Heart

UNIOUELY COLLABORATIVE EVIDENCE-2014 Sentara Heart Annual Report







The Sentara Heart Patient Experience

Non-Invasive Cardiology

Interventional Cardiology

Electrophysiology

13

14

16

18

26

30

34

22 Cardiothoracic Surgery

24 Hybrid Cardiac Operating Room

Cardiac Anesthesiology

28 Sentara Heart Arrhythmia Center

Advanced Heart Failure Program

Sentara Heart Valve and Structural Disease Center

Welcome

Sentara Healthcare Overview

Sentara Heart at a Glance

36	Advanced Information Technology
40	Digital Engagement
42	Cardiac Nursing
44	Sentara Cardiovascular Research Institute
46	Investigational Research Studies
49	Sentara Heart Surgeons and Physicians
51	Resources for Clinicians

Note: Definitions for words and phrases that are color-coded in this shade of green can be found in a glossary at the back of the report.

Sentara Heart 2014 Annual Report

The integrated system of hospital partners and cardiac programs at Sentara Heart provides advanced, uniquely collaborative, and evidenced-based patient care that is on par with our peers in nationally recognized academic medical centers across the country.

Thank you for taking the time to learn more about Sentara Heart and the advancements we have made in the delivery of cardiac diagnosis and treatment, cardiac research, and patient care. The 2014 Sentara Heart Annual Report shares many of the ways in which our integrated delivery system is made possible, using our sophisticated technology infrastructure and our commitment to blending clinical teams to provide innovative models of care.

Serving residents of Virginia and North Carolina, Sentara is one of the most progressive and integrated healthcare organizations in the nation, offering patients and referring doctors convenient access to high-level cardiac care at 12 locations throughout the service area.

Currently, we are proud to report that in the 2013-14 America's Best Hospitals ranking of U.S. News & World Report, cardiology and heart surgery services at Sentara Heart Hospital were once again recognized among the top 50 programs in the nation. This is the 14th consecutive year Sentara has achieved a national ranking in heart. We are the only nationally ranked heart program in Virginia.

With a long-standing reputation for clinical excellence, Sentara Heart has a proven record of excellent quality outcomes. What sets Sentara apart from its peers in top academic medical centers across the nation, however, is a commitment to the patient experience—a focus on providing personalized, patient-centered care. In this report, you'll read about patients like Jack Jones, whose life was not only saved by a Total Artificial Heart here at Sentara, but who became a part of the Sentara family while in our care. Sentara is nationally recognized for innovative programs and treatments such as the Sentara Heart Arrhythmia Center, Total Artificial Heart program, transcutaneous valve replacement, and advanced pulmonary hypertension care. Even more impressive is Sentara's commitment to a cohesive approach to clinical care and standardizing quality measures across the system. Our administrators and practitioners collaborate across service lines to share best practices in an effort to meet and exceed the expectation of patients who often come to our door in the most vulnerable state of their lives.

Our specialists also continue to have a profound impact on setting standards for quality heart care through their work with the American Heart Association, the Society for Thoracic Surgeons, National Heart, Lung, and Blood Institute, and many others. We are proud to be a founding member of the National Alliance of Integrated AFIB Centers (NAIAC), through which our innovative collaborations among cardiothoracic surgeons and electrophysiologists are lauded on a national scale.

We're pleased to share with you our latest initiatives, innovations, and achievements in this year's Sentara Heart Annual Report.

Sincerely,



Joseph T. Butz Senior Divisional Vice President Sentara Cardiac Service Line



Carl W. Hartman M.D. Medical Director Sentara Heart

125-Year Not-For-Profit Mission

SENTARA HEALTHCARE **OVERVIEW**

Serving residents of Virginia and North Carolina, Sentara is one of the most progressive and integrated healthcare organizations in the nation. We have over 28,000 members of the team & medical groups with over 900 physicians & advance practice clinicians all with the same mission and commitment ... TO IMPROVE HEALTH EVERY DAY.



Sentara Heart Hospital Norfolk, VA 112 Beds (Included in SNGH license)









Sentara Princess Anne Hospital Virginia Beach, VA



Sentara Virginia Beach **General Hospital** Virginia Beach, VA 276 Beds



Sentara Williamsburg **Regional Medical Center** Williamsburg, VA 145 Beds





Sentara Obici Hospital Suffolk, VA 176 Beds









Sentara Northern Virginia Medical Center Woodbridge, VA



Martha Jefferson Hospital Charlottesville, VA





Sentara Albemarle **Medical Center** Elizabeth City, NC 182 Beds

Halifax Regional Hospital Halifax, VA

Advanced Imaging & Diagnostic Centers



Located across Hampton Roads, Northern Virginia, Charlottesville, South Boston, Harrisonburg and Northeastern North Carolina

Four Medical Groups



Over 900 Quality Physicians and Advanced Practice Clinicians

Home Care & Hospice



Available in Virginia and Northeastern North Carolina

Nursing & Assisted Living Centers



Assisted Living Centers located in Hampton Roads with Nursing Centers in Hampton Roads, North Carolina and South Boston

Optima Health Plan



Serving 444,000+ Members in Virginia and North Carolina

Outpatient Care Centers



Convenient locations across Hampton Roads, Northern Virginia, Charlottesville and Northeastern North Carolina

Physical Therapy Centers



25+ Locations Across Virginia and Northeastern North Carolina

3

Staying Ahead of the Curve

Our goal at Sentara is to be among the best healthcare providers in the country. We strive for top 10 percent rankings in all areas where care, quality, and service are considered.

We're proud that we have been recognized by many state and national organizations for our work, because it means that we are giving our patients the attention and help they deserve. From hybrid ORs to innovative physicians and advance practice clinicians to new models of care, we've always been ahead of the curve.

123.013

738.185

ER Visits

Deliveries

Adult Hospital Admissions

Sentara provided \$299,989,000 in Community Benefits in 2013

^{\$}274,180,000 ^{\$}20,454,000

Uncompensated Patient Care Teaching & Training of Healthcare Professionals

\$5,355,000 Health & Prevention Programs

^{\$}299,989,000

Total Community Benefit Provided

(Does not include service areas of Halifax Regional Hospital and Sentara Albemarle Medical Center)

We performed Hampton Road's **FIRST** heart and kidney transplants, in addition to the **FIRST** open-heart surgery.



manage patients

remotely.

Opened the **FIRST** PACE (Program for All-Inclusive Care of the Elderly) site in Virginia.

48

C]



in the nation to pioneer elCU[®], a remote monitoring system for intensive care.





In 2013, Sentara Norfolk General Hospital was recognized as the **No. 1** ranked hospital in Virginia in the 2013-14 America's Best Hospitals ranking of *U.S. News & World Report*. One expected outcome as health reform takes hold is an increasing accountability on both providers and patients to evaluate health systems based upon quality data. *U.S. News & World Report* has long analyzed patient safety, death rates and other clinical measures as part of its measurement and ranking score. Being ranked is significant, and Sentara leadership is pleased that the clinical metrics around mortality and patient safety meet or exceed some of the highest ranked hospitals on the list.

Sentara MyChart provides patients with secure online access to this information, enabling new ways to interact with our doctors and staff.

• • •

Our Sentara eCare Health Network uses innovative and secure technology to link patient medical records between our hospitals, physicians, and other health care sites.

 $\mathbf{\hat{}}$

Sentara MDLIVE connects consumers to board-certified doctors by phone or secure online video 24/1/365

SENTARA HEART

5

SENTARA HEART AT A GLANCE

Ranked among the top 50 programs nationally, Sentara Heart includes more than 140 board-certified cardiologists, cardiothoracic surgeons and anesthesiologists

Sentara Heart is a comprehensive network of providers, services, outpatient facilities and hospitals, working together to ensure that patients have access to quality heart care throughout the region. Our localized approach to advanced cardiac care sets Sentara Heart apart.

Nationally recognized Sentara Heart Hospital provides coordinated care and outcomes that are typical of top-performing academic medical centers. Sentara Heart programs are accessible, located in convenient locations and welcoming facilities throughout the community. This remarkable delivery system is made possible through a sophisticated technology infrastructure and a commitment to blending clinical teams with the common goal of advancing patient care.

In the 2013-14 America's Best Hospitals ranking of U.S. News & World Report, the cardiology and heart surgery program at Sentara Heart Hospital were recognized among the top 50 programs in the nation. This is the 14th year in a row Sentara Heart has achieved a national ranking in heart. We are the only nationally ranked heart program in Virginia.



We are very fortunate to be ranked by U.S. News among the very best heart surgery and cardiology programs in the Nation.

Our success is the result of our continued commitment to a heart team model that encompasses a broad range of specialists, including cardiac surgeons, cardiologists, hospitalists, intensivists and anesthesiologists, to name a few. Our nurses, all the staff and our physicians work seamlessly in a multidisciplinary model, across disciplines to elevate the care for the region resulting in the only hospital in the state of Virginia to be ranked among the Top 50 in the nation for 14 years running. We are truly humbled that something we love so much provides so much benefit to our local and regional communities. We are committed to improve health every day."



1,942 **Cardiothoracic Surgeries** Interventional 3,205 Cath Procedures Electrophysiology Procedures **0**, **499** Diagnostic Cath Procedures 4,381 Non-Invasive **91,105** Diagnostic Testing

(Echos, Stress Echos, Treadmill, Holter and Event Monitoring)

(Does not include service areas of Halifax Regional Hospital and Sentara Albemarle Medical Center)



Multidisciplinary Sentara Heart Teams

Cardiologists Cardiothoracic Surgeons Physician Extenders / Nurses Infectious Disease Specialists Intensivists / Pulmonologists Endocrinologists Nephrologists Neurologists Hospitalists

The Sentara Heart Network

Sentara boasts a strong network of cardiac care throughout its integrated system. With the exception of heart surgery, all Sentara community hospitals provide a full complement of heart services. Patients from throughout Virginia and North Carolina can receive emergency heart care in the Sentara location closest to them and be transferred by ground or air transport to Sentara Heart Hospital, Sentara Virginia Beach General Hospital or Sentara RMH Medical Center for open heart surgery, should they need this advanced care. The other Sentara hospitals all offer complementary heart services, from comprehensive diagnostic testing and diagnostic catheterization to emergency interventional cardiology and rehabilitation, within Sentara Heart's fully integrated network of hospitals.

Specialty Sentara Heart Clinics

Cardiac Surgery Clinic: Surgical patients are evaluated 10 days after their procedure by specialized nurse practitioners trained in postoperative treatment of open heart surgery to provide rehabilitation, patient education, and ongoing cardiac monitoring.

Advance Heart Failure (AHF) Clinic: The AHF Clinic offers either outpatient monitoring or telemanagement for patients. Outpatients make regular visits to nurse practitioners, who work collaboratively with the patient's primary care doctor. Meanwhile, telemanagement allows registered nurses familiar with AHF to monitor patient progress and drug therapy compliance by phone.

Pacemaker Clinic: Expertly trained registered nurses assess and reprogram implantable pacemakers and implantable cardioverter defibrillators (ICDs).

Transplant Clinic: Patient education, medication monitoring, organ rejection evaluations, and myocardial biopsies are provided at the transplant clinic by transplant physicians and expertly trained clinicians, who monitor heart transplant patients before and after transplantation.

Coumadin/Lipid Management: Under the supervision of cardiologists, expertly trained registered nurses help to manage patient medication regimens and monitor cholesterol treatment plans to efficiently reduce risk of cardiac events and provide follow-up.



2013 Volumes Sentara Northern Virginia Medical Center



Non-Invasive Diagnostic Testing (Echos, Stress Echos, Treadmill, Holter and Event Monitoring)



Sentara Northern Virginia Medical Center (SNVMC)

Sentara Northern Virginia Medical Center provides Prince William County with exceptional patient care, leading cardiologists, and a focus on the community.

In 2013 the hospital established the web-based LIFENET system to help diagnose heart attacks in the field and transmit EKG data to its emergency department, providing over 40 portable lifepacks to Prince William County emergency medical services. Where previously there was no way to send an EKG from the field, EMS can now transmit an EKG to SNVMC wherever they are, enabling the hospital to immediately prepare for the patient's arrival. Clinicians at SNVMC have detailed advance notice of a patient's arrival and an unrivaled set of data for managing his or her care. SNVMC also provided heart disease awareness clinics in 2013 as part of its commitment to the community.

The hospital's establishment of a cardiac quality committee has led to an increased focus on metrics, as well as cross-training of staff among the cath lab, peripheral lab and holding. They recruited a clinical manager who is an RN/RCIS with cath lab, EP and vascular experience to support that goal. SNVMC's nursing and medical affairs departments have increased their focus on reducing heart failure readmission. And the hospital implemented a chest pain team to reduce length of stay (LOS) and improve patient experience.

In 2013 the hospital received the following recognitions: American Heart Association's Mission: Lifeline® Bronze Quality Achievement Award; the American College of Cardiology Foundation's NCDR ACTION Registry – GWTG Silver Performance Achievement Award for its vascular ultrasound lab for peripheral arterial disease testing; IAC accreditation for extracranial cerebrovascular testing and peripheral arterial testing; and AACVPR reaccreditation for both cardiac and pulmonary rehab.

SNVMC is pursuing a dedicated electrophysiology lab as well as a peripheral vascular disease program, for which the hospital is currently developing guidelines and a framework for quality assessment.

Martha Jefferson Hospital Member of Sentara Healthcare

Located in Charlottesville, VA, Martha Jefferson Hospital ranks in the top 10 for Virginia's top hospitals in the 2013-14 America's Best Hospitals ranking of U.S. News & World Report. With the exception of openheart surgery, Martha Jefferson has a comprehensive cardiac program comparative with other hospitals of its size, providing the community with the following services: cardiac electrophysiology — including catheter ablation, implantable cardioverter defibrillators, pacemaker and CRT implantation — and atrial fibrillation therapy.

Martha Jefferson offers a specialized Device Clinic for patients with pacemakers and ICDs, with services located inside the hospital as well as monitoring from home. Of their catheterization cases, 90 percent are conducted using a radial approach (catheters are inserted through the wrist instead of the femoral artery in the groin), which vastly reduces vascular complications. They have also begun use of the PlasmaBlade for electrophysiology procedures, which decreases burn and spares tissue.

Martha Jefferson Hospital serves as a model for its approaches to patient care and streamlining pre- and postop procedures. A pre-catheterization clinic establishes relationships with patients and handles screenings. Nurse navigators and physician assistants at the Heart Rhythm Center provide patients with comprehensive care, before and after procedures.

In 2013, the hospital implemented a cardiac research program, launching two studies for MRI-compatible pacemakers and a heart failure registry study.



2013 Volumes Sentara RMH Medical Center

Cardiothoracic Surgeries 181 Interventional Cath Procedures 316 Electrophysiology Procedures 330 (Ablation, AICDs and Pacers) 330 Diagnostic Cath Procedures 668 Non-Invasive Diagnostic Testing 9,810



Sentara RMH Medical Center

HEART PROGRAM

SPOTLIGHT

Sentara RMH Medical Center serves a seven-county area with a population close to 218,000. Community wellness and outreach are the primary cornerstones of the hospital's mission. Focused on patient-centered care, safety, teamwork, and quality outcomes, the Heart and Vascular Center is a comprehensive program offering cardiothoracic surgery, interventional cardiology, electrophysiology, heart disease prevention and screening programs.

Specific procedures conducted in 2013 include CABG/valve surgery; thoracic surgery; percutaneous coronary interventions (approximately 70 percent through radial access); carotid artery stenting, EP device implants and EP ablations.

In 2013, the hospital also adopted several new technologies, including the Impella Heart Pump, tilt table exams, MRI-safe pacemakers and cryoablation for EP. New programs launched in 2013 included a women's heart program and a hypertrophic cardiomyopathy clinic. The Heart and Vascular Center achieved a door to balloon time of 44.5 minutes, compared to the national median of 59.4 minutes.

As a result of these efforts and achievements, Sentara RMH Heart and Vascular Center received numerous accolades last year, including: GWTG 2013 Platinum Performance Achievement Award (NCDR ACTION Registry); Mission Lifeline Bronze Award for STEMI Care; and the Patient's Choice Customer Service Award (Gold Level). HealthGrades also ranked the program no. 1 in Virginia for cardiology services for the third year in a row and no. 5 in Virginia for overall cardiac services. They also recognized the program as a 5 star recipient for treatment of heart failure for the 9th year in a row.

SENTARA HEART

or a long time, Dana Grasty's life was demanding. She drove from western Tidewater to the Oceanfront to work as a chef. The fast pace at a popular restaurant kept her moving, and she was able to keep up – until last winter.

That's when she felt tired and short of breath. She figured she should slow down. But something more serious was needed.

One evening around 2 a.m., the shortness of breath intensified so much that Dana couldn't lie down comfortably. Scared, she went to Sentara Obici Hospital.

"I was freaking out because I couldn't breathe," Dana says. "The nurses were patient. They calmed me down."

"She was so young," recalls emergency department nurse Jessica Peppers. "She's 41, too young to usually point to heart failure. When I pulled up my stethoscope and heard fluid, I was surprised."

Jessica and her co-workers gave Dana Lasix, a diuretic to pull the fluid from her lung. They also started Bipap, a respiratory intervention.

Dana was admitted. Soon, she was told she had heart failure. A leaky mitral heart valve was to blame.

When she felt better, Dana returned home, with instructions to receive care from Sentara Obici Hospital's new Heart Failure Management Clinic.

Dana Grasty

"Follow up is so important. I start the education, but so much more than just knowledge is needed to change your whole life," says Ross Reitz, cardiac patient navigator at Obici. "With Dana, I stressed how to know when your heart is not doing well and the importance of acting early. When she developed symptoms again, she knew to turn to the Clinic."

A few weeks after her discharge, Dana reported more shortness of breath while at the Clinic. She consulted with cardiology nurse practitioners originally from Sentara Cardiology Specialists, headed up by Dr. Edward Lynch and Dr. William Delacey.

April Rawlings is one of the three nurse practitioners who recently started rotating weekly between the specialists' office, Sentara Obici Hospital and the Clinic.

"We all have a broad range of skills, and we bring continuity to the patients' care," April says. "It means a lot to a patient to see a familiar face because we're going from the hospital to the clinic to the doctor's office like they do."

Sentara Heart PATIENT



The Sentara Heart Patient Experience

Personalized Care

With a long-standing reputation for clinical excellence, Sentara Heart has a proven record of quality outcomes. What sets Sentara apart from its peers in top academic medical centers across the nation is a commitment to the patient experience — a focus on providing personalized, patient-centered care.

A dedicated nurse practitioner helps patients navigate their experience at Sentara Heart, coordinating their appointments and ensuring they are able to see multiple specialists, often within a single visit. This personalized attention is not only comforting to patients but helps to reduce canceled surgeries, common complications, and length of stay. A cardiac intake nurse practitioner assists patients with chronic comorbidities to prepare for surgery, collaborating with specialists at Eastern Virginia Medical School. Dedicated cardiac hospitalists manage the care of every surgical transfer patient at Sentara Heart Hospital, from preparation through recovery.



continued from p. 12

Dana was readmitted to Sentara Obici Hospital and transferred to Sentara Heart Hospital in Norfolk.

"Within a few days, I had my heart valve repaired," she says.

In March, she again worked on her recovery with Ciara Jones, a patient navigator nurse at the Clinic.

"We educate patients about exercise and diet and involve their families in cooking lessons," Ciara says. "We teach about their medicines, and if it's a problem, help them find a way to pay for it. We have a support group, too."

Barbara Kelly-Gibbs, community care case manager, follows patients after their in-patient care as well.

When she met Dana in her home, she observed her walking. After a few steps, Barbara saw her short of breath. She contacted the cardiologists to get advice.

Barbara lessens emotional strains, too. One of Dana's family members was pushing her to walk more.

"I explained that I knew he was well-intentioned, but Dana had to work up to more," Barbara says. "Everyone then understood better what is possible. We have to be patient, and I told Dana to work on increasing her distance only every three days."

She encourages Dana with other big goals, too – like owning a home, yet to do so slowly:

"I tell her 'first you get better, then you get back to work, and then you get your own place."

SENTARA HEART

Non-Invasive Cardiology

Sentara Advanced Imaging

For a long time, most diagnosis of the heart required cardiac catheterization. These procedures exposed patients and hospitals to more risk, and more cost. Over the last ten years, the healthcare community has been pressured to make diagnosis faster and cheaper, with less aggravation to the patient. Innovative and improved diagnostic tools, such as advanced coronary computed topography (CT) scans, now enable doctors to noninvasively detect or exclude heart problems in patients.

The Advanced Imaging Center at Sentara Heart Hospital was launched in 2006 and is home to the most complex cardiac imaging within 150 miles. Located on the first floor of the fully digital Sentara Heart Hospital, the center combines the skills of sub-specialized doctors with superior, advanced technology. The result is a new era in imaging for the fastest, most accurate diagnosis of cardiovascular disease, chest pain, stroke, and other life-threatening illnesses.

The Advanced Imaging Center at Sentara Heart currently offers:

あん間

- One of the region's fastest and most accurate cardiac CT scanners. This **320-slice cardiac CT scanner** creates complete images of the heart and surrounding arteries in just five seconds – or five heartbeats.
- A **centralized, 3-D echocardiography lab** where 99 percent of all echocardiograms are read by a cardiologist, with a same-day turnaround. 3-D echocardiography gives doctors the ability to crop and obtain more detailed views of a specific structure, helping them and their teams make better decisions around surgery.
- A **sophisticated database** that enables doctors and researchers to monitor and track patients over a period of years, preventing complications by identifying risk levels.
- An advanced art processing lab at Sentara Heart Hospital the only one of its kind in the Hampton Roads region — ensuring universal access to imaging and reporting.

Advanced Technologies

In 2013, new technologies and programs helped the center serve over 1,700 patients seeking care for a wide range of cardiovascular problems.

- The Sentara Heart Advanced Imaging Center started an emergency coronary CT angiogram program for the rapid triage of chest pain through our ER department. Coronary CT angiography is an effective, evidence-based strategy for evaluating acute chest pain in the emergency department for patients at low-to-intermediate risk of acute coronary syndrome.
- In 2013 we began use of dual energy source CT enterography, a low-energy image scanning technique that dramatically reduces the radiation dose to the patient and significantly improves the imaging quality, including for those patients with higher heart rates that are typically more challenging to scan.
- Telemanagement cardiology cameras at both the Sentara Williamsburg Regional Medical Center and Sentara Virginia Beach General Hospital have been enormously successful. Web cameras installed on the CT scanners at those locations now enable doctors specialized in reading and interpreting CT scans to both observe and instruct remotely. This telemanagement capability allows us to spread our expertise over additional hospitals within the Sentara Heart network and serve as an advanced imaging and diagnosis hub for cardiac imaging to alternative community hospitals.

National Training Center

Sentara Heart Advanced Imaging Center is a national training center—one of only five on the East Coast—training over 350 radiologists and cardiologists since the program was founded by Dr. Mohit Bhasin in 2008. Doctors travel from all over the country for one intensive week of training and certification in reading and interpreting highly advanced heart photography. This program is a true differentiator for Sentara Heart and a fulfillment of our educational mission to share the expertise developed here. Sentara Heart is currently investing in a new auditorium to be built in 2014 to facilitate training and expand the number of concurrent participants from nine to 25.

In 2013, Sentara Heart Advanced Imaging Center started a one-year apprenticeship program. Our first fellow completed this 60week program, achieving level 3 CT and cardiac MR scanning certification. The program, which provides both adult and pediatric training, is administered in conjunction with Children's Hospital of the King's Daughter in Norfolk, VA.

Interventional Cardiology

The sooner a patient suffering from heart defects and disease gets interventional care, the better their chances of survival and complete recovery.

Sentara Heart provides a wide range of cardiac interventional procedures to treat coronary artery disease. More than 3,200 interventional procedures are performed each year at Sentara Heart, across 19 catheterization laboratories (cath labs) throughout the Virginia region. Sentara Heart teams provide specialized interventional catheterization for defects that have historically required open surgery, such as:

- Atrial septal defects
- Ventricular septal defects (VSD) — including implantation of a muscular VSD device
- Patent foramen ovale
- Intracoronary stents
- Drug eluting stents
- Atrial, valvulopalsty, and percutaneous coronary interventions

Radial Access for Catheterization

Sentara Heart interventional cardiologists are increasingly accessing the heart through the wrist when performing a cardiac catheterization, a technology that has developed within the past five years. Cardiovascular catheterization is a commonly used procedure to detect blockages in blood vessels in the heart and throughout the body and to clear blockages using angioplasty and stents to restore critical blood flow.

In the majority of catheterizations, a thin tube called a catheter is inserted near the groin into a large artery at the top of the leg and threaded into the heart or peripheral arteries to the affected site. Specially trained cardiologists can now use more complex techniques and even smaller devices to perform cardiac catheterizations with radial access— resulting in less bleeding, reduced patient recovery time, and reduced inhospital mortality.

Percutaneous Coronary Interventions (PCI)

Sentara Heart serves as the hub of cardiac interventional care with a reputation for clinical quality and innovation. Our hospitals throughout Virginia perform percutaneous coronary interventions (PCI) — a treatment procedure that unblocks narrowed coronary arteries without performing surgery — for patients with simple and complex ischemic disease.

STEMI Regionalization Program

Sentara Heart has been recognized as a leader in Hampton Roads for expedited treatment of ST-Elevated Heart Attack patients (STEMI). National guidelines developed by the American College of Cardiology and the American Heart Association state that hospitals treating STEMI patients with emergency PCI should reliably achieve a door-to-balloon time of 90 minutes or less. As a participating hospital in D2B: An Alliance for Quality[™], Sentara Heart's Hampton Roads hospital's median time of 60 minutes for door-to-balloon were well below average in 2013.

2009-13 Interventional In-Hospital Risk-Adjusted O/E Mortality Ratio

Source: National Cardiovascular Data Registry (NCDR): CathPCI Registry



Sentara Heart Hospital



Sentara Virginia Beach General Hospital

A ratio of less than 1.0 means that fewer patients died than expected based on the performance of other hospitals as adjusted for patients with the same types and severity of medical problems.

What does the O/E mortality ratio mean?

The observed to expected mortality outcome (O/E mortality ratio) is a risk-adjusted measure of a hospital's mortality (death) rate. Risk adjustment takes into account how sick patients are upon entering the hospital. The mortality observed-to-expected measure tells us how we are performing on mortality relative to what is expected for our patients, given a variety of complicating characteristics, including their age, chronic conditions like diabetes or heart failure, or whether the patient was transferred from another hospital or admitted as an emergency. A low O/E ratio indicates better than expected outcome and a high O/E ratio indicates poorer than expected outcome.

Total Number of Cath Labs in the System

- Sentara Heart Hospital: 5
- Sentara Virginia Beach General Hospital: 2
- Sentara Princess Anne Hospital: 1
- Sentara Leigh Hospital: 1
- Sentara CarePlex Hospital: 2
- Sentara Williamsburg Regional Medical Center: 1
- Sentara Obici Hospital:
- Martha Jefferson Hospital: 2
- Sentara RMH Medical Center: 2
- Sentara Northern Virginia Medical Center: 2

SENTARA HEART

1 /



Electrophysiology

Many heart health issues, like cardiac arrhythmias, can be treated without surgery, using effective drug therapies and procedures that take place inside the heart. At Sentara Heart, we have one of the leading electrophysiology centers in the country, offering complete consultative, diagnostic, and disease management services for patients with heart rhythm disturbances, including ablation therapy and pacemakers for the treatment of congestive heart failure. As a leader in electrophysiology, we also have a number of clinical research opportunities that give patients access to the latest in emerging cardiac care technologies.

Sentara Heart Hospital features fully-functioning electrophysiology labs with 3-D mapping systems and an expanding core of board certified electrophysiologists. The EP program utilizes the most advanced technology to produce quality outcomes for simple to highly complex cases. As one of the busiest electrophysiology centers, the sophisticated ablation, pacemaker and implantable cardiac defibrillator programs at Sentara Heart perform more than 8,400 procedures each year.

Ablation Therapy

Sentara Heart is showing increasing volume and new technologies in the treatment of atrial fibrillation (Afib), a type of heart rhythm disorder (arrhythmia), affecting nearly 5.1 million people in the U.S. The risk of developing Afib increases with age, so that figure could rise to 15.9 million by 2050, as the Baby Boomer generation ages.

Advanced therapies for Afib at Sentara Heart include:

 Cryoablation, an alternative, minimally invasive procedure that can restore normal heart rhythm by disabling the heart cells that create an irregular heartbeat. During this procedure, a balloon catheter is used to locate and freeze the heart tissue that triggers an irregular heartbeat. Using cold, rather than heat, to disable damaged tissue reduces the chances of impacting healthy heart tissue and surrounding structures. • Laser balloon therapy, which provides electrophysiologists with real time visualization. This visualization capability is a large step forward for catheter ablation and is especially important when a patient has complex anatomy. This tool enables doctors to see whether there are any gaps in the ablation lines, which could increase effectiveness, and they also can see when tissue starts to overheat and adjust the power accordingly, which may reduce some complications.



1) Indicates growth in ablation using MS-DRGs 250 and 251; a-fib accounts for nearly all growth in this terrain. Source: Anter E et al., Circulation, 2009,119: 2516 2525. Cardiovascular Roundtable research and analysis.







15.9M

uring the last few months of 2013, Sharon Rateau saw that her mother, Mary Ware, wasn't doing well. "She was moving slowly and having problems focusing," Sharon remembers. "We booked a doctor's appointment, but had to keep postponing it."

When Dr. Laura Howard from Palmyra Medical Associates finally met with Mary, she urged her to see a cardiologist the next day.

"We went, and he said my mother's heart was beating so fast that he couldn't get a clear picture," Sharon shares. "He told us to go the emergency room at Martha Jefferson Hospital because they could give her something intravenously and then get her heart rate down and get another picture."

Mary was experiencing Afib, atrial fibrillation. This rapid, irregular heart rate often causes poor blood flow to the body.

"They admitted her," Sharon says. "She stayed for six days, and got out the day before her 87th birthday."

As the staff worked to slow Mary's heart rate, Sharon found herself relaxing more – and so did her mom. "They were observant, always checked on me and were as sweet as could be," Mary says. "You never saw them come in without a smile on their face."

Mary Ware

1111111111111111

Mary was particularly pleased with husbandand-wife team David Zerrlaut, a heart specialistpatient educator, and Myrinda Zerrlaut, a floor nurse.

David talks with patients about their heart conditions – in hopes that he'll never need to see them again. "It's why we inform patients; we don't want them to have to be readmitted," he says. "Anytime you're in the hospital, it's getting harder and harder for you to fight off the progression of the disease."

With a patient such as Mary Ware, he spends about 45 minutes covering every aspect of her condition:

- What it is
- What symptoms look like
- How to avoid readmission with lifestyle changes

"I tell them to watch for weight gain, shortness of breath, fatigue and swelling of the ankles," David says.

Additional watchful eyes are available once patients are discharged. "I'll call those who



continued from p. 20

were in the hospital and go over their medications," says Sharon 'J-J' Peacock, a nurse at Palmyra Medical Associates. "I check that an appointment has been set with us and with any recommended specialists and if not, schedule a convenient appointment for the patient. I make sure the specialists get any notes from us and the hospital."

"I check on other details," J-J continues. "Is Home Health scheduled for a visit or is anyone – any family – with the patient? Everything I'm checking on I consider to be 'transformation of care,' a collaborative, patient-focused effort at every care setting and between the different settings."

Camilla Washington, clinical educator-transformation of care coordinator with Medical Jefferson Medical Enterprises, reviews how well staffers were able to carry out procedures that can keep patients healthy. Looking at reports, she investigates:

- How many patients where discharged from Martha Jefferson and if they went home, whether or not they received needed help from Home Health.
- Did necessary follow-up appointments get scheduled with the patients' primary care physicians or specialists?

"Our goal is to make the transition from hospital to home seamless," Camilla says. "Patients are touched that nurses are calling to see that they're OK after a hospital stay."

"They're surprised that we know they were in the hospital," Camilla reports. Another effort Camilla works on: Ensuring that educational materials are understandable, consistent and timely.

"Patients are part of the care team now. They need to be informed," Camilla explains. "Everything we're doing is to keep patients from being readmitted to hospitals."

Area of Focus: Left Atrial Appendage Occlusion

Left atrial appendage (LAA) occlusion is a treatment strategy to prevent blood clot formation in patients suffering from Afib. The LAA is a small pouch off the side of the heart that is a source of stroke-inducing blood clots. LAA occlusion eliminates the risk of stroke without the need for blood thinners, which is great news for the many patients who cannot take them.

The electrophysiologists at Sentara Heart have become certified in the WATCHMAN LAA Closure Device placement procedure, which can be may be done under local or general anesthesia. The procedure usually lasts about an hour, and the patient is typically in the hospital for 24 hours following the procedure. This is a very exciting area for our EP program and its patients. A clinical trial for the WATCHMAN device is currently underway at Sentara Heart.



Cardiothoracic Surgery

Cardiothoracic Surgery at Sentara Heart is a highly regarded program with nationally recognized surgeons, superior quality, and complex cases. Much like that of an academic center, this is a deep and diverse program that continues to treat increasingly acute cases. It is also a program that can serve the many needs of patients in one place, sometimes in a single visit. Last year alone, the surgeons of the cardiothoracic program managed over 1,700 cases, ranging from coronary artery bypass grafting and aortic valve-sparing procedures to lung cancer surgeries.

Mid-Atlantic Cardiothoracic Surgeons, located on the sixth floor of Sentara Heart Hospital, work closely with pulmonary medicine, oncology, and radiology to provide a multidisciplinary approach to thoracic surgery. Our surgeons lead the regional effort to launch lung cancer screenings, participate in national Society of Thoracic Surgeons (STS) quality metrics, and perform sleeve thoracic surgeries (a highly complex procedure involving the lung). Together they are well represented on national committees and highly regarded for their efforts to advance cardiovascular and thoracic practices.

Procedures performed at Sentara Heart include:

- Coronary Artery Bypass
- Ablation Procedures
- Aortic Root Replacement
- Aortic Valve Replacement
- Heart Transplant
- Minimally Invasive Mitral Valve Surgery
- Mitral Valve Repair/Replacement
- Pericardectomy
- Repair Aortic Aneurysm/Dissection (Ascending & Descending)

- Resection of Cardiac Tumor
- Repair Atrial Septal Defect
- Repair Patent Foramen Ovale
- Repair Ventricular Septal Defect
- Repair Ventricular Aneurysm
- Total Artificial Heart Implantation
- Transmyocardial Revascularization
- Tricuspid Valve Repair/Replacement
- Ventricular Assist Device Placement

Sentara Heart's Cardiothoracic Surgeons present at 50th Annual STS/AATS Tech-Con

STS/AATS Tech-Con is a jointly sponsored program on novel therapies in cardiac and general thoracic surgery. Dr. Jonathan M. Philpott of Sentara Heart served as Chairman for this conference, held immediately preceding the 50th Annual Meeting of the Society of Thoracic Surgeons. Dr. Michael F. McGrath presented on the HeartMate II, a next generation mechanical heart device used here at Sentara Heart, and Dr. Philip Gentlesk spoke on hybrid ablation for Ventricular Tachycardia.

What does the O/E mortality ratio mean?

The observed to expected mortality outcome (O/E mortality ratio) is a risk-adjusted measure of a hospital's mortality (death) rate. Risk adjustment takes into account how sick patients are upon entering the hospital. The mortality observed-to-expected measure tells us how we are performing on mortality relative to what is expected for our patients, given a variety of complicating characteristics, including their age, chronic conditions like diabetes or heart failure, or whether the patient was transferred from another hospital or admitted as an emergency. A low O/E ratio indicates better than expected outcome and a high O/E ratio indicates poorer than expected outcome.

SENTARA HEART HOSPITAL

Primary Coronary Artery Bypass Graft (CABG)

2009-13 In-Hospital Risk-Adjusted O/E Mortality Ratio

Source: The Society of Thoracic Surgeons, Adult Cardiac Surgery Database



A ratio of less than 1.0 means that fewer patients died than expected based on the performance of other hospitals as adjusted for patients with the same types and severity of medical problems.



SENTARA VIRGINIA BEACH GENERAL HOSPITAL **Primary Coronary Artery Bypass Graft (CABG)** 2009-13 In-Hospital Risk-Adjusted O/E Mortality Ratio Source: The Society of Thoracic Surgeons, Adult Cardiac Surgery Database



A ratio of less than 1.0 means that fewer patients died than expected based on the performance of other hospitals as adjusted for patients with the same types and severity of medical problems.

SENTARA HEART

Sentara Heart Hybrid Cardiac Operating Suite

The Hybrid Cardiac Operating Suite at Sentara Heart Hospital is the region's first operating room to combine the very best medical expertise of Sentara Heart cardiothoracic surgeons, electrophysiologists, and interventional cardiologists with the most advanced heart technology available. The hybrid suite is a platform for a multidisciplinary team approach to heart care. Combining the diagnostic and treatment technologies of a cardiac cath lab, electrophysiology lab and traditional cardiac surgery operating room, cardiac surgeons can now work more collaboratively with cardiologists, in real time, to offer the greatest depth and breadth of cardiac services in one location.

With a 56-inch HD screen in the suite and control room, all members of the surgery team can readily assess the patient and the progress of

continued on p. 25

The partnership that this hybrid procedure creates between the electrophysiologists and cardiac surgeons provides patients with a comprehensive ablation and mapping procedure, leveraging the skills and technologies of each specialist. **99**

66

~ Robert Bernstein, MD, FHRS, FACC, FACP

the treatment. Images and data from 21 different inputs — including angiograms, ultrasound, 3D electrical mapping, CT and MRI high-resolution images of the heart — can all be simultaneously displayed on the monitors. Hospitals around the country are looking at these results.

In the area of electrophysiology, the Hybrid Cardiac Operating Suite is setting a trend around the country for this unique type of care for atrial fibrillation patients. It is home to the groundbreaking AtriCure DEEP AF feasibility trial, for which Sentara Heart was a top performer. The DEEP AF trial was designed to evaluate the safety and efficacy of a dual epicardial/endocardial procedure (DEEP) — a hybrid procedure to treat patients with persistent atrial fibrillation. In the area of electrophysiology, the Hybrid Cardiac Operating Suite is setting a trend around the country for this unique type of care for atrial fibrillation patients. It is home to the groundbreaking AtriCure DEEP AF feasibility trial, for which Sentara Heart was a top performer.

The Hybrid Cardiac Operating Suite:

DATESTAL STORESTAN TIREA IN

PHILIPS

1.11

- Is equipped with the most advanced imaging technology, providing doctors with precise information and improving overall patient outcomes
- Enables cardiologists and cardiothoracic surgeons to perform percutaneous and open procedures simultaneously
- Reduces the risk of complications and length of stay associated with multiple procedures, allowing patients to experience a quicker recovery
- Expands the ability to provide less invasive heart surgery for more people with severe heart disease and/or other medical complications
- Offers new procedures for treating atrial fibrillation currently not possible in a normal operating room or electrophysiology lab



Cardiac Anesthesiology

With nine board certified cardiothoracic anesthesiologists, Sentara Heart provides 100 percent physician-staffed anesthesiology services. The physicians of Anesthesia Specialists work exclusively with the cardiothoracic surgeons, allowing patients to benefit from a dedicated and collaborative team of physician experts who perform high volumes of innovative procedures. Each one has completed a full residency in general anesthesia as well as advanced fellowship training in cardiothoracic anesthesiology and critical care.

This team of subspecialists excels in the management of critically ill patients undergoing complex operations, which encompasses the use of invasive monitoring techniques, single-lung ventilation, management of cardiopulmonary bypass, advanced hemodynamic management, and the control of postoperative pain. They are trained to read and interpret intraoperative transesophageal echocardiograms, allowing the team to diagnose unexpected coronary and valve problems, confirm already suspected disease processes, and determine the success of a procedure, all within the surgical suite.



Cardiothoracic anesthesiologists are exclusively dedicated to the care of patients undergoing surgery of the heart and lungs. They assist in the following cases:

- Coronary artery bypass surgeries
- Valve repairs and replacements
- Open aortic procedures
- Thoracic and lung surgery
- Heart transplant
- Ventricular assist devices
- High-risk interventions in the cath lab
- Transcatheter Aortic Valve Replacement (TAVR)
- EP Lab procedures, ablations, pacemakers, and implantable cardioverter defibrillators (ICD)
- Extracorporeal membrane oxygenation (ECMO)
- SynCardia Total Artificial Hearts

Cardiothoracic anesthesiologists at Sentara Heart are immersed in advanced training and technologies. They are afforded the opportunity to collaborate on innovative procedures such as TAVR, DEEP and artificial heart implants. And many of the cardiothoracic anesthesiologists are actively involved in hospital leadership committees focusing on patient safety, clinical quality, root cause analysis, best practices, ethics, and more.

The dedicated, skilled and experienced cardiothoracic anesthesiology team contributes to the ability of Sentara Heart to provide services that would otherwise not be available in the community. They play a crucial role in producing excellent morbidity and mortality rates, especially given the acuity level of the population we serve.





TEE Certification

Our cardiothoracic anesthesiologists are certified in transesophageal echocardiography (TEE) by the National Board of Echocardiography. As experts in the perioperative application of transesophageal echocardiography, they were among the first physicians in the state to use realtime 3-DTEE–advanced imaging that is more realistic and lifelike than any other intraoperative modality. Today, cardiac anesthesiologists at Sentara Heart stay abreast of innovative technology and hone their skills by performing high volumes of complex procedures.





Sentara Heart Arrhythmia Center

The Sentara Heart Arrhythmia Center (SHAC) is Southeastern Virginia's first and only Center that brings together highly talented cardiothoracic surgeons and cardiac electrophysiologist to diagnose and treat simple to complex atrial fibrillation (Afib), ventricular tachycardia, and other cardiac arrhythmias.

Individuals seeking arrhythmia care comprise a very diverse group of patients, some of whom require catheter ablation or complex therapies. The SHAC provides a resource for managing these unique patients across the region with seamless access to advanced diagnosis and medical and interventional treatments — within one setting. This centralized and collaborative approach to arrhythmia treatment has been an important advancement and step forward for patient care and satisfaction.



Sentara Heart Arrhythmia Center Includes:

- A hybrid team approach toward patient care both a cardiothoracic surgeon and cardiac electrophysiologist review every option with patients to determine the best treatment plan
- Comprehensive Afib treatment program that includes advanced heart mapping system and advanced diagnostic testing and procedures such as catheter ablation, hybrid surgical ablation, and the Maze procedure, for which we are a national leader



- The only advanced hybrid cardiac operating suite in the region
- Services tailored to referring doctors, ranging from one-time recommendations for medical management to invasive interventions
- A dedicated program navigator who provides a single point of contact to referring doctors and patients through the entire care cycle process
- Access to advanced Afib research studies that are among the top enrollers in the nation:
 - AtriCure ABLATE Study for Open Maze Procedures
 - AtriCure Hybrid DEEP AF trial

Areas of Growth

This past year, the SHAC continued its development of integrated services and use of the Hybrid Cardiac Operating Suite. Cardiothoracic surgeons and anesthesiologists worked closely together to handle complex treatments and surgeries for patients requiring more in-depth procedures than the standard patient. The increasing efficacy and success of these complex procedures is testament to the benefits of a highly collaborative and hybrid approach to care.

The SHAC also dramatically increased its community outreach efforts and coverage for patients who require arrhythmia management, providing ablation procedures and standard of care therapy for flutter and fibrillation to under-served and under-resourced areas of the Hampton Roads community.

The SHAC continued its development of lead management programs to address the problems that can occur over the years with implantable devices. With the dramatic growth in the implantation of cardiac resynchronization therapy defibrillators (CRT-Ds), implantable cardioverter defibrillators (ICDs), and pacemakers over the last five years, the number of cardiac leads implanted has also dramatically increased. As a result, there is a growing need for cardiac lead removal procedures to be performed as part of the normal course of management of these implanted systems.

For years, Sentara Heart has incorporated cardiac lead removal practices into its cardiovascular services in order to provide a comprehensive approach to lead management and to address this growing need. This continues to be an area of continued growth for the SHAC.

To contact the Sentara Heart Arrhythmia Center, call (757) 388-8020 or go online to sentara.com/Afib

Electrophysiology and Surgical Collaboration

The combination of electrophysiology and surgical programs at Sentara Heart treating Afib exemplifies our highly collaborative approach to diagnosis and treatment.

We are proud to be a founding member of the National Alliance of Integrated AFIB Centers (NAIAC). NAIAC, comprised of the nation's top hospitals, is passionate about bringing comprehensive, expert Afib care to patients. NAIAC members are collaborating across facilities and specialties, combining resources, specialists, research, and technology. This means that patients receive evidence-based treatment that will offer them the best outcome possible.

When patients come to a NAIAC center like the Sentara Heart Arrhythmia Center at Sentara Heart Hospital, they are under the care of both a heart surgeon and an electrophysiologist (a cardiologist that specializes in heart rhythm disorders). Working together, the surgeon and electrophysiologist ensure that the patient receives comprehensive, expert care from leading specialists in the field and provide a full array of treatment options. In addition to prescribing certain medications, these treatment options can include:

- Catheter Ablation: Minimally invasive procedure to address areas of the heart causing the arrhythmia.
- Open Cox Maze IV: Instead of using incisions, a surgical laser (in some cases) is used to stop the errant electrical signals.
- Hybrid AF Ablation (Staged or Simultaneous): Procedure that combines a surgical procedure and catheter ablation and is performed by an electrophysiologist and a cardiothoracic surgeon.

"We are extremely excited to partner with NAIAC," said Mellanie True Hills, Founder and CEO of StopAfib.org, a patient advocacy group and founding alliance member. "We will work closely with NAIAC to provide the patient perspective as we continue to provide patients with a wide variety of educational resources."

Advanced Heart Failure Program

Sentara Heart was the first healthcare system in Southeastern Virginia to perform heart transplants in 1989. Since that time, more than 300 patients have benefitted from donor transplantation and have gone on to lead happy and productive lives.



In the decades since transplantation began, Sentara has also been on the leading edge of programs that help extend and improve the quality of life for patients with end stage heart failure.

The Advanced Heart Failure Program at Sentara Heart provides specialized care for patients suffering from any form of heart failure and at any stage. With subspecialized heart failure physicians and clinicians, the program offers comprehensive heart failure management from diagnostic testing and medical therapy to advanced surgical options that include rhythm control devices, left ventricular assist devices, innovative total artificial heart or heart transplantation. In addition, the program is one of only a handful of sites that provides evaluation and treatments of advance pulmonary arterial hypertension.

In 2012, Sentara Heart Hospital became the first facility in Southeastern Virginia to offer the SynCardia Total Artificial Heart (TAH) and only the second in all of Virginia. This artificial heart is a life-saving bridge for patients suffering from end-stage biventricular heart failure and waiting for a heart donor. In 2013, Sentara Heart performed four TAH implants, in each patient replacing both ventricles and four valves with the artificial heart in a procedure lasting four to six hours.

Previous treatments, such as intravenous drugs, could buy only months for patients awaiting



transplants. The artificial heart can give them years.

"The medicines that we used to give for weeks or months are not nearly as good as the Total Artificial Heart," says Dr. John Herre. "The worst thing that can happen is to try to transplant somebody whose other organs, like their liver and their kidneys, are not functioning because they've been in heart failure for so long."

Sentara Heart provides a large volume of ventricular assistance device implantation procedures each year for an expanding patient population. These procedures have proven to be enormously successful, extending life by a factor of eight. In the last year and half, two new heart failure specialists – Dr. Katheryn Lietz and Dr. Brittany Palmer – were hired to complement our team of doctors and grow this successful program.

To contact the Sentara Advanced Heart Failure Center, call (757) 388-2831 or go online to sentara.com/HeartFailure

In 2013, Sentara Heart provided:



20 Short-Term VAD Implants

A ventricular assist device (VAD) is a mechanical pump that is used to support heart function and blood flow in people who have weakened hearts. It is used to stabilize a patient for up to a few days (short-term VAD) or as a bridge to heart transplant to a long-term solution (long-term VAD) to help a heart work better.

Advancements in Artificial Heart Support

The supply of hearts available for Americans awaiting a transplant is a relatively static number, with approximately 2,100 available a year (3,500 worldwide). The population with advanced heart failure, however, continues to expand. Mechanical hearts are the only means to bridge that growing gap. Mechanical circulatory support can go a long way toward saving lives when severe disease is complicated by arrhythmia or cardiogenic shock and when post-operative patients fail to wean from cardiopulmonary bypass. Our doctors are participating in groundbreaking research to improve the management of heart failure patients.

INOVATE-HF

Principle Investigator: John Herre, MD INcrease Of VAgal TonE in CHF (INOVATE-HF)

Intermacs

Principle Investigator: John Herre, MD

Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS)

Laptop - HF

Principle Investigator: John Herre, MD Left Atrial Pressure Monitoring to Optimize Heart Failure Therapy (LAPTOP-H)

S-ICD PAS

Principle Investigator: John Herre, MD

Registry is an observational study to study the clinical effectiveness the Cameron Health S-ICD System

True-AHF

Principle Investigator: John Herre, MD

Evaluate the efficacy and safety of a continuous intravenous (IV) ularitide infusion on the clinical status and outcome of patients with acute decompensated heart failure (ADHF).

Freedom Driver

Principle Investigator: Michael McGrath, MD SynCardia Freedom Driver System Study

HeartWare

Principal Investigator: Jonathan Philpott, MD

Prospective, randomized, controlled, unblinded, multicenter evaluation of the stroke incidence in patients implanted with a HeartWare® HVAD who receive optimal blood pressure management I n July of 2013, Jack and Mary Jones left Tennessee to visit Williamsburg for their 25th anniversary, expecting to be back home in a week to harvest their blackberries. On the first night of their trip, however, Jack didn't feel right, and a few hours later, he was headed by ambulance to Sentara Heart Hospital in Norfolk—where Jack stayed for the next 145 days.

He went to sleep on vacation, and when he woke up, his wife explained to him that he no longer had his heart. Instead, Jack had an artificial heart implanted in his chest, powered by an external artificial heart system dubbed "Big Blue."

In 2011, Sentara Heart began using the Total Artificial Heart, made by SynCardia Systems Inc., for patients whose lower heart chambers pumped so poorly they were in end-stage heart failure. Jack was the fifth patient on Big Blue at Sentara Heart; since then, one more has benefitted from the device, and all but one patient are still alive today. The driver powers a polyurethane device implanted where all but the top of the diseased part of the heart is removed. Approximately 80 percent of patients with artificial hearts bridge to a new (live) heart transplant.

Jack had never had heart problems, but he hadn't been feeling well for months. He had

Jack Jones

seen a doctor about fatigue, back and chest pain, and night sweats. When his heart failed on vacation in July, his only chance at life was the removal of his ruined heart.

After 57 days on Big Blue, he switched to an apparatus called the Freedom driver, which remains under clinical study at Sentara Heart. The new device weighs only 13 pounds and allowed Jack and Mary to walk around the hospital grounds without having someone push the machine.

Some patients are discharged to await a heart at home, but Jack's Greenbrier, TN, home was too far from a heart transplant hospital. If he left, he would lose his spot on the waiting list. Mary resigned from her job as an accounting consultant for Ford Motor Co. and took up residence in one of the hospital's guest services rooms.

Meanwhile, the couple got to know the nurses and doctors and custodians by name, and they befriended a Jack Russell terrier therapy dog, coincidentally named Jack, who visited twice

Sentara Heart PATIENT

eart Hospital

111111111

The latest generation of mechanical circulatory support devices, also known as ventricular assist devices, represents a dramatic advancement in this technology and carries the potential to revolutionize future treatment for patients in advanced-stage heart failure.

The most advanced device approved by the FDA is the **HeartMate II**, a left ventricular assist device (LVAD) manufactured by Thoratec. The HeartMate II has been studied extensively as a bridge to transplantation, including ongoing clinical trial, and has been successfully implanted in 30 patients at Sentara Heart during 2013. An LVAD is designed to help the left side of the heart pump blood.

In most cases with a HeartMate II LVAD, advanced heart failure patients can experience a dramatic improvement in their heart failure symptoms. With oxygen-rich blood flowing throughout the body, most people say they feel better and have more energy. Most HeartMate II patients also experience an improved quality of life, once again enjoying their favorite activities. The HeartMate II is small enough to fit people of many sizes and ages and is designed to work for a number of years.

Extracorporeal Life Support (ECLS)

Initiated in 2013, Sentara Heart's ECLS program (also known as ECMO) is a emergency stabilizer for patients suffering acute heart or respiratory failure, allowing us to provide urgent support to patients to help them recover or to bridge them to other therapy. This ventricular support system bypasses the heart and lungs altogether, pumping and oxygenating a patient's blood outside the body, allowing the heart and lungs to rest. As a bridge for patients awaiting lung transplant, the ECLS helps keep tissues well oxygenated, which makes the patient a better candidate for a transplant.

The first patient to take advantage of this device was treated in December of 2013. Sentara Heart will continue use of the ECLS:

- For patients recovering from heart/lung failure or heart surgery
- As a bridge option to further treatment
- For support during high-risk procedures in the cardiac catheterization lab
- As a bridge to a heart assist device

The larger goal of the ECLS program is to extend its use regionally, taking the equipment into the field to stabilize patients and eventually transfer them to Sentara Heart Hospital for therapy.

continued from p. 32



a week. The dog sat in Jack's lap on the way to the operating room and would pull him along in his wheelchair, and two grew quite attached.

Waiting for a real heart — and not knowing how long that wait will be — is extremely challenging for patients and their loved ones. The demand for donor hearts has increased over the years, but the supply is generally a static number that hovers around 2,100 each year.

On Nov. 12, transplant coordinator Katharine Biagi called to tell them that a heart had been found. The next day, after 57 days on Big Blue and 55 days on the Freedom apparatus, he received a new heart.

Dr. Michael McGrath, surgical director for the Advanced Heart Failure program at Sentara Heart, said patients who stay that long become part of the hospital family. He has known some who stayed more than a year.

"He's leaving his heart in Norfolk," McGrath said of Jack. "But they promise to come back and actually go to Williamsburg next time."

SENTARA HEART

Sentara Heart Valve and Structural Disease Center

The Sentara Heart Valve and Structural Disease Center is an advanced program with established and innovative valve repair and catheter intervention initiatives focused on quality. The program offers patient evaluations and individualized disease management plans by a team of cardiothoracic surgeons and interventional cardiologists, often in one visit. Our Center serves as valve referral center for the 2.4 million people living in Southeastern Virginia and Northeastern North Carolina and is the region's only program focused on diagnosing and treating heart valve and structural heart disease.

Rapidly growing advances in minimally invasive heart surgery are yielding faster recoveries and improving patient satisfaction and comfort with less visible scarring. Whenever possible, minimally invasive heart surgery is being routinely performed for most single-valve repair and replacement surgeries because of these benefits. At Sentara Heart, cardiothoracic surgeons use minimally invasive procedures for:

- Mitral valve repair or replacement
- Aortic valve repair or replacement
- Tricuspid valve repair or replacement
- Atrial septal defect repairs

The Sentara Heart Valve and Structural Disease Center has seen exponential growth since starting this program in 2010. The newest generation of valves can now be implanted through minimally invasive catheter procedures.

The Future of Valve Repair and Replacement

Sentara Heart continues to be on the forefront of innovative technology. In 2013 we had much success with transcatheter aortic valve replacement (TAVR), a new nonsurgical treatment to replace diseased aortic valves. Sentara Heart has completed 160 TAVR surgeries since its inception, allowing us to treat high-risk and elderly patients who were previously considered inoperable. The equipment is now small enough that what used to require open heart surgery now can be carried out in a closed chest through an incision in the leg or chest.

TAVR is a highly innovative treatment for patients who suffer from severe aortic stenosis, a condition caused by the buildup of calcium on the aortic valve that reduces blood flow and results in extreme fatigue, severe shortness of breath, and possible heart failure. Many of these patients also present with severe comorbidity problems, like diabetes or lung disease. TAVR uses a compressed replacement valve that is placed into the heart with a catheter. The valve is carefully positioned and then inflated with a balloon, replacing the collapsed valve. Patients are often out of the ICU in a day and home with 72 hours.

The highly trained and collaborative team of cardiologists, cardiothoracic surgeons, nurse practitioners, and cardiac anesthesiologists are able to conduct this surgery because of the most advanced operating room in the region, the Hybrid Cardiac Operating Suite.

"While it's very time and resource intensive to create the heart team collaboration of cardiothoracic surgeons and interventional cardiologists, this extraordinary team approach has allowed us to deliver care to patients who have previously been considered inoperable or very high risk in a minimally invasive approach."

— Deepak Talreja, MD, FACC, FSCAI



TAVR Program Growth

(Does not include clinical trial volume)

26%

2012

2013

Research Highlight

Sentara Heart enrolling in Trial to Test Dissolving Heart Device

In May of 2013, Sentara Heart Hospital began a randomized multicenter clinical research trial to study an investigational "dissolving" device to treat blockages in the vessels serving the heart. The narrowing of vessels in the heart due to a buildup of plaque is known as coronary artery disease and is the leading cause of death in men and women in the U.S. The study device, Absorb™, is made by healthcare company Abbott and is designed to open blocked heart vessels and restore blood flow to the heart. Instead of permanent metallic stents used for decades, Absorb dissolves into the blood vessel over time. After Absorb dissolves, only two tiny pairs of markers remain in the artery and enable a physician to see where the device was placed.

"This innovative new device represents the next generation technology for the treatment of coronary artery disease. We're excited to be part of research that could provide our patients with new treatment options in the future," says Paul Mahoney, M.D., principal investigator for this study at Sentara Heart.

Cardiologists practicing at Sentara Heart Hospital have opened the ABSORB III study to patients to test the safety and effectiveness of this new device compared with current standard treatment of medicated metallic heart stents called drug eluting stents.



35

Advanced Information Technology

Sentara Heart is a multi-site system with cardiac services at several locations within a 50-mile radius of the flagship facility, Sentara Heart Hospital, as well as several hospitals outside the core area of Hampton Roads. Providing a high level of coordinated, close-to-home care for the residents requires coordination of care driven by an advanced technology infrastructure. From Grand Rounds webcasts every Tuesday morning to standardized, web-based echocardiography reporting to the highly successful electronic medical record at Sentara (EPIC), the clinical staff of Sentara Heart communicate virtually through an innovative and nationally recognized information technology network.



Appropriate Use Criteria Eliminates Unnecessary Echocardiograms

Sentara Heart is the first health system in the country to create a system to ensure echocardiograms are ordered using appropriate use criteria. Because most echo procedures are not ordered by cardiologists, Sentara Heart recognized the need for a tool that places evidence-based standards in the hands of the physician ordering the test. Using criteria approved by American College of Cardiology and embedded in the Electronic Medical Record, Sentara Heart is establishing a more efficient mechanism for ordering echocardiograms and assisting physicians in making decisions that support the system's efforts to control healthcare costs and eliminate unnecessary testing.

Median Time Reduced 23 Minutes



33% Better Than National Guidelines

LIFENET Alert Regionalizes and Improves STEMI Care

Taking a leadership role in Hampton Roads, Sentara Heart was the first in the state to launch the LIFENET system to help diagnose heart attacks in the field and transmit EKG data to regional emergency departments. Working in conjunction with the Peninsula and Tidewater EMS Councils, STEMI Regionalization team at Sentara Heart broke through barriers and boundaries to purchase and install an open platform technology in more than 200 area ambulances.

With innovative technology and advanced functionality, the LIFENET System is a comprehensive web-based network that seamlessly mobilizes data to increase efficiency across the care continuum and deliver critical information to help hospital care teams reduce time to treatment. Clinicians have detailed advance notice of a patient's arrival and an unrivaled set of emergent data for managing their care. And a more efficient community of responders — empowered by the ability to share important information across devices and



organizations — can stay connected to superior decision support as they work to save lives.

This system is achieving its goal of reducing door to balloon time for patients in Southeastern Virginia who experience a ST-segment elevation myocardial infarction. The program reduced the time it takes to unblock blood vessels for any STEMI patient transported to any Hampton Roads emergency department. As a result of this team's efforts, the median door to balloon time has been reduced by 23 minutes in Hampton Roads Sentara facilities. The national guideline is 90 minutes and Sentara currently averages 60 minutes — 33 percent better than national guidelines. Studies have shown that transmission to emergency department for physician interpretation improves the positive predictive value of the pre-hospital 12-lead ECG for triage and therapeutic decision-making.

Advanced Information Technology

EMMI Program Facilitates Informed Consent

Now more than ever, patients want accurate information about their health. Sentara Heart helps meet this demand with an interactive patient education program that also serves to facilitate informed consent. Through the use of online technology, Sentara Heart is ensuring that patients receive standardized, accurate education about their conditions and procedures.

The Emmi program makes complicated medical information simple and easy to understand. It also improves communication between physicians and patients. Physicians send patients a link to view the program online. The program covers the risks, benefits and alternatives of various cardiac procedures such as EP, catheterization and open heart surgery. Patients must answer



questions to ensure they reviewed the information and then provide informed consent for the procedure.

The Emmi program is expected to increase patient satisfaction by delivering up-to-date and comprehensive information in an easy to access online video format.

ProSolv System Standardizes Echocardiography Reporting

Sentara Heart is standardizing echocardiography reporting with a systemwide technology from ProSolv CardioVascular Solutions. ProSolv is a high-performance, web-based software solution with advanced clinical tools that provide one entry point to instant image viewing and reporting. Clinicians and staff access the information they need to work efficiently and decisively to deliver the best care.

Fujifilm's Synapse® Mobility Extends Imaging Reach for Sentara Heart

Synapse[®] Mobility is a new mobile application that enables remote access to Fujifilm's suite of Synapse products from handheld mobile devices. Sentara Heart Cardiologists now have on-the-go access to the images and information stored in Synapse[®] Cardiovascular using the Web browser of their choice, increasing accessibility to patient information and improving workflow. The application provides advanced viewing capabilities for physicians to view 3D images as well as to be able to zoom, window and level, and use MIP/MPR just as they would do at a clinical workstation. Synapse Mobility affords our cardiologists tremendous time savings during exams and triage, which is helping us provide the best possible care while also increasing our patient stratification.

Coronary CT Angiography Provides Full Cardiac Detail in Less Time

Coronary computed tomography angiography (CTA) is a noninvasive heart imaging test currently undergoing rapid development and advancement. High-resolution, 3-dimensional pictures of the moving heart and great vessels are produced during a coronary CTA to determine if either fatty or calcium deposits (plaques) have built up in the coronary arteries.

Before the test, an iodine-containing contrast dye is injected into an IV in the patient's arm to improve the quality of the images. A medication that slows or stabilizes the patient's heart rate may also be given through the IV to improve the imaging results.

During the test, which usually takes about 10 minutes, X-rays pass through the body and are picked up by special detectors in the scanner. The newer scanners produce clearer final images with less time than the older models. These new technologies are often referred to as "multidetector" or "multislice" CT scanning.

Sentara Heart Hospital has the newest technology, known as dualsource CT, which uses two sources and two detectors at the same time. This technology provides full cardiac detail with about 50 percent less radiation exposure than traditional CT.

Along with the new state-of-the-art CT scanner, Sentara Heart has launched a new technology to decentralize services back to the community hospital with oversight from a team of experts located at Sentara Heart Hospital. In 2013, two sites were launched and equipped with telepresence technology (VBG/WMC). This allowed the patient to stay close to home while receiving the same high quality scan with oversight from the experts at Sentara Heart.



Xper System Improves Efficiency in Cath Labs

With technology at the core of the Sentara Heart system, we're improving efficiency and productivity throughout the entire network. The Xper Hemodynamic system offers more than a traditional monitoring system. Cath labs across the Sentara system are now standardized resulting in increased efficiency, improved revenue capture, decreased supply cost and increased physician satisfaction. Standardization and appropriate use documentation are our best defense against DOJ and RAC audits. The system also offers endless possibilities within the database to query information for research purposes.

Sentara Heart Digital Engagement

At Sentara Heart, our priority is simple: We put patients first, in everything we do. That means not only providing the most advanced, high-quality heart care possible when patients need it, but also actively raising awareness about heart health, prevention and screenings to keep them healthy.

In honor of American Heart Month in February, Sentara launched a comprehensive, 28-day marketing campaign to digitally engage our audience through a number of targeted channels, including daily blogs, social media posts (Facebook, Twitter, YouTube, Pinterest), an online photo contest and an interactive heart profiler tool at MyHeartAge.info. Offline, our team also staged a flash-mob style dance routine at a local coffee shop and shared the surprised crowd's reaction on YouTube.

Sentara Heart Profiler (MyHeartAge.info)

Our heart profiler asked users a series of questions to determine their heart age – comparing their actual age to their heart's biological age. We used social media posts (including paid and promoted Facebook posts) as well as strategic blog posts to drive traffic to the profiler. Over the month, it received a total of 9,004 visits, with users spending an average of 7 minutes with the interactive tool.

28 Days of Heart

February 2014 marked our second year of our successful 28 Days of Heart campaign. Our team researched, wrote and promoted daily blogs, Facebook posts and Tweets for each day of the month. Topics ranged from heart healthy recipes, tips for exercise and other lifestyle changes, heart patient profiles and advice on quitting smoking and raising heart-healthy children, among others. Centrally hosted at 28DaysofHeart.com, our strategic campaign received nearly 3,000 page views over the month.

U.S. OF

SENTARA HEART

#ShowUsYourHeart 😏 🖏







Women's Health Flash Mob

Our dance team "flash mob" was a creative and socially relevant event to raise awareness about women's heart health and drive traffic to our online heart profiler. Taking inspiration from guerilla marketing campaign strategies, our flash mob was conceived to delightfully surprise consumers and spark social buzz about Sentara Heart.

Posing as regular patrons at a coffee shop, our dance team members revealed themselves one by one, taking off coats to show red costumes. Their routine shared heart healthy tips, compelling statistics and info about the heart profiler. The YouTube video capturing the live routine received over 800 views within the first two weeks of release.

Show Us Your Heart Photo Contest

We asked consumers to send us their most creative heart-themed photos for the chance to win heart healthy gifts. Our fans took inspiration from their daily life, sending photos of staged or naturally heart-shaped objects. The contest, which we promoted on Pinterest and Facebook, received 50 entries, with 1,342 people voting for the winner. Show Us Your Heart received 13,163 total views, but when taking into account social media shares, it actually reached 23,474 people.





Questions for your Care Team

Cardiac Nursing



and truly satisfied patients require a qualified nursing staff. Sentara invests in these resources and competencies to ensure the highest level of care and service for all patients. We are making changes that in ways may seem small, but together as whole signify to our patients that they are our primary concern.

Recent areas of focus and change include:

- Continued focus to deliver the top 10 percent care in quality, safety and customer service
- Adoption of our Clinical 3 initiatives to reduce length of stay, re-admission rates and mortality for heart failure, pneumonia and sepsis patients through our transformation of care model.
- Execution of the nursing bundles
- Bedside shift report
- Hourly rounding
- Use of whiteboards
- Discharge phone calls
- Achieving Magnet Designation

Sentara Nursing is proud of its efforts to transform care by reducing falls and hospital acquired pressure ulcers. A patient fall, defined as a sudden, unintentional change in position, coming to rest on the floor is among the most commonly reported adverse hospital events, with more than 1 million occurring annually. U.S. hospital fall rates range from 3.31 to 11.5 fall events/1,000 patient-days. In 2013, Sentara Healthcare encouraged all employees to utilize their Behavior Based Safety Habits to keep our patients safe. The results of this initiative reflect the success noted to the right.

Sentara Philosophy of Nursing:

The foundation of our work is a culture of safety and accountability. Our nursing practice foundations differ between facilities as we respect the culture, history, and diversity of patient populations. Our responsibility is to create a caring and compassionate relationship with patients, families, family members, and residents. As nurses, we collaborate with the healthcare team to use evidence-based practice in providing care. Nurses access, manage, coordinate, and evaluate the care and education of the patient and family along the continuum of care. Our vision is to create an environment of health and healing.



Metric	National Mean	2012	2013	Goal
npatient Falls with njury per 1,000 days	0.81	0.434	0.394	0.43
Total Falls per 1,000 npatient days	3.66	2.31	2.21	2.79



The Commonwealth of Virginia and Sentara Healthcare funded a collaborative grant initiative encouraging joint research between College of William & Mary and Eastern Virginia Medical School. Teams from each institution will explore workshops and other collaborative and educational programming, which is slated to continue through 2017. Sentara Healthcare contributed \$100,000 to this effort. Academic relationships are an important focus of Sentara Healthcare and Sentara Heart.

44

Sentara Cardiovascular Research Institute

The SCRI was established in 2005 to advance the understanding and treatment of cardiovascular disease, which is the nation's no. 1 killer. Uniquely qualified registered nurse research coordinators and cardiologists collaborate with local institutions, government agencies, and biomedical companies to perform clinical research trials. Ultimately the work of the SCRI enables clinicians to improve clinical care delivery, patient outcomes, and the overall health of our community. For more information visit our website at **sentara.com/ heartresearch**.

Our services cover all types of cardiovascular research such as medical devices, heart failure, electrophysiology, cardiac surgery, cardiac interventional procedures, and medical management of CAD risk factors such as diabetes and lipid management, among others. Research nurses educate and follow research participants through the entire trial process. They coordinate all aspects of the patient's experience and advocate for them, helping them feel cared for while at their most vulnerable. Our program currently has research nurses who are highly autonomous and selfdirected. Collectively, they coordinate over 80 clinical trials.

Many of the trials we participate in are nationally and internationally recognized. They have been designed to identify new, improved treatment methods and protocols, while at the same time eliminate therapies and approaches to clinical care that are not as effective or may have been shown to be harmful.

2013 Physician Education

Advanced Heart Failure Symposium: Mechanical Circulatory Support

The symposium took a comprehensive approach to managing heart failure emphasizing the role of the primarycare physician/cardiologist as the central care provider. The event addressed treatment options for managing patients with heart failure, including initiating comprehensive lifestyle changes, lifetime mechanical circulatory support and heart transplantation. Course Director: John Herre, MD

Imaging at the Beach Conference: Cardiac Echo and CT/MRI

The high-level imaging conference brought together experts from the areas of cardiac echocardiography, CT, MRI and perioperative echo for the purpose of exploring the multimodality imaging and integrating these fields while focusing on the newest modalities and techniques used in cardiovascular imaging, as well as discuss the clinical usefulness and limitations. Course Director: David Eich MD

PAH Symposium: Pulmonary Hypertension – When is it a Number? When is it a Diagnosis? & Why Are We Still Getting It Wrong?

The symposium explored the importance of the proper diagnostic approach and treatment of pulmonary arterial hypertension (PAH) with discussion including recent advances, future direction in the treatment, diagnostic paradigms and management of this disease. Course Director: Michael Eggert, MD



Currently Enrolling Investigational Research Studies at Sentara Heart

Samurai

Principle Investigator: Robert Bernstein, MD

Principle Investigator at Martha Jefferson Hospital: John Zakaib, MD

SAMURAI collects data to confirm the safety, performance and effectiveness of the ImageReady System for use in the Magnetic Resonance Imaging (MRI) environment.

CABANA

Principal Investigator: Robert Bernstein, MD

Catheter Ablation Versus Antiarrhythmic Drug Therapy for Atrial Fibrillation Trial (CABANA).

Silver AMI

Principle Investigator: John Brush, MD

SILVER-AMI is a research study of older persons who are admitted to the hospital with a heart attack.

Analyze ST

Principle Investigator: Allen Ciuffo, MD

ST monitoring to detect acute coronary syndrome events in implantable cardioverter defibrillator patients (Analyze ST).

Riata Lead

Principal Investigator: Allen Ciuffo, MD

Riata Lead Post-Market Evaluation.

Parachute

Principle Investigator: Allen Ciuffo, MD and Paul Mahoney, MD

Assess the safety of the CardioKinetix parachute implant and delivery system in the partitioning of the left ventricle in patients with heart failure due to ischemic heart disease.

TDE-PH-310

Principle Investigator: Michael Eggert, MD

A Phase III, international, multicenter, randomized, double- blind, placebo-controlled, event driven study to compare the time to first clinical worsening in subjects with pulmonary arterial hypertension receiving UT-15C in combination with a PDE5-I or ERA compared with a PDE5-I or ERA alone.

TDE-PH-311

Principle Investigator: Michael Eggert, MD

Open-Label Extension Study of UT-15C in subjects with pulmonary arterial hypertension- a long-term follow-up to protocol TDE-PH-310.

As of June 2014

Aspire

Principle Investigator: Michael Eggert, MD

Study of incidence of respiratory tract adverse events in patients treated with Tyvaso® compared to other FDA approved Pulmonary Arterial Hypertension (PAH) Therapies.

Symphony

Principle Investigator: Michael Eggert, MD

SYMPHONY is prospective, multicenter, open-label, single-arm, Phase 3B psychometric validation study of the PAH-SYMPACT, a new quality of life questionnaire for patients with pulmonary arterial hypertension.

46

BEAT

Principle Investigator: Michael Eggert, MD

A multicenter, double-blind, randomized, placebo-controlled, Phase 3 study to assess the efficacy and safety of oral BPS-314d-MR added-on to treprostinil, inhaled (Tyvaso®) in subjects with pulmonary arterial hypertension.

INOVATE-HF

Principle Investigator: John Herre, MD

INcrease Of VAgal TonE in CHF (INOVATE-HF).

Intermacs

Principle Investigator: John Herre, MD

Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS).

Laptop - HF

Principle Investigator: John Herre, MD

Left Atrial Pressure Monitoring to **Optimize Heart Failure Therapy** (LAPTOP-H).

S-ICD PAS

Principle Investigator: John Herre, MD

Registry is an observational study to study the clinical effectiveness the Cameron Health S-ICD System.

True-AHF

Principle Investigator: John Herre, MD

Evaluate the efficacy and safety of a continuous intravenous (IV) ularitide infusion on the clinical status and outcome of patients with acute decompensated heart failure (ADHF).

REDUCE

Principle Investigator: Paul Mahoney, MD

GORE HELEX[™] Septal Occluder for Patent Foramen Ovale (PFO) Closure in Stroke Patients.

Absorb

Principle Investigator: Paul Mahoney, MD

Evaluate the safety and effectiveness of the Absorb BVS System compared to the XIENCE in the treatment of subjects with ischemic heart disease caused by up to two de novo native coronary artery lesions in separate epicardial vessels.

Prevail (CAP2)

Principle Investigator: Paul Mahoney, MD

To provide additional information about the safety and efficacy of the WATCHMAN LAA Closure Technology.

Nutrition

Principle Investigator: Paul Mahoney, MD

A randomized double blinded controlled trial of an oral nutritional supplement containing AN 777 in older hospitalized patients.

Partner II

Principle Investigator: Paul Mahoney, MD

To determine the safety and effectiveness of the Edwards SAPIEN XT transcatheter heart valve and delivery systems: NovaFlex (transfemoral access) and Ascendra2 (transapical access) in patients with symptomatic, calcific, severe aortic stenosis.

Surtavi

Principle Investigator: Paul Mahoney, MD

To evaluate the safety and Efficacy Study of the Medtronic CoreValve® System in the treatment of severe, symptomatic aortic stenosis in intermediate risk subjects who need aortic valve replacement (SURTAVI).

Belatacept

Principle Investigator: Michael McCune, MD

The primary purpose is to assess the benefits and risks of changing from Cyclosporine or Tacrolimus to Belatacept between 6-36 months after kidney transplant.

Freedom Driver

Principle Investigator: Michael McGrath, MD

SynCardia Freedom Driver System Study.

Resolute Integrity Long Lesion

Principle Investigator:

Ronald McKechnie, MD

This is a post approval study to conduct a prospective, multi-center evaluation of the procedural and clinical outcomes of subjects that are treated with the commercially available Medtronic Resolute Integrity Zotarolimus-Eluting Coronary Stent System

Evita

Principle Investigator: Wayne Old, MD

Tests the effect of varenicline (Champix[™]), a new drug used to help people quit smoking, in patients who have suffered a heart attack

Stroke TT

Principle Investigator: Jonathan Philpott, MD

To assess the safety and efficacy of the atricure when placed via minimally invasive surgical deployment to the Left Atrial Appendage.

Gloria AF Registry

Principle Investigator: Stewart Pollock, MD

Sentara RMH Medical Center

Global registry on long-term oral anti-thrombotic treatment in patients with atrial fibrillation

HeartWare

Principal Investigator: Jonathan Philpott, MD

Ablate PAS

Principle Investigator: Jonathan Philpott, MD

To evaluate the clinical outcomes in a cohort of patients with non-paroxysmal forms of atrial fibrillation treated during commercial use of the AtriCure Synergy Ablation System by physicians performed the Maze IV procedure

Prospective, randomized, controlled, unblinded, multicenter evaluation of the stroke incidence in patients implanted with a HeartWare® HVAD who receive optimal blood pressure management

LSS4

Principle Investigator: Ian Woollett, MD

Longitudinal Surveillance Study of the 4-SITE Lead/Header System

Advance-CRT Registry

Principle Investigator: John Zakaib, MD

Martha Jefferson Hospital

St. Jude Medical ADVANCE-CRT REGISTRY study

For information about current research trials or questions about SCRI, please call (757) 388-5480.

SCRI Director

Brent Ibata, PhD, JD, MPH, RAC, CCRC Director Cardiac Research and Education Sentara Heart Hospital 600 Gresham Drive Norfolk, VA 23507

Sentara Heart Surgeons and Physicians

MULTIDISCIPLINARY CENTERS

Sentara Advanced Heart Failure Center (757) 388-2831 sentara.com/HeartFailure

Sentara Heart Arrhythmia Center (757) 388-8020 sentara.com/Afib

Sentara Heart Advanced Imaging Center (757) 388-8870 sentara.com/imaging

Sentara Heart Valve and Structural Disease Center (757) 388-6144 sentara.com/HeartValveCenter

HAMPTON ROADS, VA

CARDIOTHORACIC SURGERY Mid-Atlantic Cardiothoracic Surgeons, Ltd. (757) 388-6005 macts.com

Norfolk

CARDIAC ANESTHESIOLOGY

Anesthesia Specialists (757) 431-9551

• Virginia Beach

CARDIOLOGY

Sentara Cardiology Specialists (855) 363-3868 sentara.com/cardiology

- Carrollton
- Chesapeake
- Franklin
- Kitty Hawk
- Newport News
- Nassawadox
- Norfolk
- Suffolk
- Virginia Beach
- Williamsburg

Cardiovascular Associates

(757) 395-5300 cval.org

- Virginia Beach
- Chesapeake

HAMPTON ROADS, VA (cont'd)

Hampton Roads Cardiology (757) 827-2200

• Hampton

Chesapeake Bay Cardiology (757) 464-5707

• Virginia Beach

Fort Norfolk Plaza Cardiology Associates (757) 624-1785 fortnorfolkmedical.com

Norfolk

PULMONOLOGY

Sentara Pulmonary, Critical Care & Sleep Specialists (757) 388-6115 sentara.com/smg

- Norfolk
- 🔍 Virginia Beach
- Hampton

Cardiac Hospitalists

Sentara and Eastern Virginia Medical School Hospitalists support the Sentara Heart Hospital program.

NORTHERN VIRGINIA

CARDIOLOGY Carient Heart and Vascular (703) 492-0709 carient.org

• Woodbridge

Mount Vernon Cardiology Associates (703) 730-4681 mvcaheart.com

Woodbridge

NOVA Cardiovascular Care (703) 492-6822 novacardiocare.com

• Woodbridge

Potomac Cardiovascular Consultants (703) 730-8002

Woodbridge

Dominion Cardiac Care, PC

(703) 490-3700 doctorhashemi.com

• Woodbridge

Office of Dr. Mousavi (703) 878-0941

Woodbridge

Office of Dr. Sheikh

(703) 491-9506

• Woodbridge

Office of Dr. Siriprakorn (703) 491-2179

• Woodbridge

CHARLOTTESVILLE, VA

CARDIOLOGY

Blue Ridge Heart & Vascular (434) 296-9596 blueridgeheart.com

Charlottesville

Cardiovascular Associates of Charlottesville (434) 293-4072

cvilleheart.com

Charlottesville

HARRISONBURG, VA

CARDIOLOGY

Harrisonburg Medical Associates (540) 434-0559 hmahealth.org

Harrisonburg

CARDIOTHORACIC SURGERY

Sentara RMH Cardiothoracic Surgery (540) 689-5555 RMHOnline.com

Harrisonburg

ANESTHESIOLOGY

Harrisonburg Physicians for Anesthesiology (540) 879-2583

• Dayton

Resources for Clinicians

Transferring a Patient to Sentara Heart

Through our CARE Unit, Sentara Heart established a streamlined patient transfer system for our referring providers and their cardiac patients. With one call, the expert CARE Unit team member can evaluate a patient's clinical needs, arrange for air or ground transportation and provide one central point of contact for transfer procedures and/or status updates. This service is available for all cardiac transfers to Sentara Heart Hospital from referring hospitals or physicians.

For transferring or admitting a cardiac patient, call (757) 388-8064.

The CARE Unit (cardiac assessment, recovery and evaluation) at Sentara Heart Hospital on the campus of Sentara Norfolk General Hospital serves as the portal for entry, preparation and recovery for catheterization, electrophysiology and heart surgery procedures. Regardless of how patients enter the Sentara Heart system, an established process ensures seamless coordination of heart care throughout the Hampton Roads region.

Clinical Trials

For a complete list of currently enrolling clinical trials at Sentara Heart, visit sentara.com/heartresearch. For more information or to enroll a patient, call (757) 388-5480.

Continuing Medical Education

For information about education from Sentara Heart, the Sentara Heart Learning Innovation Center will be launching in 2014 supporting the advancement of cardiovascular training and learning opportunities for clinicians. Visit sentara.com/cardiaceducation for current opportunities and updates.

2014 Sentara Heart Annual Report

NIGHTINGAL

GLOSSARY of terms

We have provided this glossary for those readers who may not be as familiar with some of the medical terms used in this annual report. Words and terms defined below appear in **green** throughout the report.

arteries Blood vessels that carry blood away from your heart to other parts of your body.

atrial fibrillation Atrial fibrillation, or AF, is the most common type of heart rhythm disorder (arrhythmia). During an arrhythmia, the heart can beat too fast, too slow, or with an irregular rhythm. AF occurs if rapid, disorganized electrical signals cause the heart's two upper chambers (the atria) to contract very quickly and irregularly (fibrillate).

atrial septal defect (ASD) A form of a congenital heart defect that enables blood flow between two compartments of the heart and can lead to lower-than-normal oxygen levels in the arterial blood that supplies the brain, organs, and tissues. However, an ASD may not produce noticeable signs or symptoms especially if the defect is small.

cardiac ablations A procedure that can correct heart rhythm problems, typically using long, flexible tubes inserted through a vein in the groin (or wrist) and threaded to the heart to correct structural problems. Cardiac ablation works by scarring or destroying tissue in the heart that triggers an abnormal heart rhythm. **cardiac catheterization** Cardiac catheterization is a minimally invasive procedure commonly used to diagnose and treat heart conditions. During catheterization, small tubes (catheters) are inserted into the circulatory system to determine if there are obstructions within the blood vessels that feed the heart.

cardiopulmonary bypass (CPB) A technique that temporarily takes over the function of the heart and lungs during surgery, maintaining the circulation of blood and oxygen in the body.

cardiothoracic surgery The field of medicine involved in surgical treatment of diseases affecting organs inside the chest (the thorax), generally the heart and lungs.

comorbidity The presence of one or more additional disorders or diseases that occur at the same time as a primary disease or disorder.

echocardiogram (ECHO) A test that uses sound waves to produce live images of your heart, allowing your doctor to monitor how your heart and its valves are functioning. An Echo can help spot blood clots in the heart, fluid in the sac around the heart, and problems with the aorta.

electrocardiogram (EKG) A test that checks for problems with the electrical activity of your heart and translates the heart's electrical activity into line tracings — spikes and dips, called waves — on paper.

electrophysiology (EP) A branch of cardiology that deals with the diagnosis and treatment of heart rhythm disorders. EP doctors (electrophysiologists) ablate tissue, implant and manage cardiac devices, and otherwise care for patients with heart rhythm disorders.

extracorporeal membrane oxygenation

(ECMO) The technique of providing both cardiac and respiratory support (oxygen) to patients whose heart and lungs are so severely diseased or damaged that they can no longer function. Other variations of its capabilities have been tested and used over the last few years, making it an important tool in life and organ support (extracorporeal circuitry). With all of these uses, a new term, extracorporeal life support (ECLS), is now commonly used to describe this technology.

implantable cardioverter defibrillators A

small device that's placed in the chest or abdomen to help treat irregular heartbeats called arrhythmias. An ICD uses electrical pulses or shocks to help control life-threatening arrhythmias, especially those that can cause sudden cardiac arrest.

lipid A group of naturally occurring molecules that include fats, waxes, sterols, and fat-soluble vitamins.

mitral valve repair A surgical procedure to treat the narrowing (stenosis) or leakage (regurgitation) of the mitral valve—the "inflow valve" for the left side of the heart.

myocardial biopsies The removal of a small piece of heart muscle for examination.

patent foramen ovale (PF0) A "hole" in the heart that is often harmless. About 1 in 5 Americans has a PFO. Many don't know it until a medical condition like a stroke or mini occurs. PFOs often have no symptoms but they may increase your risk for stroke.

percutaneous coronary

intervention (PCI) A procedure more commonly know as coronary angioplasty that is used to treat the narrowed (stenotic) coronary arteries of the heart found in coronary heart disease. These narrowed segments are due to plaque buildup.

perioperative The time period describing the duration of a patient's surgical procedures from check-in through recovery preoperative, intraoperative, and postoperative.

peripheral vascular disease (PVD)

A slow and progressive circulation disorder. It may involve disease in any of the blood vessels outside of the heart or in the arteries, veins, or lymphatic vessels. Organs supplied by these vessels, such as the brain, heart, and legs, may not receive adequate blood flow. The legs and feet are most commonly affected.

pressure ulcers Also known as bedsores, pressure ulcers are localized injuries to the skin and/or underlying tissue that usually occur over a prominence as a result of pressure or friction.

pulmonary arterial hypertension(PAH) An increase of blood

pressure in the pulmonary arteries. These arteries carry blood from your heart to your lungs to pick up oxygen. PH causes symptoms such as shortness of breath, dizziness, fainting, chest pain, and leg swelling. As the condition worsens, its symptoms may limit all physical activity.

Stents A small mesh tube that's used to treat narrow or weak arteries.

ST-segment elevation myocardial infarction (STEMI) A type of heart attack that occurs when a coronary artery suddenly becomes at least partially blocked by a blood clot, causing at least some of the heart muscle being supplied by that artery to die.

Telemanagement Advanced technology that enables doctors and nurses to monitor patients remotely.

Transcatheter Aortic Valve

Replacement TAVR This minimally invasive surgical procedure repairs the valve without removing the old, damaged valve. Instead, it wedges a replacement valve into the aortic valve's place. This new procedure is FDA approved for people with a narrowing of the aortic valve opening (aortic stenosis) who are considered a high risk patient for standard valve replacement surgery.

Transesophageal

echocardiography (TEE) A test that uses sound waves to create high-quality moving pictures of the heart and its blood vessels.

Tricuspid valve repair The

tricuspid valve is located between the heart's right upper chamber (atrium) and lower chamber (ventricle). Its role is to make sure blood flows the correct way through the heart. In some people, this valve does not function correctly (tricuspid valve disease). The valve can be repaired (preferred) or replaced.

Valvulopalsty A procedure in which a catheter is advanced from a blood vessel in the groin through the aorta into the heart. A large balloon at the tip of the catheter is inflated until the flaps of the valve are opened. Once the valve has been opened, the balloon is deflated and the catheter is removed. Valvuloplasty is performed in certain situations in order to open a heart valve that has become stiff.







sentara.com/heart