participate in leading research to help identify safer, less invasive ways of treating cardiovascular conditions.”

The service line has been extended into southern West Virginia, expanding access across the Appalachian landscape to Thomas Hospital in South Charleston and Princeton Hospital.

Our award-winning imaging team is a leader in innovation, echocardiographic diagnosis, artificial intelligence, and phenotyping. We developed a proprietary machine-learning algorithm that enhances early diagnosis of left ventricular diastolic dysfunction.

Our advanced cardiac imaging services include:

- Advanced nuclear cardiology, including state-of-the-art techniques for perfusion mapping
- Viability assessments
- Cardiac amyloidosis imaging
- Cardiovascular inflammation imaging

These advanced techniques identify heart conditions in the early stages and guide early intervention efforts, reducing the progression of heart failure and, in some cases, stopping it altogether.



Points of Pride

- + The only Joint Commission-accredited LVAD program in West Virginia
- + The state’s first and only site to implant the Barostim Neo — a breakthrough device using neuromodulation to improve the symptoms of patients with heart failure
- + American Heart Association Get with the Guidelines Gold Plus award for excellence in heart failure care
- + International Cardio-Oncology Society Gold Center of Excellence – the highest possible designation

Heart Failure



“Our comprehensive multidisciplinary team has the expertise and experience to provide complex heart failure management and offer the full range of medical and surgical capabilities,” **George Sokos, DO**, director of the Advanced Heart Failure Program, said.

The Advanced Heart Failure Program provides:

- Access to advanced therapeutics in clinical trials
- Heart transplantation management
- Temporary mechanical circulatory support for the treatment of cardiogenic shock
- Home infusions of inotropic therapy
- Remote CardioMEMS, pacemaker, and defibrillator monitoring
- Programs for advanced pulmonary hypertension and hypertrophic cardiomyopathy

The Advanced Heart Failure Program provides the most comprehensive inpatient and outpatient multidisciplinary care in the state with multiple satellite clinics and telemedicine locations throughout West Virginia and the surrounding states.

The integrated team is comprised of fellowship-trained cardiologists, surgeons, physical therapists, nutritionists, pharmacists, and nurse coordinators.



Cardio-Oncology

Our specially trained cardio-oncologists use the latest technology and research to prevent, detect, and treat heart disease in cancer patients before, during, and after treatment for cancer. Our goal is to prevent heart damage caused by cancer treatments and manage care for patients who are fighting both cancer and heart disease.

The International Cardio-Oncology Society named our Cardio-Oncology Program a Gold Center of Excellence – the highest possible designation.



This designation recognizes the dedication of our team at WVU Medicine and the Heart and Vascular Institute to advancing specialized heart care for unique cancer patients at the highest level,”

Christopher Bianco, DO • Leader of the Cardio-Oncology Program

Structural Heart

The Structural Heart Program specializes in diseases of the heart valves, walls, and chambers. We use the latest percutaneous catheter-based techniques to treat all forms of structural defects, including aortic and mitral valve disease, congenital defects, tricuspid valve regurgitation, as well as paravalvular leaks.

“Here at the WVU Heart and Vascular Institute, patients with structural heart conditions have access to the highest level of expertise and experience in the state and region,” **Ramesh Daggubati, MD**, director of the Structural Heart Program, said. “Given our nationally recognized expertise, we have routinely been the first in the region to provide access to emerging new techniques.”

Team members offer the following structural interventions:

- Left atrial appendage closure (WATCHMAN, WATCHMAN FLX, and Amulet devices)
- Percutaneous balloon aortic and mitral valvuloplasty
- Transcatheter edge-to-edge mitral valve repair (MitraClip, NTR, XTR, G4)
- Transcatheter mitral valve replacement (Tendyne)
- Transcatheter aortic valve replacement (TAVR), including alternative access techniques
- Protected TAVR to avoid stroke using cerebral embolic protection
- Multidisciplinary heart team access to robotic aortic valve replacement (new)
- Transcatheter valve-in-valve therapies for degenerated mitral and tricuspid valves
- Catheter-based closure of atrial and ventricular septal defects, pseudoaneurysms, and paravalvular leaks
- CardioMEMS device placement in patients with heart failure

Electrophysiology

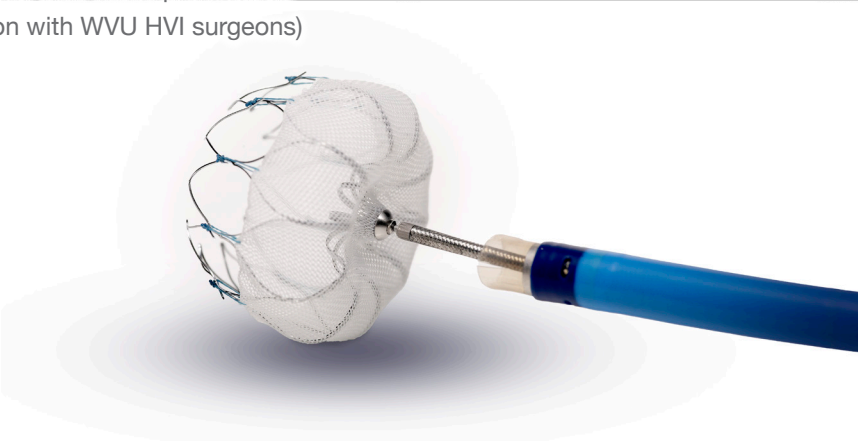
Our electrophysiologists diagnose and treat patients with a multitude of arrhythmias, such as atrial fibrillation, ventricular tachycardia, premature ventricular contractions, and Wolff-Parkinson-White syndrome.

The unique partnership we have with our world-class arrhythmia surgeons makes our Comprehensive Atrial Fibrillation Center second to none in the region.

“Because we offer the full range of medical, surgical, and interventional services, we can tailor therapies to address each patient’s unique arrhythmia, symptoms, or risk factors using the best evidence available,” **Stanley Schmidt, MD**, electrophysiologist, said.

Electrophysiology services provided include:

- Cardiac resynchronization therapy (biventricular pacing) for patients with heart failure and arrhythmia
- Catheter ablation, including cryoablation, radiofrequency, and irrigated radiofrequency
- CT-guided, 3D mapping of arrhythmias
- Laser extraction of pacemaker and defibrillator leads
- Left atrial appendage closure (WATCHMAN, WATCHMAN FLX, and Amulet devices)
- Pacemaker and defibrillator implantation and monitoring
- Robotic-assisted Cox-Maze procedures (in collaboration with WVU HVI surgeons)



Cardiac Surgery

The Division of Cardiac Surgery is recognized as the best in West Virginia and one of the top programs in the nation. We provide the highest quality and most advanced cardiac surgical therapies available.

We performed more than 1,000 operations in 2022 featuring unique specialization in complex valve repair, aortic surgery, advanced heart failure therapies, and internationally recognized robotic cardiac surgery. Our Mitral Valve Repair Program is an international leader in the management of mitral valve disease.

300

More than 300 peer-reviewed publications in top-tier journals over the past five years

1,000

More than 1,000 operations performed in 2022

2,000

More than 2,000 repair cases in both tricuspid and bicuspid aortic valves have been performed worldwide with superb results since launching at the WVU HVI in 2017

The Division of Cardiac Surgery has accomplished many first operations for West Virginia, such as heart transplantation, LVAD, and robotic surgery, and several other advanced cardiac operations, including:

- Complex valvular reconstruction of regurgitant lesions, such as mitral valve repair, tricuspid valve repair, and primary aortic valve repair facilitated by geometric ring annuloplasty or root remodeling
- Mitral valve repair, tricuspid valve repair, involving complex reconstruction and robotic approaches to valve repair
- Surgical treatment of atrial fibrillation, featuring robotic biatrial Cox-Maze operations
- Novel robotic aortic valve replacement using biological and mechanic prostheses
- Complex aortic aneurysm repair, hybrid arch reconstruction, debranching, and frozen elephant trunk therapy
- Coronary artery bypass grafting (CABG), including robotic minimally invasive CABG
- Surgical myectomy for hypertrophic cardiomyopathy, including a robotic approach
- Orthotopic heart transplantation
- Mechanical circulatory support, veno-arterial ECMO, right ventricular support, and LVAD devices
- Adult congenital heart surgery



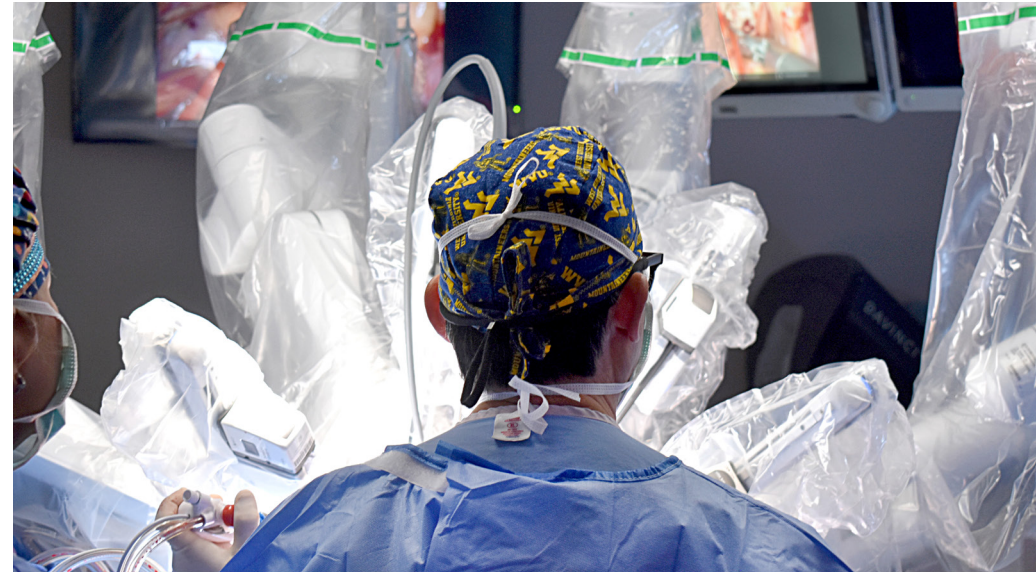
Robotic Cardiac Surgery

Our Robotic Cardiac Surgery Program and Center for Advanced Robotic Surgery are recognized by the Society of Thoracic Surgeons (STS) and the American Association for Thoracic Surgery (AATS) as premier destinations for advanced techniques and robotic training.

Multiple surgical teams visited in 2022 to be mentored in advanced techniques and training. To this end, the we have proctored and assisted in launching several programs around the world.



The WVU Heart and Vascular Institute is a world leader in robotic cardiac surgery. Not only do we treat patients from across the globe but also help train surgeons to use the most advanced robotic techniques.



Robotic aortic valve replacement (RAVR) was first developed and launched at WVU in 2020 and is performed routinely. We remain the world's most experienced RAVR program and hosted the first-ever international RAVR symposium, which featured robotic surgical leaders from across the United States, Europe, and the Middle East, who traveled to Morgantown for instruction.

Currently, we routinely offer robotic cardiac options for multiple valves, including several concomitant operations involving surgical ablation of atrial fibrillation. In 2022, we performed the world's first robotic surgical myectomy to treat hypertrophic cardiomyopathy.

Our Aortic Valve Repair Program has pioneered new approaches to repair leaking aortic valves as an alternative to replacement. In 2017, we performed the first repair cases in both tricuspid and bicuspid aortic valves in the United States using a novel geometric ring annuloplasty technique.

Since our program's launch, more than 2,000 operations have been performed worldwide with superb results. Primary aortic valve repair is now our preferred routine option for aortic valve insufficiency.

Points of **Pride**

- + World's first robotic surgical myectomy to treat hypertrophic cardiomyopathy
- + Recognized by the Society of Thoracic Surgeons and the American Association for Thoracic Surgery as premier destinations for advanced techniques and robotic training
- + Robotic aortic valve replacement (RAVR) was first developed at WVU and launched in 2020 and is performed routinely
- + First repair cases in both tricuspid and bicuspid aortic valves in the United States using a novel geometric ring annuloplasty technique
- + Only center in the multistate region with unique access to multiple novel clinical trials in the treatment of cardiovascular disease
- + Our surgeons maintain senior national leadership responsibilities in the American Association for Thoracic Surgery and Society of Thoracic Surgeons

Furthermore, we have excelled academically with more than 300 peer-reviewed publications in top-tier journals over the past five years, including the *New England Journal of Medicine*, *Lancet*, *JAMA*, *Circulation*, *Journal of Thoracic and Cardiovascular Surgery*, and *Annals of Thoracic Surgery*.

We were awarded grant support from the National Institutes of Health National Heart, Lung, and Blood Institute, and we remain the only center in the multistate region with unique access to multiple novel clinical trials in the treatment of cardiovascular disease.

These trials evaluate differences between transcatheter and surgical repair of mitral insufficiency, transcatheter treatment of high-risk patients with mitral valve disease, alternative antibiotic regimens for patients with

Cardiothoracic Surgery Fellowship Program

We are exceedingly proud of our CT Surgery Fellowship Program, as the education of the next generation of cardiothoracic surgeons is one of our top priorities.

Since its launch in 2017, we have successfully matched our top candidates from across the nation every year. The fellows are offered a multitude of exemplary technical and academic opportunities, and each one presented cutting-edge research at the STS and AATS annual meetings and has subsequently advanced to an excellent cardiothoracic faculty position around the United States.

tricuspid valve endocarditis, and optimal anticoagulation for postoperative atrial fibrillation. Our surgeons have received numerous awards, serve on multiple editorial board appointments, and maintain senior national leadership responsibilities in the AATS and STS.

In 2022, we hosted the inaugural Inter-Institutional Collaboration Symposium as part of our collaborative NIH-funded Clinical and Implementation Research Skills Program for trainees from around the region.



Division of

Pediatric Cardiothoracic Surgery

The WVU Medicine Children’s Heart Center provides comprehensive lifelong treatment for those with congenital heart disease. From the prenatal period through adulthood, our program offers world-class care for patients with the most complex lesions.

The program is led by its executive director, pediatric cardiothoracic surgeon **Christopher E. Mascio, MD**, who brings 17 years of experience to caring for patients born with heart defects. It is housed in the new, state-of-the-art \$215 million WVU Medicine Children’s Hospital, which opened in September 2022.

6

Number of beds in our new Pediatric Cardiac Intensive Care Unit that supports children recovering from heart surgery or serious

9

The number of outreach clinics throughout West Virginia that bring pediatric heart care close to our patients’ homes

Dr. Mascio and **Dhaval Chauhan, MD**, offer the full range of surgical repairs for congenital heart disease – from complex neonatal reconstructions to operations for adult congenital heart disease. Dedicated pediatric cardiac anesthesiologists, cardiac operating room nurses, and pediatric perfusionists provide vital support during these critical operations. They also offer extracorporeal membrane oxygenation (ECMO) for patients with the most severe forms of cardiac and/or respiratory failure.

The Divisions of Cardiology and Cardiac Intensive Care are led by **Jai P. Udassi, MD**, and offer the full spectrum of cardiology and intensive care therapies, including:

- Fetal cardiology
- Echocardiography
- Cardiac catheterization, including placement of transcatheter pulmonary valve and ductal occluder
- Electrophysiology, including ablation for dysrhythmias
- Advanced cardiac imaging, including cardiac magnetic resonance imaging (MRI) and cardiac computed tomography (CT)
- Adult congenital heart disease

In addition, our Single Ventricle Monitoring Program helps care for patients during the critical interstage period of single ventricle palliation.

Our Cardiac Intensive Care Team is comprised of physicians and advanced practice providers who are present each day in the intensive care unit and are dedicated to caring for medical and surgical patients admitted with congenital heart disease.



Surgeons at the WVU Heart and Vascular Institute work together with colleagues at the WVU Medicine Children’s Hospital to bring state-of-the-art cardiac treatment options for pediatric patients in the state and region.

Points of Pride

- + West Virginia’s only pediatric cardiac surgery program
- + West Virginia’s only pediatric ECMO program
- + First in the state to offer a new, nonsurgical treatment for babies born with a heart defect called a patent ductus arteriosus, or PDA

Hope’s New Home

WVU Medicine opened a state-of-the-art, 150 bed Children’s Hospital, a fully-integrated facility that provides specialized, high-level care in areas such as comprehensive heart, pulmonary, neuro, cancer, orthopaedic, dental, craniomaxillofacial, ENT, ophthalmology, gastrointestinal, urology, surgical, and trauma.

Learn More: WVUKids.com



Thoracic Surgery

The Division of Thoracic Surgery is the regional leader in thoracic surgery serving West Virginia and five neighboring states through a hub-and-spoke model that features WVU Medicine J.W. Ruby Memorial Hospital as the central campus with satellites in Parkersburg (west), Martinsburg (east), Wheeling (north), and Bridgeport (central).

At the flagship hospital, Ruby Memorial, our thoracic surgeons perform the most comprehensive and contemporary surgical procedures with comparable outcomes to the nation's highest-ranking institutions. In 2022, we extended our thoracic footprint to South Charleston through our expansion at WVU Medicine Thomas Memorial Hospital.



Our thoracic surgeons continue to treat patients with a wide array of cancers within the chest cavity, lungs, and upper gastrointestinal system (esophagus and stomach). We use the most advanced equipment and latest surgical techniques in minimally invasive robotic surgery and video-assisted thoracic surgery.

Centers of Excellence

Robotic Thoracic Surgery Program: We perform the highest number of robotic thoracic procedures in the region. WVU Medicine Wheeling Hospital, WVU Medicine Camden Clark Medical Center in Parkersburg, and WVU Medicine Berkeley Medical Center in Martinsburg now offer robotic thoracic surgery.

Center for Benign Esophageal Disease: The Center provides a wide array of cutting-edge therapies, including use of high-resolution manometry, impedance, and BRAVO capsule aid. The Esophageal Cancer Program earned a distinguished three-star (highest) rating from the Society of Thoracic Surgeons (STS) for esophageal cancer care and the robotic esophagus surgery outcomes. This rating denotes the highest category of quality and places us among an elite few in the United States and Canada.

Center for Airway Disease: The Center manages complicated airway conditions that span an array of procedures, including re-operative tracheal resections involving the use of free forearm flap intrathoracic trachea replacement. We also offer treatment for tracheal stenosis, endobronchial tumors, and bronchial strictures with ablative therapy, cryotherapy, photodynamic therapy, endobronchial stenting, endobronchial valves, and tracheal resection continued in the program.

Advanced Lung Cancer Program: The Program continues to expand its care of patients with locally advanced lung cancer in collaboration with our radiation and medical oncologists, radiologists, pulmonary physicians, and pathologists. We provide surgery for combined and multimodality treatment with immunotherapy, chemotherapy, and targeted therapies.



A team of surgeons at the WVU Heart and Vascular Institute performed a first-of-its-kind procedure to resect a large tracheal tumor. The team utilized a free flap harvested from the patient's forearm for the reconstruction which had been implanted weeks prior with cadaveric rib cartilage to mimic the structured support of tracheal rings.

Points of Pride

- + Regional leader in thoracic surgery
- + Highest number of robotic thoracic procedures in the region
- + U.S. News & World Report's Best Hospitals in 2022-2023 designated our Lung Surgery Program as High Performing in the Procedures and Conditions category
- + Three-star (highest) rating from The Society of Thoracic Surgeons



Lung Cancer Screening Program:

The Program has expanded within the state using LUCAS, a first of its kind, state-of-the-art mobile lung cancer screening unit increasing the diagnosis of early cancers. The ION Navigational Robotic bronchoscopy platform has allowed us to diagnose and treat early-stage lung cancer and greatly enhanced our lung screening efforts. We now routinely use the robotic bronchoscope to tattoo tumors and then remove them robotically at the same sitting.

Vascular and Endovascular Surgery

The Division of Vascular and Endovascular Surgery offers the full spectrum of open and endovascular surgical procedures at four WVU Medicine hospitals – J.W. Ruby Memorial Hospital in Morgantown, Berkeley Medical Center in Martinsburg, Camden Clark Medical Center in Parkersburg, and Wheeling Hospital.

4,000

We performed more than 4,000 procedures across our practice locations in 2022

23,000

Number of interpretations for noninvasive vascular lab studies provided in 2022

Complex Aorta Care

Complex aorta surgery care is provided through a multidisciplinary approach involving teamwork between cardiac and vascular providers. The expertise proffers the ability to care for the full spectrum of aortic pathology, including complex aortic dissections, aneurysms, and aortic infections.

Advanced imaging protocols using EKG gated CT angiography scans and Dynamic MRI are routinely used.

We continue to perform traditional open aorta exposures when indicated. Advanced endovascular techniques are performed using commercially available fenestrated and branched stent grafts.

In 2022, the first GORE TAG Thoracic Branch Endoprosthesis (TBE) was introduced to treat a patient with an Aortic Dissection for the first time in West Virginia. This FDA-approved device is consisting of a main aortic component and a side branch component that lands in the subclavian artery. It provides a minimally invasive option for repair of descending thoracic aorta aneurysms, transections, or dissections. A carotid-subclavian bypass can in this way be avoided, where it has traditionally been a requirement. We are proud to offer this innovation to the citizens of West Virginia.

Noninvasive Vascular Lab Services

Our Intersocietal Accreditation Commission (IAC)-accredited noninvasive vascular lab services and volume continues to expand. In October 2021, a new structured reporting system, Medstream by FIVOS, was introduced at our parent hospital. In 2022, we implemented the system throughout the state. This has resulted in faster turnaround times with testing results at the fingertips of referring physicians within 24 hours, raising physician satisfaction, and improving patient care. In 2022, we provided interpretations for 23,000 noninvasive vascular lab studies.



Procedures offered include:

- Open and endovascular reconstruction for aneurysmal and occlusive aortoiliac disease
- Open and endovascular reconstruction for peripheral arterial disease (PAD)/limb salvage
- Carotid reconstruction, including endarterectomy
- Transcarotid artery revascularization (TCAR) and percutaneous transfemoral intervention for carotid occlusive disease
- Minimally invasive venous intervention for symptomatic venous disease

Points of Pride

- + The first GORE TAG Thoracic Branch Endoprosthesis (TBE) was introduced to treat a patient with an aortic dissection for the first time in West Virginia in 2022
- + Region's premier fenestrated endovascular aneurysm program, which provides minimally invasive treatment of juxtarenal and paravisceral aortic aneurysms
- + First in West Virginia to fix a thoracic aortic aneurysm using the Relay PRO implant
- + Recognized as a Vascular Quality Initiative (VQI) 3-Star Program by the Society for Vascular Surgery, participating in 10 registries
- + Region's preferred Trans Carotid Artery Revascularization (TCAR) program for the treatment of carotid stenosis



Vascular Quality Initiative

We are the national leader in the Vascular Quality Initiative (VQI) registry of the Society for Vascular Surgery (SVS). Our faculty serve as medical director and data coordinator for the Virginia and West Virginia region and on the VQI National Governing Council and Research Advisory Committee.



In this vein, we provide leadership on regional and national projects to improve the quality of care for vascular patients and the highest quality of evidence-based care for patients across the state. Our division was awarded a three-star (top) rating from the VQI, which was only awarded to 72 of 968 participating centers.

Division of

Cardiovascular Intensive Care & ECMO Program

The Cardiovascular Intensive Care Unit (CVICU) is a 28-bed high-acuity unit that renders care to the sickest patients in the region. The CVICU is staffed 24/7 by a highly skilled, multi-disciplinary team led by an in-house faculty intensivist.

Our care spans a wide spectrum, including mechanical ventilation, continuous renal replacement therapies (CRRT), ventricular support devices (VADs), and extracorporeal membrane oxygenation (ECMO) to support patients with cardiac, respiratory, and multi-organ failure.

50

Institutions around the country mentored by our ECMO Program

70

Speaking invitations received by our ECMO Program over the course of 2022

The team provides expert care in the management of myocardial infarction cardiac arrest, cardiogenic shock, septic shock, multi-organ failure, and post-operative and post-transplant care and is committed to high quality, routinely reviewing processes and algorithms for opportunities to advance the standard of care. The CVICU is the flagship ICU in the WVU Medicine system.

Last year was both challenging and rewarding, as we navigated the provision of critical care during successive waves of the COVID pandemic. We recognize that our personnel and staff are our greatest resources. Our devoted nurses, respiratory therapists, dietitians, physical therapists, physicians (intensivists), advanced practice providers, social workers, and support staff collaborate to provide care to the sickest patients through compassionate, timely, and exceptional care provided in an interdependent, multi-stakeholder environment.

We actively participate in interdisciplinary research and education related to life-threatening medical problems in partnership with the WVU Critical Care and Trauma Institute.

We also provide training to residents and fellows from several different programs. The instruction involves both didactics and hands-on learning. The CVICU has a robust curriculum of weekly conferences and monthly Critical Care Grand Rounds, which feature faculty from across the institution and the country.

The faculty hold leadership positions within several professional societies and contribute to national meetings and educational activities. The Division's involvement in research is significant with broad participation in clinical trials and investigator-initiated research. The faculty are recipients of grant funding from WVU and the National Institutes of Health (NIH), which is a testament to their high quality of service and strong commitment to science.



ECMO

The ECMO Program continues to be a nationally recognized Center of Excellence, providing care to the sickest patients in the region as well as serving as a mentoring institution to more than 50 others around the country.



We continue to provide thought leadership in the management of acute heart and lung failure as well as disaster and pandemic mitigation. The Program received research awards from the American Association of Thoracic Surgery and Society for Thoracic Surgeons.

Our outcomes with the use of ECMO in patients with COVID-19 were published in the *Journal of Thoracic and Cardiovascular Surgery*, as the highest survival in the country, and the programmatic ethos of "Cannulate, Extubate, Ambulate" has been widely accepted as a national standard. The Program received more than 70 speaking invitations over the course of the year.

Research

The Division of Research is the academic epicenter for the facility’s faculty, residents, fellows, and collaborators. As the flagship Institute for cardiac, thoracic, and vascular care within the multistate network, we provide regional thought leadership across the spectrum of research and innovation.

Our team of research coordinators and regulatory personnel support the faculty investigators through an array of more than 50 cutting-edge, sponsored clinical trials each uniquely designed to maintain our clinical practice at the cutting edge. Through our newly minted WVU Heart and Vascular Innovation, Research, Education, and Prevention, we provide robust research infrastructure and a platform for prestigious extramural and federally funded grants.



850

We continue to be a top contributor to the literature with more than 850 peer-reviewed publications in the past five years. We routinely lead the national lists of top-enrolling centers in several cardiac trials within the Cardiothoracic Surgery Network (CTSNet).



Cardiovascular and Thoracic Surgery and Critical Care Research

Samantha Minc, MD, associate professor in the Department of Cardiovascular and Thoracic Surgery, was awarded a grant from the National Institutes of Health’s (NIH) National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Division. Her work entitled, *“Implementing a Community-Engaged Amputation Prevention Intervention in Rural Patients with Diabetes and Peripheral Arterial Disease,”* has been celebrated both within the institution and through the 2022 SVS Foundation/American College of Surgeons (ACS) Mentored Patient-Oriented Research Career Development Award from the Society of Vascular Surgeon’s (SVS) Foundation.



Ankit Sakhuja, MD, assistant professor in the Division of Critical Care, received NIH-NIDDK funding for his work entitled, *“Using Novel Machine Learning Methods to Personalize Strategies for Prevention of Persistent AKI after Cardiac Surgery.”*

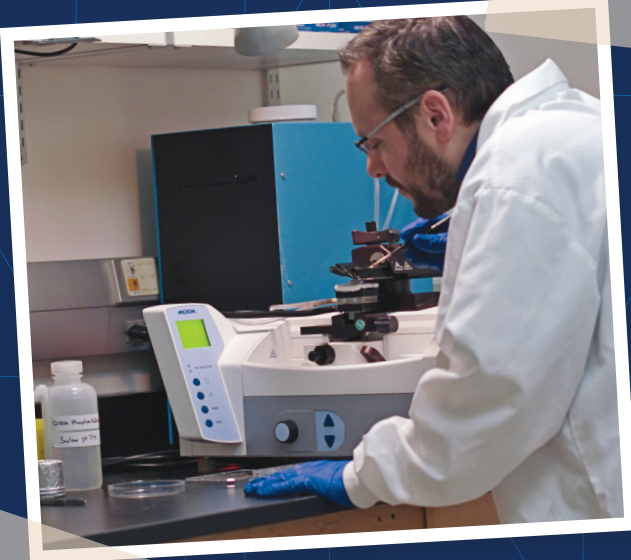


Paul McCarthy, MD, associate professor in the Division of Critical Care, and **J.W. Awori Hayanga, MD**, professor and director of the Division of Research, received two of the three internal \$200,000 Synergy Grant funding collaborative grants. Dr. McCarthy’s study entitled, *“Unravelling the consequences of maternal obesity on mitochondrial, metabolic, and redox reprogramming in adult progeny”* and Dr. Hayanga’s entitled, *“Systems toxicity of Inhalational exposures to single and complex mixtures,”* are both testament to the active university-wide academic collaborations and partnerships that characterize the Heart and Vascular Institute as a research center of excellence.



Selected List of ClinicalTrials.gov Registered Trials:

A-DUE	JANSSEN	Clinical Study to Compare the Efficacy and Safety of Macitentan and Tadalafil Monotherapies With the Corresponding Fixed-dose Combination Therapy in Subjects With Pulmonary Arterial Hypertension (PAH) (A DUE)
ALLEVIATE AF	MEDTRONIC	ALgorithm using LINQ Sensors for EValuatIon And TreatmEnt of Heart Failure (ALLEVIATE-HF)
Cadence	ACCERLERON	A Phase 2, Double-blind, Randomized, Placebo-controlled Study to Evaluate the Effects of Sotatercept Versus Placebo for the Treatment of Combined Postcapillary and Precapillary Pulmonary Hypertension (Cpc-PH) Due to Heart Failure With Preserved Ejection Fraction (HFpEF)
CORE	IONIS	A Randomized, Double-blind, Placebo-Controlled, Dose-Ranging Phase 2 Study of ISIS 678354 Administered Subcutaneously to Patients With Hypertriglyceridemia and Established Cardiovascular Disease (CVD) or at a High Risk for CVD
DyeMINISH	OSPREY	DyeVert™ System Use for Contrast Monitoring and Minimization in At-Risk Patients Undergoing Angiography Procedures: A Real-World Registry (DyeMINISH Registry)
EB05	EDESA	A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Safety and Efficacy of EB05 + SOC vs. Placebo + SOC in Adult Hospitalized Patients With COVID-19
HAART	BIOSTABLE	Safety and Performance of Aortic Valve Repair Using the HAART Aortic Annuloplasty Devices - A Registry Study
ICE-AF	ATRICURE	AtriCure CryoICE Lesions for Persistent and Long-standing Persistent Atrial Fibrillation Treatment During Concomitant On-Pump Endo/Epicardial Cardiac Surgery
I-SPY	QUANTUM LEAP	I-SPY COVID TRIAL: An Adaptive Platform Trial to Reduce Mortality and Ventilator Requirements for Critically Ill Patients
Lower	AEGERION	LOWER: Lomitapide Observational Worldwide Evaluation Registry
MK-5475	MERCK	A Phase 2/3, Multicenter, Randomized, Double-blind, Placebo-Controlled, Adaptive Design Study to Evaluate the Efficacy and Safety of MK-5475 in Adults With Pulmonary Arterial Hypertension
OPTIMAL	NIH/CTSN	Postoperative Antibiotic Management Duration Following Surgery for Intravenous Drug Abuse (IVDA) Endocarditis (OPTIMAL)
PACeS	NIH/CTSN	Anticoagulation for New-Onset Post-Operative Atrial Fibrillation After CABG
PRIMARY	NIH/CTSN	Percutaneous or Surgical Repair In Mitral Prolapse And Regurgitation for ≥65 Year-olds (PRIMARY)
Practive HF	ENDOTRONIX	A Prospective, Multi-Center, Open Label, Single Arm Clinical Trial Evaluating the Safety and Efficacy of the Cordella™ Pulmonary Artery Sensor System in NYHA Class III Heart Failure Patients (PROACTIVE- HF Trial)
ProTECT	NATERA	Prospera Test Evaluation in Cardiac Transplant (ProTECT)
PROTECT IV	ABIOMED	Impella®-Supported PCI in High-Risk Patients With Complex Coronary Artery Disease and Reduced Left Ventricular Function: The PROTECT IV Trial
REPAIR-MR	ABBOTT	Percutaneous MitraClip Device or Surgical Mitral Valve REpair in PATients With PrlmaRy MItral Regurgitation Who Are Candidates for Surgery (REPAIR MR)
SMART	MEDTRONIC	SMall Annuli Randomized To Evolut™ or SAPIEN™ Trial
STEMI-DTU	ABIOMED	Primary Unloading and Delayed Reperfusion in ST-Elevation Myocardial Infarction: The STEMI-DTU Trial
SUMMIT	ABBOTT	Clinical Trial to Evaluate the Safety and Effectiveness of Using the Tendyne Transcatheter Mitral Valve System for the Treatment of Symptomatic Mitral Regurgitation
WARRIOR	UNIVERSITY OF FLORIDA	Women’s IschemiA TRIal to Reduce Events In Non-ObstRuctive CAD



Vascular and Endovascular Surgery Research

The Division of Vascular and Endovascular Surgery continues to grow and excel, with a goal to produce meaningful research for the people of West Virginia and to lead innovation in the field of vascular surgery. Over the last five years, the Division has secured \$1.3 million in investigator-initiated grants from both private and public funding sources.

Our most recent projects include the prestigious K Award funded by the NIDDK, the SVS Foundation, and the ACS is focused on implementing community-engaged amputation prevention in rural West Virginia. This project continues to build momentum and support in rural communities and has been embraced nationally and internationally.

Our surgeon-scientists are routinely invited to speak at major national and international conferences. We also offer a multidisciplinary approach to limb preservation with strong collaboration between our Division, the WVU Center for Advanced Wound Healing, and WVU Medicine Podiatry at the Main Campus.

In addition to grant funding, we continue to produce impactful manuscripts focused on health disparities research, research methodology, and innovations in vascular disease management. We published more than 25 publications in major vascular journals and textbooks and two of our manuscripts were selected as an editor's top pick and discussed at national journal clubs.

Finally, we continue to build research capacity and skill amongst WVU students and trainees and are proud to have supported undergraduate students, medical students, residents, and fellows to present their work from our Division at major conferences across the nation.

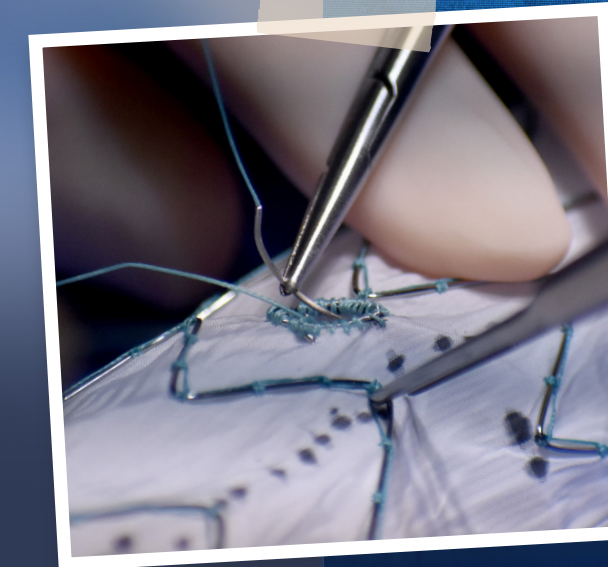
At the forefront of new and innovative treatments, we are helping develop new treatments and finding ways to improve patient care.

WVUMedicine.org/Heart/Clinical-Research



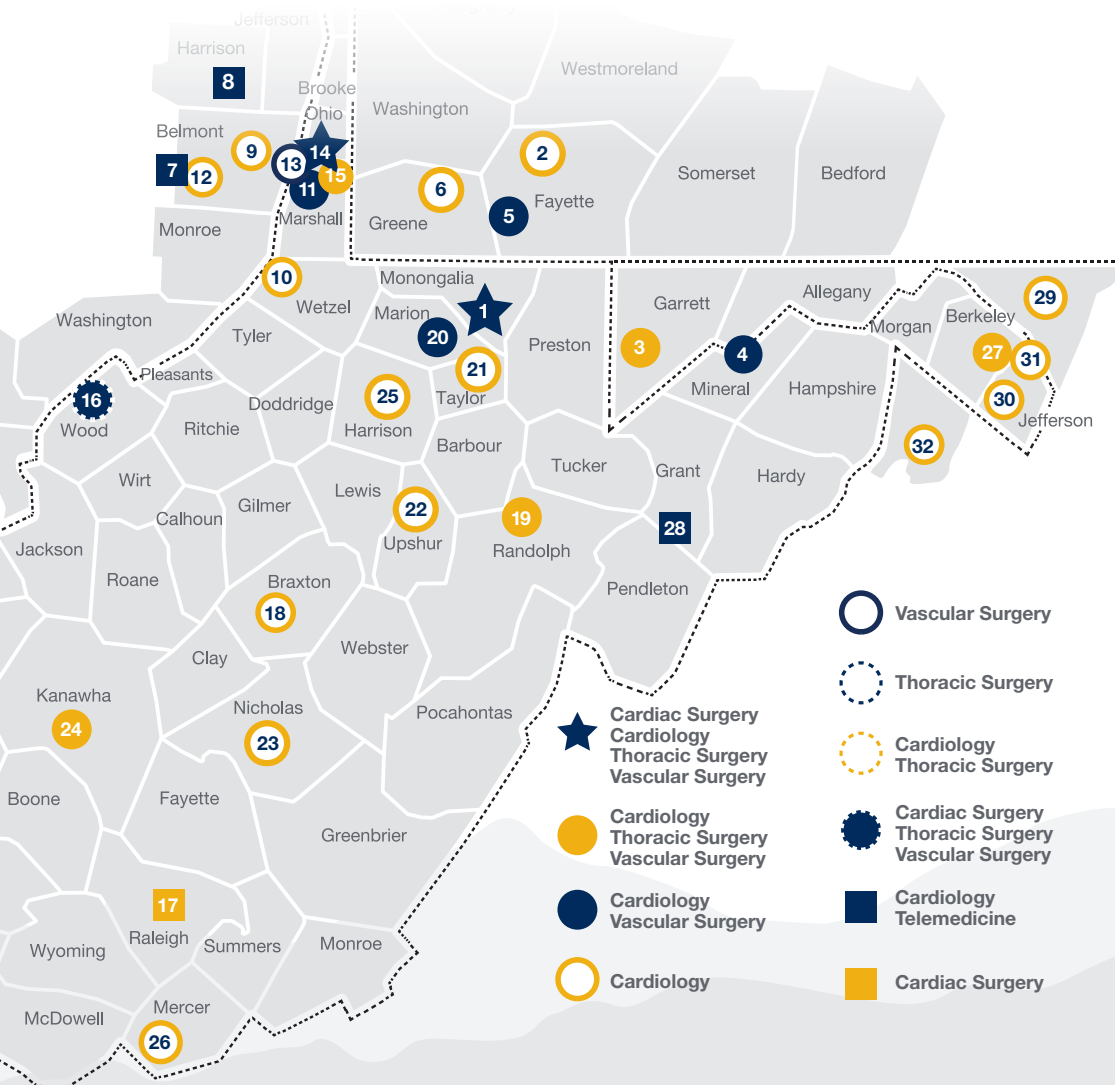
We view survival from severe illness, not merely as an event, but as a process, and so we use that process to restore the patient to the highest possible quality of survival.

J.W. Awori Hayanga, MD



As an academic health institution and a National Institutes of Health (NIH) funded center, we are at the forefront of developing cutting-edge research, and our patients have access to the latest clinical trials.

Locations & Clinics



- Through the expansion of our hub-and-spoke system of care, we are able to bring world-class cardiothoracic care to the areas where our patients need it – close to their homes.*

Guided by our mission, our leadership ensures we provide the best care for our patients, improve the well-being of the diverse communities we serve, and continue to advance research and education.



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Executive Chair



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Research



 **WVU** Heart & Vascular Institute

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