

# Cardiovascular and Surgical Outcomes | 2018



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Dear Colleague,

Physicians and staff of the BayCare Cardiovascular Service Line are pleased to present the annual clinical outcomes for 2018. The outstanding clinical results for patients within BayCare are a direct result of dedicated teams of caregivers who use the latest technology to address very complex cases.

In 2018, BayCare was named a top 20 health system. Out of 110 large hospital systems that IBM Watson Health (*formerly Truven Health Analytics*) studied, BayCare was the only one in Florida to make the top 20 percent.

Building on this foundation of clinical excellence, the cardiovascular service line has been structured to allow multidisciplinary teams to manage a vast range of cardiovascular disease conditions, rigorously benchmarking our progress against top IBM Watson Health metrics.

The following pages will highlight volume and select clinical outcomes within BayCare. We hope you can utilize the information in this outcomes book to help with patient care and treatment decisions. For more information or to refer a patient to any of our programs, call (844) 344-1990.

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## Why Choose Us?

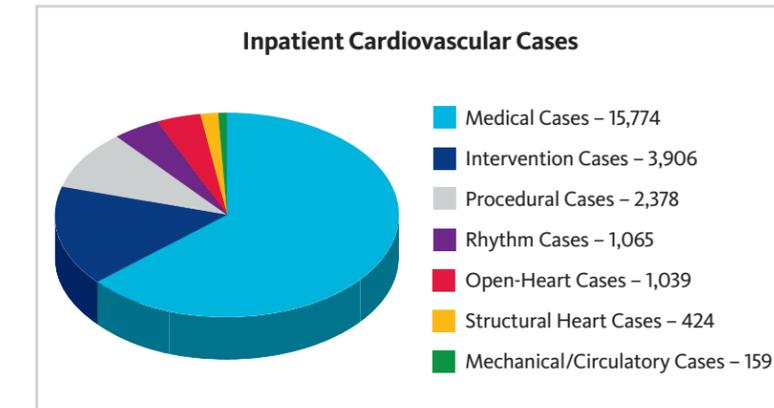
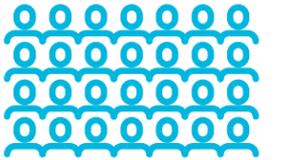
Awarded the highest three-star rating from the Society of Thoracic Surgeons (STS), BayCare is the largest not-for-profit health care system in West Central Florida. From our three flagship cardiovascular institution leaders in complex arrhythmias, advanced structural heart and valve, open-heart surgery and advanced heart failure, to the clinically integrated network of hospitals, outpatient centers, surgery centers, labs and outpatient imaging facilities, BayCare physicians and patients have access to experts across the spectrum. In addition, through our expansive network footprint, patients are able to move easily within the system to get the care and clinical expertise they need, regardless of their location.

At BayCare, quality is serving the needs of our customers. With the support of nearly 29,000 team members, BayCare fosters a forward-thinking culture that's advancing superior health care and creating an environment that allows quality to flourish.

**To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990**

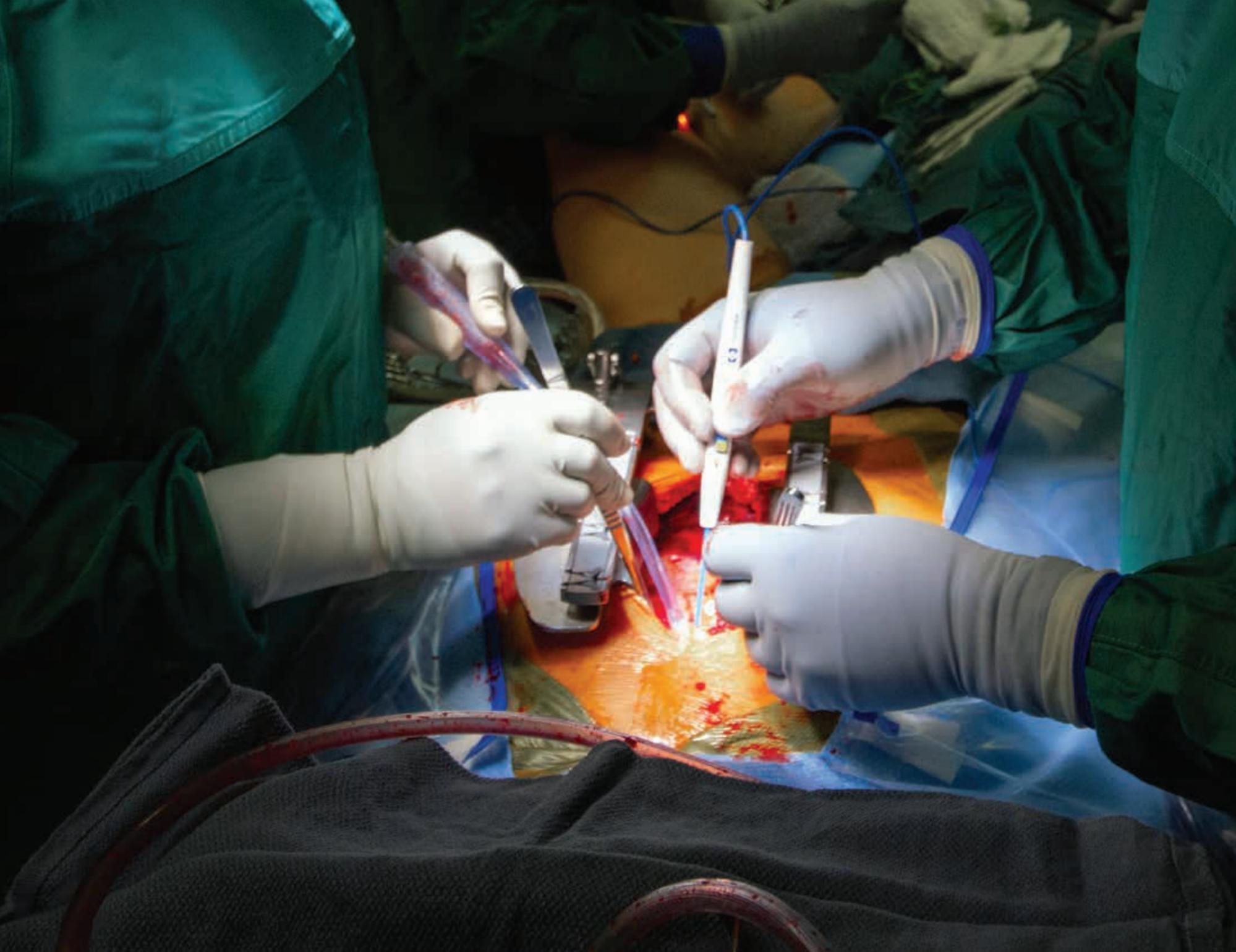
**3.9** Days  
Average Length of Stay

**24,745**  
Inpatient Cardiovascular Cases



Inpatient state data 4Q2017–3Q2018 for the four-county area (Hillsborough, Pasco, Pinellas and Polk), cardiovascular DRGs, excluding pediatric and specialty hospitals

**3** Three-star STS Rating



## Cardiovascular Surgery

When it comes to your patients' care, we realize that quality, outcome and cost are of the utmost importance. BayCare's cardiovascular and cardiothoracic surgeons are all members of the Society of Thoracic Surgeons (STS) whose mission is to enhance the ability to provide the highest quality patient care. BayCare participates in the STS National Adult Cardiac Surgery Database that includes over 1,200 participating institutions throughout the country.

Cardiovascular surgery is currently performed at three BayCare facilities: Morton Plant Hospital, St. Joseph's Hospital and Winter Haven Hospital. Cardiothoracic surgeons Dr. David Evans, Dr. John Ofenloch and Dr. Andrew Sherman acknowledge that "Cardiac surgery remains one of the most scrutinized and publicly reported specialties, with data collection on nearly every aspect of patient care. The BayCare cardiovascular surgeons remain committed to utilizing the extensive information provided to us via the Society of Thoracic Surgeons database in order to implement meaningful changes in the treatment of our patients throughout West Central Florida. Through frequent collaborative meetings and constant evaluation of data-driven best practices,

we have impacted countless patients lives. We strive to provide the highest quality of care from the moment we meet our patients, at the time of their operative procedures, continuing into the postoperative period and well into their recovery." For information on BayCare's management and treatment of pediatric and adult congenital heart disease, see the Pediatric and Adult Congenital Heart section of this book on page 31.

**BayCare's cardiovascular surgical procedures include:**

- Aortic aneurysm repair
- Aortic valve repair and replacement
- Carotid endarterectomy and stenting
- Coronary artery bypass
- Endovascular aneurysm repair (EVAR)
- Implantable defibrillator insertion and lead extraction
- Minimally invasive valve replacement/repair
- Mitral valve repair and replacement
- Redo cardiac surgery
- Surgical treatment for atrial fibrillation (*Maze, Convergent, AtriClip*)

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*"The BayCare cardiovascular surgeons remain committed to utilizing the extensive information provided to us via the Society of Thoracic Surgeons database in order to implement meaningful changes in the treatment of our patients throughout West Central Florida."*

~ Dr. David Evans  
*Director, Cardiac Surgery  
at the Bostick Heart Center  
at Winter Haven Hospital*

~ Dr. John Ofenloch  
*Chief of Cardiothoracic  
Surgery and Medical Director,  
Morgan CVICU/OR at  
Morton Plant Hospital*

~ Dr. Andrew Sherman  
*Chief, Department of  
Cardiothoracic Surgery  
at St. Joseph's Hospital*

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### A Look at Volume

2018 Open-Heart Surgery Breakdown	
	BayCare
Surgical Valve	481
Isolated CABG	775
Other	200

**Surgical valve** = Represents total number of valves, not patients; **Other** = Includes all procedures that fall outside any STS procedure identification category

2018 Surgical and Transcatheter Valve Volume	
	BayCare
Aortic Valve	309
Mitral Valve	213
Tricuspid valve	54
Transcatheter Valve (aortic and mitral)	427

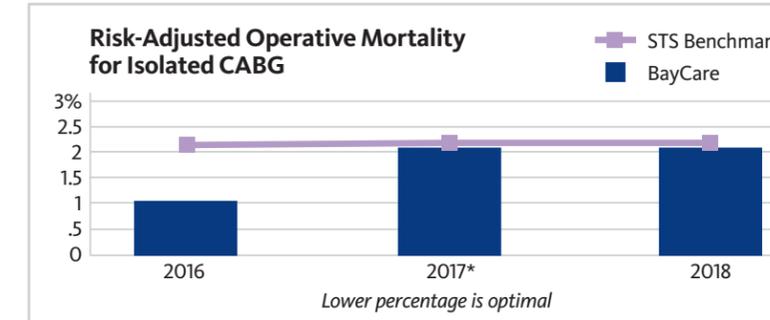
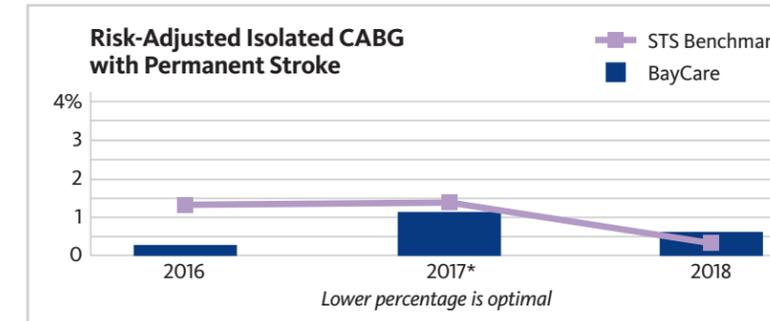
Represents total number of valves, not patients

*“BayCare cardiovascular surgeons continue to lead the way with a multidisciplinary approach to minimally invasive and catheter-based therapies for valvular heart disease.”*

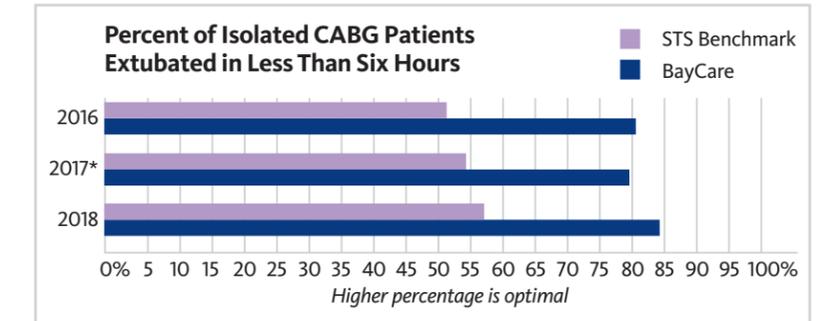
~ Dr. John Ofenloch  
 Chief of Cardiothoracic Surgery and Medical Director,  
 Morgan CVICU/OR at Morton Plant Hospital

### A Look at Quality

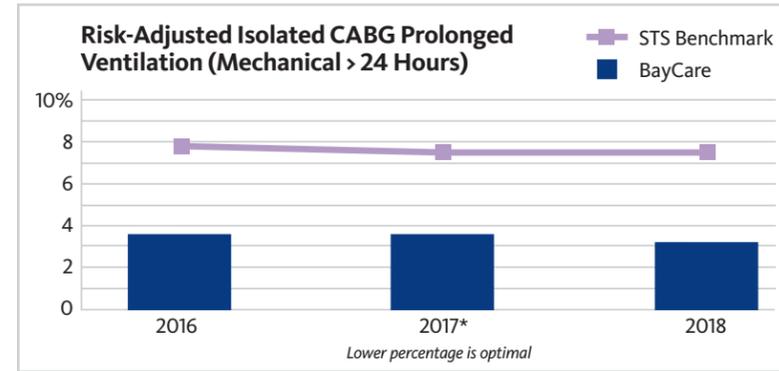
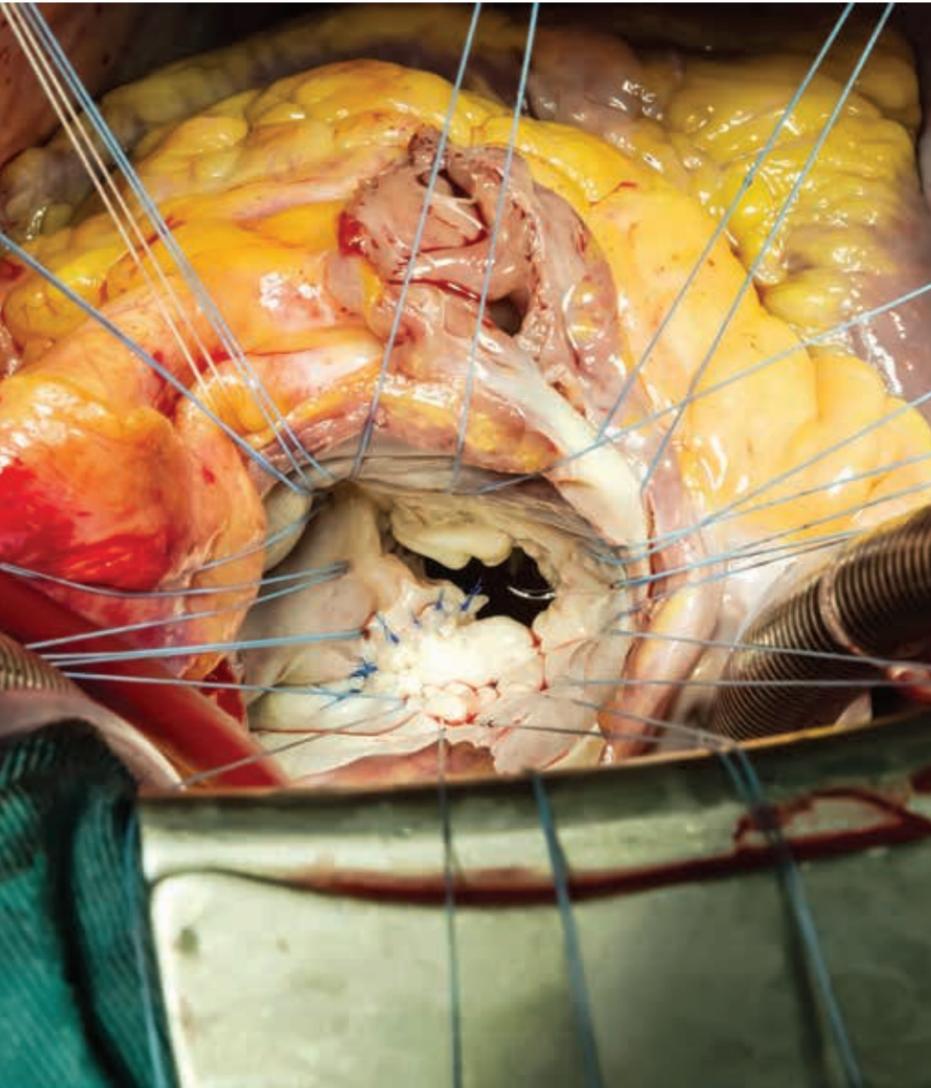
The data listed below for 2016 and 2018 reflect composite scores. For 2017, the risk-adjusted composite scores for BayCare as a health system were unavailable. To review risk-adjusted cardiovascular surgery data by facility for that year, see the Cardiovascular Surgery Data Addendum by Facility section of this book on page 52.



STS Major Cardiac Procedures Mortality				
	Number of Procedures	Operative Mortality	O:E	STS O:E
2016	988	1.7%	0.88	1.0
2017	1,053*	2.28%	N/A	1.0
2018	1,111	2.4%	0.96	2.5



\*Indicates non risk-adjusted data. Composite risk stratification not available in 2017. For risk-adjusted data by facility for that year, see the Cardiovascular Surgery Data Addendum by Facility on page 52.



**Deep Sternal Wound Infection for Isolated CABG**

	STS Benchmark	BayCare
2016	0.3%	0.0%
2017	0.3%	0.0%
2018	0.3%	0.0%

Lower percentage is optimal

**Emphasis on Mitral Valve Repair for Mitral Regurgitation**

For many patients with severe mitral valve regurgitation, surgically repairing the valve is often the preferred form of treatment over mitral valve replacement. According to Dr. Andrew Sherman, chief of the department of cardiothoracic surgery at St. Joseph's Hospital, "It has become very clear in the cardiac surgical literature that repairing a patient's leaking mitral valve earlier in the disease process can have significant benefits with respect to decreasing their chances of future heart failure and increasing their overall survival. One of the most important aspects of the decision-making process is that there will be a high likelihood of successful valve repair with a high degree of safety. BayCare surgeons have proven this expertise in both the volume of valves they have repaired and our extremely low mortality rates."

\*Indicates non risk-adjusted data. Composite risk stratification not available in 2017. For risk-adjusted data by facility for that year, see the Cardiovascular Surgery Data Addendum by Facility on page 52.



**Case Study**

A severely ill 72-year-old male with a past medical history of atrial fibrillation, chronic obstructive pulmonary disease, cardiomyopathy, Legionnaires' disease and chronic renal insufficiency, presented to the emergency department with complaints of chest pain. Cardiac workup revealed ejection fraction of 50 percent, severe mitral regurgitation, moderate tricuspid regurgitation, severe aortic regurgitation and pulmonary hypertension with normal coronary arteries. The patient required open-heart surgery with aortic and mitral valve replacement. Postoperatively, in the cardiovascular intensive care unit, the patient received multiple inotropic drips for stabilization. The patient was extubated in 11.5 hours. The patient's condition improved and the drips were discontinued. The patient was transferred to the cardiovascular stepdown unit, and after continued improvement, subsequently was discharged from the hospital. After discharge, the patient was enrolled in outpatient cardiac rehabilitation and physical therapy. He's recovering well.

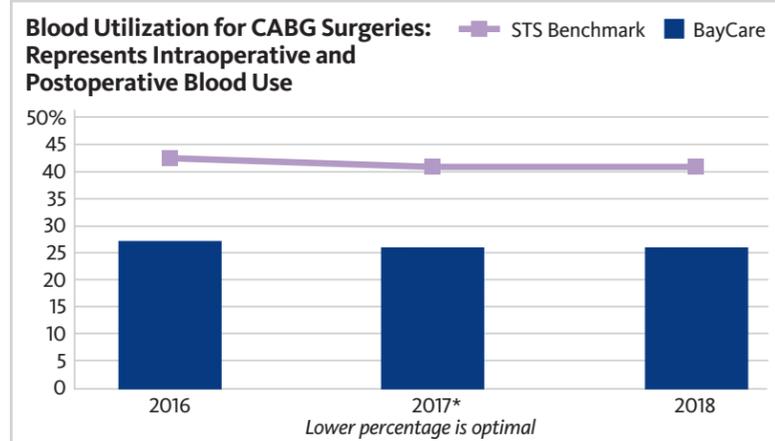
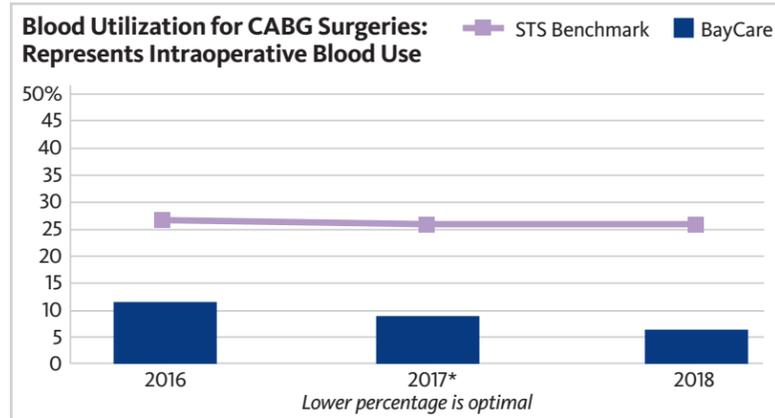
To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990



### Importance of Blood Conservation

Multiple strategies are utilized within BayCare cardiovascular surgical programs to limit operative blood loss and patient exposure to blood products. Techniques to limit bleeding and return shed blood to the patient include:

- Optimization of patient's own clotting mechanism prior to operation
- Cell saver technology
- Cardiotomy suction
- Meticulous surgical technique
- Medication administration during surgery prior to incision to enhance patient's clotting mechanism
- CardioPat closed chest tube drainage systems in the CVICU postoperatively
- Specialized medications utilized to address specific deficiencies in coagulation



### Emphasis on Arterial Grafting for CABG

“Arterial bypass grafts have been proven to provide superior long term outcomes and, as such, our utilization of multiple arterial grafts, including radial artery and bilateral internal mammary artery grafts, is significantly higher than regional and national averages,” according to chief of cardiothoracic surgery and medical director of the Morgan CVICU/OR at Morton Plant Hospital, Dr. John Ofenloch.

\*Indicates non risk-adjusted data. Composite risk stratification not available in 2017. For risk-adjusted data by facility for that year, see the Cardiovascular Surgery Data Addendum by Facility on page 52.

“BayCare cardiovascular surgeons are committed to providing the highest quality surgical care. Not only are in-hospital and 30-day mortality rates important, but also long-term freedom from further cardiovascular events.”

BayCare cardiovascular surgeons have utilized the internal mammary artery for CABG surgery in 100 percent of appropriate cases over the past several years. Use of a second arterial graft, either an additional internal mammary artery or a radial artery graft, is increasingly employed as a strategy by BayCare cardiovascular surgeons to enhance long-term freedom from repeat intervention and cardiovascular events.

Radial Artery Usage		
	STS Benchmark	BayCare
2016	5.1%	20.9%
2017*	5.0%	20.2%
2018	6.0%	25.7%

Higher percentage is optimal

### Isolated Aortic Valve Replacement

Two recent large multi-institutional studies showed that transcatheter aortic valve replacements (TAVR) are quite safe from an overall mortality and stroke rates standpoint in low-risk patients. There are still patients who need open standard aortic valve replacements (SAVR) and it is imperative that these are performed with very similar high standards. BayCare cardiovascular surgeons are proud that in 2018, 108 open SAVRs were completed with no mortalities and no strokes.

2018 Isolated Aortic Valve Replacement (AVR) Complications		
	STS Benchmark	BayCare
Mortality	1.9%	0.0%
Stroke	1.0%	0.0%

Lower percentage is optimal

\*Indicates non risk-adjusted data. Composite risk stratification not available in 2017. For risk-adjusted data by facility for that year, see the Cardiovascular Surgery Data Addendum by Facility on page 52.

### Surgical Treatment for Cardiac Arrhythmias

Surgical treatment for cardiac arrhythmias, typically atrial fibrillation, has become increasingly important within advanced cardiovascular surgery programs. Often these patients are treated in a comprehensive manner incorporating cardiovascular surgeons and cardiac electrophysiologists. Intraoperatively, surgeons have an ideal opportunity to treat atrial fibrillation with a Maze procedure or other type of ablation. Additionally, the left atrial appendage may be closed or occluded at the time of surgery to potentially reduce patient's stroke risk secondary to atrial fibrillation.

Arrhythmia surgery is commonly performed in conjunction with mitral valve repair or replacement, but can also be performed concomitantly with other valve surgery or CABG. BayCare's cardiovascular surgeons also perform a unique, hybrid approach for the treatment of atrial fibrillation. “Atrial fibrillation (AFib) is a major cause of morbidity and stroke in patients with cardiovascular disease. BayCare cardiovascular surgeons have made treatment of AFib a high priority in alignment with the recommendations of the major societies,” according to Dr. Andrew Sherman, chief of the department of cardiothoracic surgery at St. Joseph's Hospital. “A multidisciplinary approach provides patients with AFib an individualized treatment approach at the time of their other cardiac procedures and has been proven in recent literature to positively impact their life expectancy. A significant point of emphasis in the management of our shared patients with AFib involves closure of their left atrial appendage (LAA) for stroke prevention. BayCare has one of the highest volumes of minimally invasive approaches to LAA exclusion in the country.”

2018 Surgical Treatment of Arrhythmias	
	BayCare
Maze	81
PVI	75
Convergent	32
<b>Total</b>	<b>188</b>



## Advanced Structural Heart and Valve

### Structural Heart and Valve Disease Treatment

Team-based advanced treatment for structural heart and valve disease is available within BayCare. Several hospital facilities in Hillsborough, Pinellas and Polk counties have developed dedicated structural heart teams that specialize in the medical and surgical care of these cardiac problems. BayCare's structural heart and valve teams are comprised of physicians and health care providers from multiple heart and vascular specialties who have interest and expertise in the treatment of complex cardiac conditions.

According to Dr. Joshua Rovin, medical director of the Center for Advanced Valve and Structural Heart Care at Morton Plant Hospital, "Our program's success has been built upon the foundation of our experienced multidisciplinary heart team. We always strive to provide the right care at the right time for our patients, following the latest guidelines developed by our collective professional cardiology and cardiovascular surgical societies. Our teamwork and outcomes have allowed us to participate in multiple national research trials. Such trials provide us the opportunity to treat our patients with heart valve disease using the latest minimally invasive technologies."

These specialists are from the divisions of cardiovascular surgery, interventional cardiology, cardiac imaging and cardiac anesthesia. They work together to provide innovative heart treatment solutions and the best possible outcomes for patients with structural heart abnormalities. A large number of affiliated health care providers participate on the dedicated team as well, including nurses, physician assistants, advanced nurse practitioners and cardiac imagers. Structural heart disease may affect the heart muscle and the valves that regulate blood flow within the heart. Some structural heart abnormalities are congenital and others are the result of acquired heart disease. Many of these abnormalities ultimately result in congestive heart failure (CHF). Some of the most common conditions and their treatments are described in the Medical Terminology and Procedure Review section on page 55.

For information on BayCare's management and treatment of pediatric and adult congenital heart disease, see the Pediatric and Adult Congenital Heart section of this book on page 31.

BayCare's advanced structural heart and valve procedures include:

- Balloon aortic and mitral valvuloplasty
- Left atrial appendage closure
- Transcatheter patent foramen ovale (PFO) closure and atrial septal defect closure
- Transcatheter aortic valve replacement (TAVR)
- Transcatheter mitral valve repair (MitraClip™)
- Transcatheter mitral valve replacement (TMVR)
- Transcatheter paravalvular leak closure

**To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990**

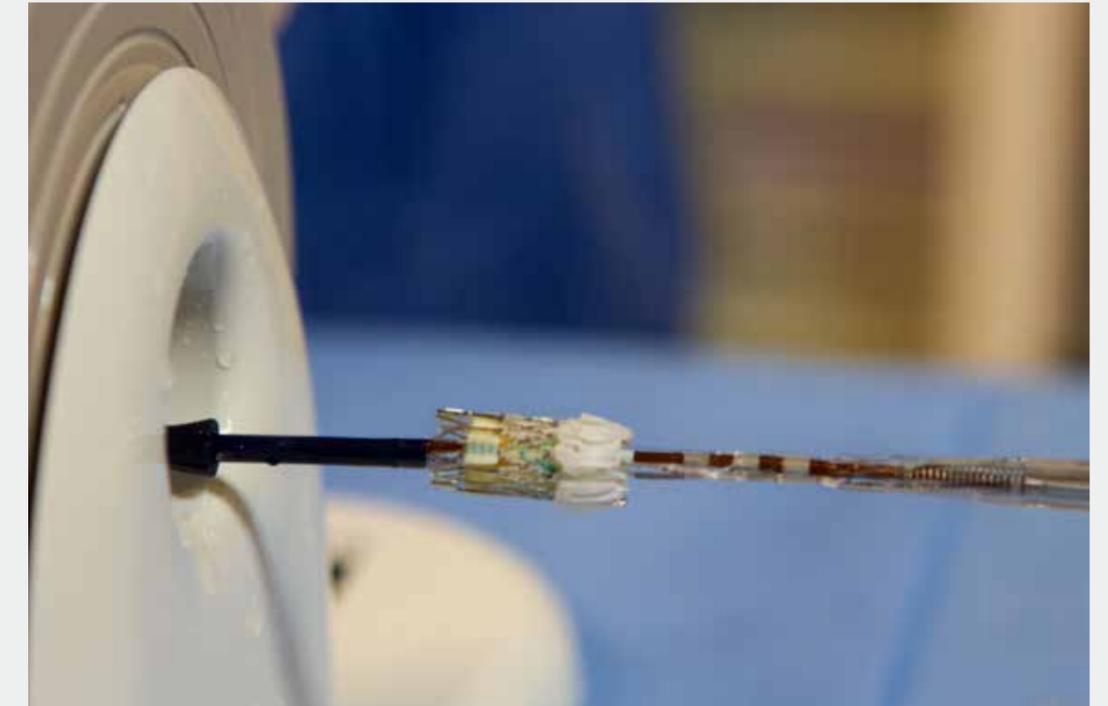


**A Closer Look:  
Transcatheter Aortic Valve Replacement (TAVR)  
in Low-Risk Patients**

Transcatheter aortic valve replacement (TAVR) has been utilized to treat patients with severe symptomatic aortic stenosis since 2012, beginning at BayCare's Morton Plant Hospital. Initially, TAVR was only utilized to treat the sickest patients that could not undergo open heart surgery.

Over the last several years, BayCare physicians have utilized TAVR to treat younger and healthier patients with severe aortic stenosis. Currently, the FDA has approved TAVR to treat patients who are too ill to undergo open surgical aortic valve replacement (SAVR), as well as patients who are at high-risk or intermediate risk for SAVR. However, nearly 60 to 70 percent of patients with severe, symptomatic aortic stenosis are considered to be low-risk candidates for SAVR and are not presently candidates for TAVR.

BayCare has been participating in the Medtronic Evolut TAVR trial for low-risk surgical patients since early 2016 at Morton Plant Hospital. We are very excited about the one-year low-risk trial data that was presented at the American College of Cardiology in March 2019. Data was presented from the two major low-risk TAVR trials and demonstrated that TAVR was at least equivalent to, if not better than, SAVR in these low-risk patients. The low-risk TAVR



group experienced less disabling stroke, shorter hospital stays and an initial better quality of life when compared with SAVR.

We believe these low-risk TAVR studies are real game-changers in the way that we will be treating patients with severe aortic stenosis in the near future. The excellent data generated by these trials will likely result in the approval of TAVR for low-risk patients by the FDA

but, in 2018, low-risk patients with severe symptomatic aortic stenosis could only be treated with TAVR by enrolling in the continued access low-risk trials at BayCare's Morton Plant Hospital.

### Surgical Innovation

Surgical innovation and advances in cardiovascular surgical care are paramount to the success of the BayCare cardiovascular program. Over the past seven years, BayCare hospitals, with the collaboration between cardiovascular surgeons and cardiologists, have implemented many new programs which have benefited many BayCare patients. Valve surgery, in particular, has been an area of rapid progression and growth. As an example, transcatheter valve surgery avoids a sternal incision, and most patients can be discharged home the day after their procedure.

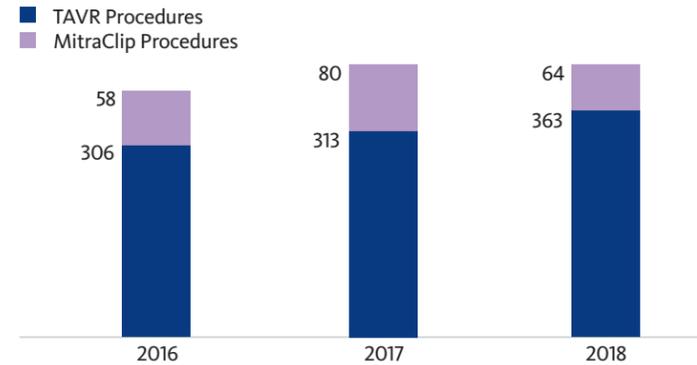
- Greater than fifty percent of all BayCare cardiovascular surgical and transcatheter cases involve valve surgery.
- One quarter of all BayCare cardiovascular cases are transcatheter-based.
- Nearly half of all BayCare valve procedures are currently performed by transcatheter approach.



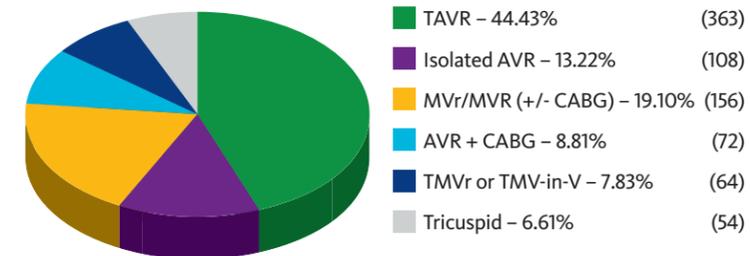
2018 TAVR 30-Day Outcomes (In hospital)	
	BayCare
	*N=363 (%)
All-cause mortality	1.96%
Major disabling stroke	1.12%
Access site vascular complications	1.68%

\*Includes research cases

#### A Look at Transcatheter Valve Volume



#### 2018 Valve Surgery and Transcatheter Therapy Breakdown



TAVR = Transcatheter aortic valve replacement; AVR = Aortic valve replacement; MVr = Mitral valve repair; MVR = Mitral valve replacement; CABG = Coronary artery bypass graft; TMVr = Transcatheter mitral valve repair; TMV-in-V = Transcatheter mitral valve in valve

### Case Study

An 83-year-old male presented with extreme shortness of breath and fatigue. Previously, the man had been very active. The man could now only walk 30 feet before needing to sit and catch his breath. He loved to mow his lawn and play golf several days a week. He also suffered from hypertension, peripheral vascular disease, chronic kidney disease and was very depressed over his current health status. After extensive testing, the heart team discovered the patient had not only severe aortic stenosis, but also severe blockages in his coronary arteries. Due to his complex, heavily calcified coronary anatomy, he couldn't safely undergo standard percutaneous coronary artery stenting, and due to the heavy calcium in his aorta, he couldn't undergo standard surgical replacement of his aortic valve. The structural heart team devised a plan to treat his coronary artery disease utilizing an open-heart coronary bypass technique and implantation of a TAVR valve via his groin artery during the same procedure. The patient underwent the combined TAVR and CABG procedure, remained in the hospital five days, had an uneventful recovery and was discharged home. At his follow-up appointment, the patient said he hasn't felt this great in years! He is participating in cardiac rehabilitation and making great progress.



## Arrhythmia

BayCare arrhythmia specialists are internationally recognized for their pioneering work in the field of clinical electrophysiology. For over 25 years, arrhythmia specialists at BayCare helped further the discipline of rhythm disorders by contributing to the body of literature supporting development of procedures, catheter design and ultimately the management of electrical disorders of the heart, and includes one of the only facilities to provide management of arrhythmia for both adults and pediatric patients.

Electrical disorders of the heart encompass a wide range of cardiac diseases. The discipline of electrophysiology involves the diagnosis of arrhythmia using diagnostic equipment which includes tilt table testing, ambulatory monitoring, cardiac imaging using sophisticated equipment including 3-D reformatting of MRI, CT and ultrasound, and invasive testing in the form of catheter-based electrophysiology studies.

Symptoms of arrhythmia can range from the most obvious which include syncope, chest pain, dizziness, symptoms of stroke and palpitations, to the more subtle, such as exertion fatigue and in some cases, no symptoms at all.

“The treatment of cardiac arrhythmias is continuously evolving. At BayCare, our Rhythm specialists collaborate on a scale not often seen in today’s health care environment. Through sharing of ideas, techniques and the latest research, BayCare physicians provide cutting-edge treatments and evidence-based care for patients,” according to Dr. Rodrigo Bolaños, medical director of electrophysiology at Winter Haven Hospital. “The collective procedural experience of our physicians combined with a collaborative ‘team approach’ allows the BayCare Rhythm team to deliver unmatched patient care across our communities and beyond.”

Common arrhythmia disorders and the procedures that manage them are listed in the Medical Terminology and Procedure Review section of this book on page 55. For volume related to surgical management of arrhythmias, see the Cardiovascular Surgery section of this book on page 5.

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*“The collective procedural experience of our physicians combined with a collaborative ‘team approach’ allows the BayCare Rhythm team to deliver unmatched patient care across our communities and beyond.”*

*~ Dr. Rodrigo Bolaños  
Medical Director,  
Electrophysiology at  
Winter Haven Hospital*

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## A Closer Look: Arrhythmia Device Therapy

### Device Therapy

A critical component of cardiac arrhythmia management is device therapy. It includes implantable cardioverter defibrillators (ICDs), pacemakers and implantable cardiac rhythm monitoring devices (ILR or implantable loop recorders). There has been momentous advancement in device therapy over the past decade. Dr. Vaibhav “AJ” Moondra, clinical cardiac electrophysiologist at Morton Plant Hospital, notes, “BayCare has kept up with the advancements in an effort to provide our patients with the ‘latest and greatest’ technology. In addition, we offer devices from all the major vendors, which allows the electrophysiologist to tailor the device to the patient’s needs.” Examples of this technology include MRI compatibility, leadless pacemakers, sub-cutaneous ICDs and His bundle pacing. BayCare’s cardiac arrhythmia programs have extensive experience in the implantation and management of these new devices.

### Leadless Pacemaker

Traditional pacemakers have two components: a generator (battery) and a lead. The generator is implanted in the subclavicular region and connected to the lead, which is advanced to the ventricle via the left upper venous system. Leadless pacemakers have now combined the battery and lead into a single unit which is roughly the size of a double AA battery. This unit is then delivered to the right

ventricle via delivery sheath through the right femoral vein. Currently, the leadless pacemaker is only available for ventricular pacing.

### Subcutaneous ICD

Traditional ICD devices are implanted similarly to traditional pacemakers, with a battery and a transvenous lead. Subcutaneous ICDs have the advantage of not utilizing the vascular space to implant the ICD lead. This is particularly useful in patients who don’t have vascular access, patients who are high risk for infection, or younger patients who’ll require multiple generator replacements in their lifetime.

### His Bundle Pacing

This exciting new technology has come to fruition over the past few years and will probably take over traditional ventricular pacing in the future. Patients who require frequent ventricular pacing are at high risk for developing pacing-induced cardiomyopathy. This occurs because the activation of the right and left ventricle occur sequentially rather than simultaneously. With His bundle pacing, the right ventricular lead is placed into the His bundle with conduction progressing down the right and left ventricle simultaneously, so as to mimic normal conduction and preserve synchrony. Biventricular pacing is similar but requires two leads—one in RV and one in LV.

### BayCare’s arrhythmia programs include:

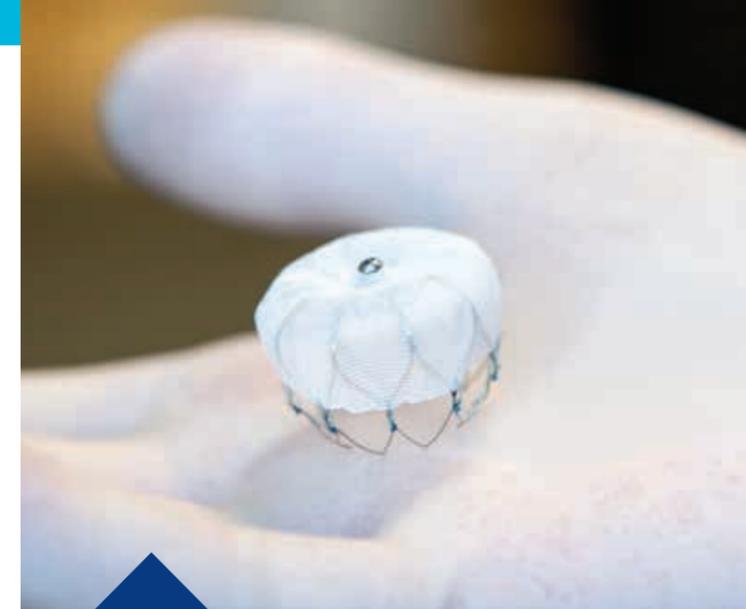
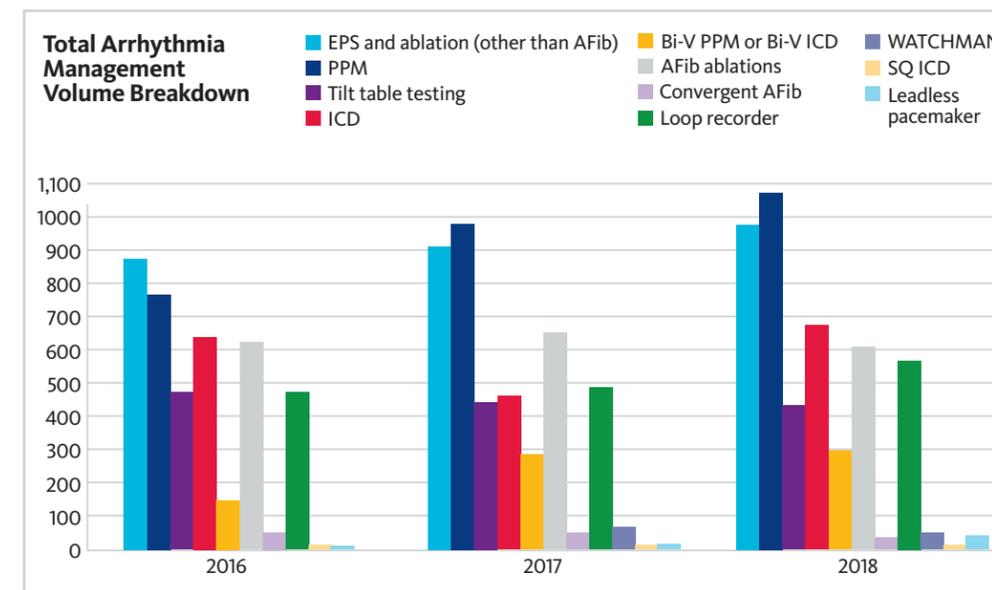
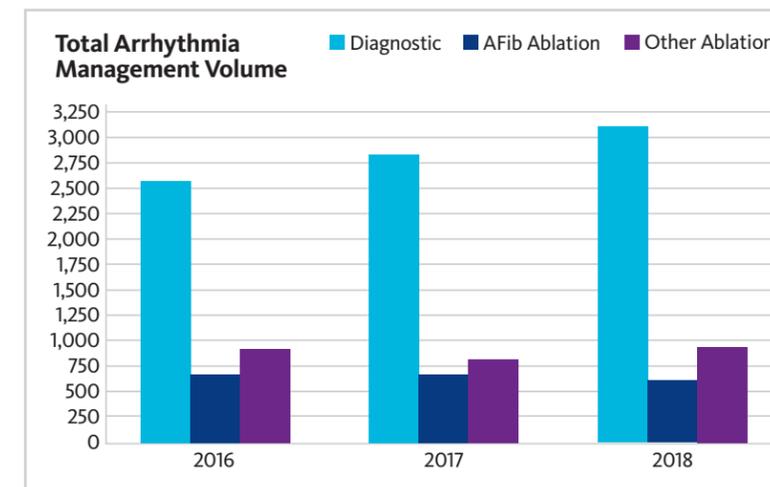
- Management of complex arrhythmia using ultrasensitive 3-D mapping
- AFib ablation (*pulmonary vein isolation*) using radiofrequency and cryoballoon
- Hybrid AFib ablation for advanced AFib
- VT/VF ablation with hemodynamic assist
- Left atrial occlusion/ligation
- Surgical Maze procedure
- Convergent hybrid Maze

### Cardiac rhythm management (CRM) device implants include:

- Diagnostic EP studies as part of implantation
- Transvenous and subcutaneous implantable cardioverter defibrillators (ICD)
- Biventricular and His bundle pacing
- Injectable loop recorders
- Permanent and leadless pacemakers (PPM)
- Tilt table testing
- Lead extraction and venoplasty

Information on BayCare’s management and treatment of pediatric and adult congenital heart disease can be found in the Pediatric and Adult Congenital Heart section of this book on page 31.

### A Look at Volume



### Case Study

An 82-year-old male presented with persistent atrial fibrillation. Past medical history included anemia, hyperlipidemia, hypertension, diabetes mellitus, coronary artery disease and pancytopenia with a platelet count of 49,000. Related to his long-standing history of atrial fibrillation, and a CHA2DS2-VASc score of 5, he would require oral anticoagulation to protect against potential thromboembolic events. Oral anticoagulation with a vitamin K antagonist or a direct oral anticoagulant hadn’t been pursued due to pancytopenia. Subsequently, he was referred to the structural heart valve clinic for consideration of left atrial appendage (LAA) closure. The heart team evaluation deemed the patient an appropriate candidate for LAA with the WATCHMAN device and the procedure was performed successfully. A 45-day postoperative transesophageal echocardiogram confirmed the device was well seated without any para-device leak, and anticoagulation was discontinued.



## Percutaneous Coronary Intervention

The landscape of coronary disease treatment is changing and evolving rapidly with more complex diseases being treated with percutaneous techniques. Examples of innovative procedures and technologies include the use of long, drug-eluting stents that provide excellent long-term patency rates, the ability to open arteries that have been occluded chronically and the ability to support the failing heart muscle with different percutaneous devices (*i.e. Impella*). “Ischemic heart disease commonly places real people into emergency situations. These are serious, unexpected and dangerous events that require immediate action. BayCare is proud to present its metrics as part of a global strategy to hone the skills needed to preserve life and health,” said Dr. David Kohl, clinical leader for percutaneous coronary intervention at BayCare and interventional cardiologist at St. Anthony’s Hospital.

Angioplasty, or percutaneous coronary intervention (PCI), is performed at Bartow Regional Medical Center, Mease Countryside Hospital, Morton Plant Hospital, Morton Plant North Bay Hospital, St. Anthony’s Hospital, St. Joseph’s Hospital, St. Joseph’s Hospital-North, St. Joseph’s Hospital-South, South Florida Baptist Hospital

and Winter Haven Hospital. In addition, Mease Countryside Hospital, Morton Plant Hospital, Morton Plant North Bay Hospital, South Florida Baptist Hospital, St. Anthony’s Hospital, St. Joseph’s Hospital, St. Joseph’s Hospital-North, St. Joseph’s Hospital-South and Winter Haven Hospital are also STEMI receiving centers.

Cardiac catheterization procedures can be done by advancing catheters through the radial artery in the wrist as well as the femoral artery in the peripheral groin area. Radial procedures have been linked to a decrease in length-of-stay and bleeding risks, and a shorter duration of bedrest after a catheterization procedure. Many of the physicians within these hospitals are able to perform radial procedures when appropriate.

**BayCare’s PCI procedures include:**

- Diagnostic coronary angioplasty
- Diagnostic peripheral angioplasty
- Mechanical support in cardiogenic shock
- Percutaneous coronary intervention (PCI)
- Peripheral vascular intervention (PVI)

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*“BayCare is proud to present its metrics as part of a global strategy to hone the skills needed to preserve life and health.”*

*~ Dr. David Kohl  
Clinical Leader for  
Percutaneous Coronary  
Intervention at BayCare  
and Interventional  
Cardiologist at  
St. Anthony’s Hospital*

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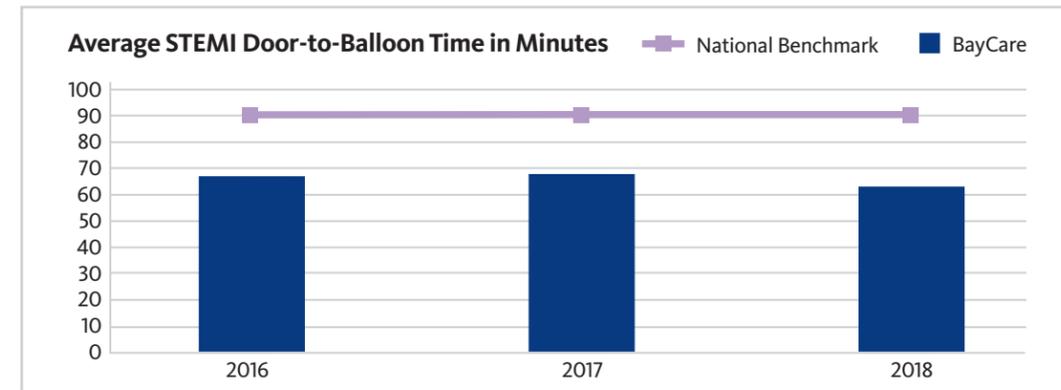
### A Look at Volume

PCI Volume			
	2016	2017	2018
PCI volume	5,187	5,262	5,873
Total peripheral vascular intervention volume	2,511	1,797	3,315
Diagnostic cath lab volume	12,254	11,936	12,201

The cardiac catheterization, percutaneous coronary intervention (PCI) and peripheral intervention volumes included in this year's outcomes book reflect cases performed in the cardiac catheterization labs throughout BayCare. These volumes include a variety of procedures that address a multitude of diseases both chronic and acute in nature.

The PCI procedures include the treatment of coronary artery disease by angioplasty, stenting and atherectomy. Many of the peripheral intervention procedures include the treatment of peripheral vascular disease by thrombectomy, angioplasty, stenting and/or catheter-directed thrombolysis to improve quality of life, relieve pain, and in more advanced cases, for limb salvage. These procedures can be performed using a variety of access points including femoral, popliteal and pedal vessels, depending on the lesion being addressed.

### A Look at Quality

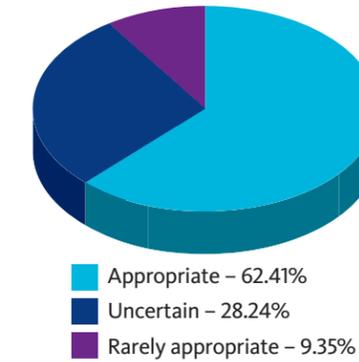


Dr. Lang Lin, co-director, STEMI Program at Morton Plant Hospital, notes "In STEMI care, 'time is heart muscle.' Timely intervention in opening a clotted or closed artery is essential for short- and long-term outcomes and decreased mortality and morbidity. Moreover, "STEMI treatment has improved in the BayCare system and in the United States as a whole," states Dr. David Kohl, clinical leader for percutaneous

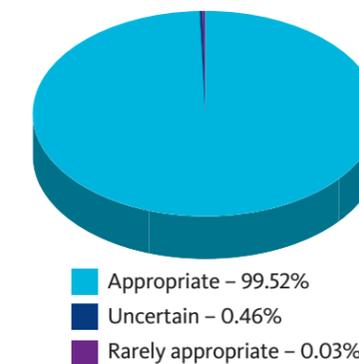
coronary intervention at BayCare. "Close attention to process is essential. Use of pre-hospital ECGs, median first medical contact to device time, and adjusted mortality excluding patients with known cardiac arrest, have all improved significantly over the past five years. At BayCare, we continually strive to improve our process and outcomes, which in turn improves the quality of care we're able to give our patients."

**To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990**

### 2018\* Proportion of Evaluated PCI Procedures Without Acute Coronary Syndrome



### 2018\* Proportion of Evaluated PCI Procedures With Acute Coronary Syndrome



**Appropriate:** Meets ACC/NCDR guidelines for performing PCI  
**Uncertain:** Currently insufficient evidence  
**Rarely Appropriate:** Not generally acceptable

\*Data is through Q1 2018 only.



Initial angiogram



Intra-procedure with wires crossed lesions and balloon inflation



Post-procedure results

### Case Study

A 78-year-old woman presented to the hospital several days after a myocardial infarction with congestive heart failure and post-infarction angina. At catheterization, she was found to have occlusion of the dominant circumflex coronary artery with left ventricular systolic dysfunction and severe mitral regurgitation secondary to papillary muscle dysfunction. In addition, there was a severe bifurcation lesion at the level of the left anterior descending and the diagonal arteries. A heart team approach was taken. After thorough discussion, the team proceeded with a MitraClip and then Impella-assisted PCI. These two procedures were accomplished in a staged fashion, with a very good clinical result and a grateful patient.



## Heart Failure

Heart failure is any condition in which the heart is unable to supply the body with needed oxygen and nutrients. Many patients with heart failure also have other conditions such as coronary disease, chronic obstructive pulmonary disease (COPD), diabetes, kidney disease and arrhythmia, which further complicate management. BayCare offers comprehensive care for patients with heart failure, whether they're admitted to one of our hospitals, at home or at a skilled nursing facility.

“The number of people with heart failure continues to increase every year and the challenge of caring for them is often more than a single doctor can handle. BayCare Heart Function Clinics were designed to offer a team of cardiologists, cardiac surgeons, nurse specialists and other medical professionals who work collaboratively with primary care providers to deliver all the care heart failure patients need in a well-coordinated manner,” said Dr. Augustine Agocha, medical director of the Heart Function Clinic at St. Joseph's Hospital.

The Heart Function Clinics specialize in the management of heart failure at all stages and from all causes. The clinics serve the needs of patients with secondary heart failure due to other medical conditions as well as heart failure from primary heart muscle diseases (cardiomyopathy).

The Heart Function Clinic network allows BayCare to offer optimal and consistent care to heart failure patients across our entire system. BayCare Heart Function Clinics are located on the campuses of Mease Countryside Hospital, Morton Plant Hospital, St. Anthony's Hospital, St. Joseph's Hospital, St. Joseph's Hospital-North, South Florida Baptist Hospital and Winter Haven Hospital.

### Additional services offered are:

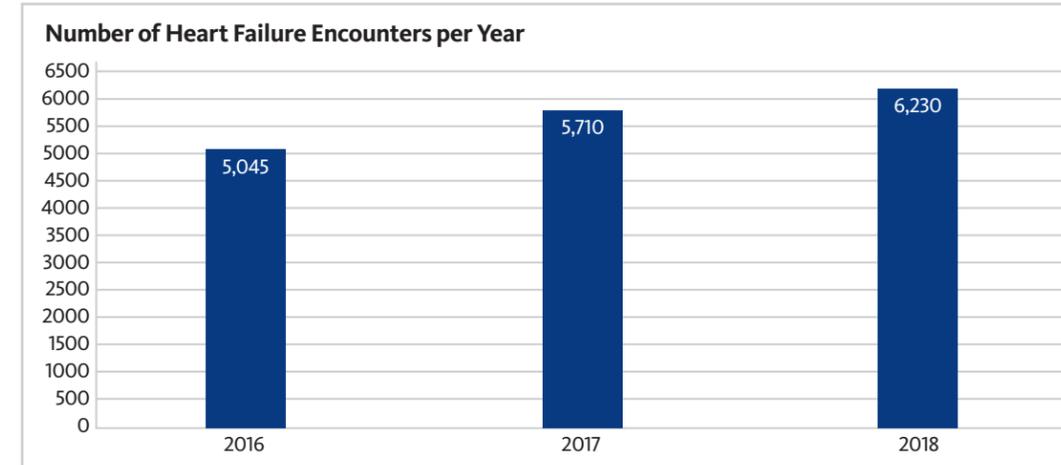
- Comprehensive evaluation for cause of cardiomyopathy
- Emergency room care follow up
- Inpatient continuity of care and transition management
- Team-based longitudinal outpatient care
- Coordination of home-based care and monitoring
- Coordination of multiple chronic condition care
- Home infusion therapy
- Device therapy management
- Hospital readmission risk management
- Opportunity to participate in clinical research trials
- Access to support groups for patients and caregivers

**To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990**

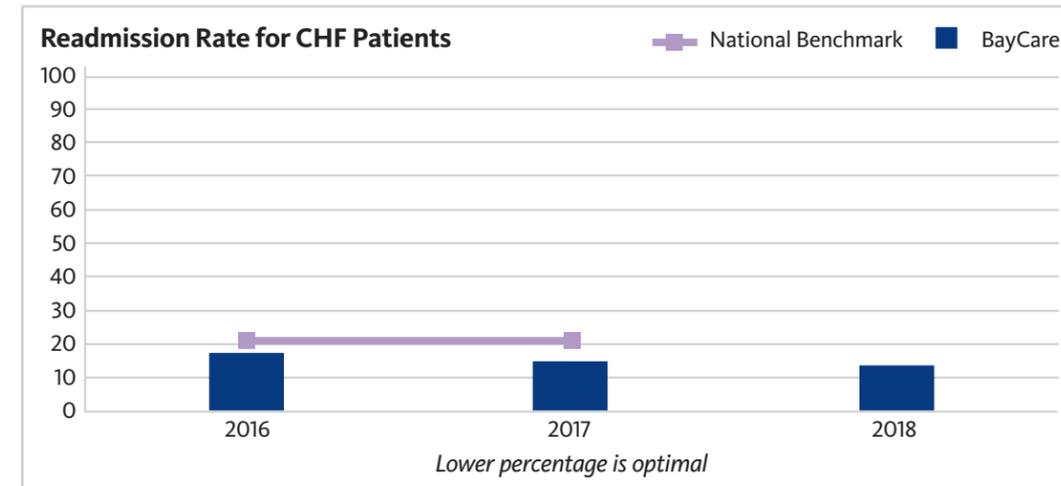
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~ Dr. Augustine Agocha  
Medical Director,  
Heart Function Clinic  
at St. Joseph's Hospital

### A Look at Volume



### A Look at Quality



### A Closer Look: BayCare's Ventricular Assist Device (VAD) Program

Heart failure is an epidemic in the United States with an estimated 5.7 million Americans living with this diagnosis. As the population ages, 650,000 new cases are diagnosed annually and that number continues to rise. Even more sobering, about half of the people who develop heart failure will die within five years of their diagnosis. Because of this, many medical and surgical therapies are being developed to help patients with this disease.

Advanced heart failure is defined as those patients who, despite our goal-directed medical therapy, continue to have recurrent episodes of heart failure and require hospitalization. These are some of the most difficult patients to help, as medications no longer work to help their hearts pump effectively. That's why left ventricular assist devices (LVAD) were developed.

The LVAD is an implantable pump attached to the heart that takes over the work of the main pumping chamber, the left ventricle. By doing so, the LVAD functions to increase blood delivery to the body, which was lacking prior to implantation. With adequate blood flow, the patient feels better, may live longer and more importantly, live better. A LVAD works similar to a jet engine. Blood is drawn into the pump from the heart where it then passes through a magnetically levitated rotor



Anterior view of an implanted VAD and a dual chamber ICD

and is ejected through a graft connected to the aorta. It receives power from a driveline that comes out from a very small area in the patient's abdomen. The driveline can be connected to batteries that allow the patient to go anywhere they wish. Patients can continue to live the life they want without being limited by heart failure.

BayCare's Advanced Heart Failure program at St. Joseph's Hospital offers comprehensive heart care that includes LVAD implantation and care. According to Dr. Michael Bradner, surgical director, mechanical circulatory support team at St. Joseph's Hospital, "LVAD is an amazing technology and to be able to offer it to patients in the community is a fantastic achievement. It's BayCare's mission to provide the best therapies we have to offer to improve the quality and longevity of life."

### Guidelines for LVAD referral:

- NYHA class III/IV
- One or more hospitalizations in the past six months
- Significant functional limitation despite maximum medical therapy
  - Diuretic dose > 1.5mg/kg/day or routine thiazide
  - Reduction in ACE inhibitors/ARBs or beta blocker due to hypotension
- Heart disease not amenable to surgical correction, refractory angina or life-threatening arrhythmia despite maximum medical therapy/surgical modalities; CRT non-responders
- Na <136
- BUN >40 or Cr >1.5 in setting of low LVEF
- Peak VO<sub>2</sub> <14 or 50% of predicted for age
- Pulmonary systolic pressure >45mmHg
- Pulmonary resistance >3 Woods units
- Hematocrit <35%



## Pediatric and Adult Congenital Heart

BayCare is home to Tampa Bay's only comprehensive congenital heart disease (CHD) center capable of delivering full-spectrum care for the CHD patient from conception to late adulthood. This unique program is located on the campus of St. Joseph's Children's Hospital in Tampa. In 2018, the Adult Congenital Heart Association awarded the Tampa Bay Adult Congenital Heart Center at St. Joseph's Hospital the status of ACHD Accredited Comprehensive Care Center.

Developed in collaboration with the Children's Hospital of Pittsburgh, the center's congenital surgical program is a leader in patient volume, surgical outcomes, early extubation and short length of stay. Surgical planning often begins at fetal diagnosis, allaying family anxiety and ensuring that parents know what to expect when their child is born. Throughout the CHD center and programs, there's a strong belief in quality, excellence and transparency. The CHD center actively participates in various National Databases for Quality Improvement and Benchmarking, including Society of Thoracic Surgeons Congenital Heart Surgery Database (STS CHSD), Improving Pediatric and Adult Congenital Treatment (IMPACT), and Extracorporeal Life Support Organization (ELSO).

The physicians at the CHD center specialize in the care of patients with congenital heart disease at all ages, including but not limited to the following conditions:

- Aortic stenosis, mitral stenosis
- Atrioventricular septal defect
- Coarctation of the aorta
- Complex single ventricle
- Ebstein's anomaly
- Hypoplastic left heart syndrome
- Pulmonary and tricuspid valve atresia
- Pulmonary stenosis
- Shone's syndrome
- Tetralogy of Fallot
- Transposition of Great Arteries

### Services and procedures include:

- Specialized pediatric/congenital cardiology services treating a wide range of patients with mild to complex heart conditions
- Cardiac catheterization designed especially for children and adults utilizing a less invasive alternative for some heart conditions. The

catheterization laboratory is one of the most widely used congenital laboratories in Florida, performing over 460 procedures annually, most of which are interventions. Some procedures include:

- Angioplasty
- Atrial septal defect (ASD) device closure
- Atrial septostomy
- Balloon valvotomy
- Coil embolization
- Electrophysiology studies with/without ablation
- Implantable cardioverter defibrillators (ICD) and pacemakers
- Patent ductus arteriosus (PDA) device closure, including newborns weighing less than 2kg
- Pulmonary valve insertion (Melody® valve, Sapien valve)
- Radiofrequency and cryoablation (often without fluoroscopy)
- Stent implantation
- Ventricular septal defect (VSD) device closure

### A Closer Look: Adult Congenital Heart Program Accreditation

BayCare's St. Joseph's Hospital is the first in the region and second facility in Florida to earn accreditation from the Adult Congenital Heart Association (ACHA) in recognition of its expertise in serving adults with congenital heart disease. ACHA is a nationwide organization focused on connecting patients, family members and health care providers to form a community of support and a network of experts with knowledge of congenital heart defects.

Individuals born with a congenital heart defect (CHD), the most common birth defect diagnosed in one in 100 births, are living longer now than ever. Currently, there are 1.4 million adults in the United States living with one of many different types of congenital heart defects, ranging among simple, moderate and complex.

St. Joseph's Hospital received accreditation for its Adult Congenital Heart Program by meeting ACHA's criteria, which includes medical services and personnel requirements, and going through a rigorous accreditation process, both of which were developed over a number of years through a collaboration with doctors, physician assistants, nurse practitioners, nurses and adult CHD patients.

#### ■ Pediatric cardiac imaging including:

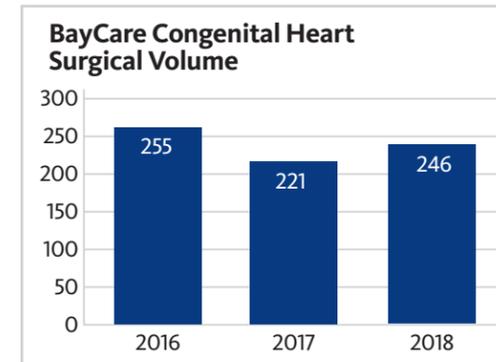
- Echocardiology laboratory: The first accredited center for transthoracic, transesophageal and fetal echocardiography in West Central Florida by the Intersocietal Accreditation Commission (IAC)
- Fetal echocardiology
- 3-D echo

#### ■ Pediatric and adult congenital cardiovascular surgery serving children and adult congenital heart patients. Some offered procedures include:

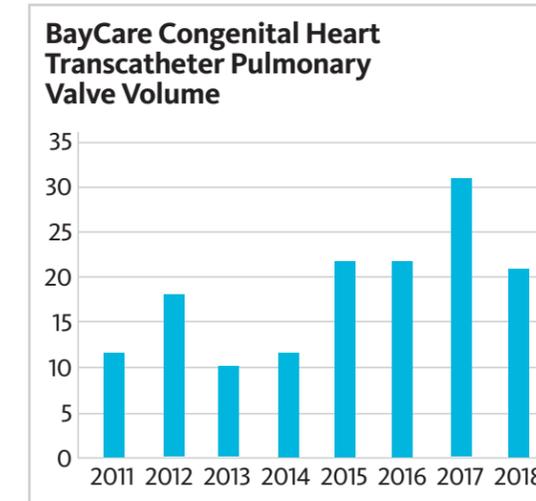
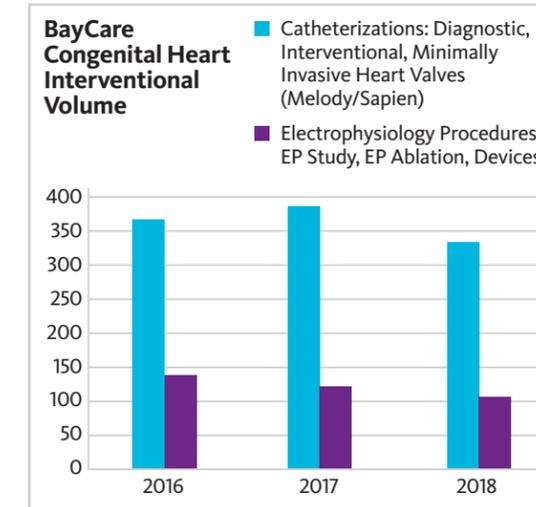
- Arterial switch
- Atrioventricular septal defect repair
- Complex valve repair
- Fontan procedure and Fontan conversion
- Hybrid, palliation and repair of hypoplastic left heart syndrome (HLHS) and single ventricle heart disease
- Tetralogy of Fallot (TOF) and TOF with pulmonary atresia repair
- Various hybrid procedures

- Pediatric and adult congenital cardiac anesthesiology serving the particular needs of congenital heart patients including early extubation and pain management that may include more favorable cardiac performance, reduced length of ICU and hospital stay, and a lower rate of ventilator associated respiratory infections. Greater than 60 percent of our congenital heart patients leave the operating room without a breathing tube.

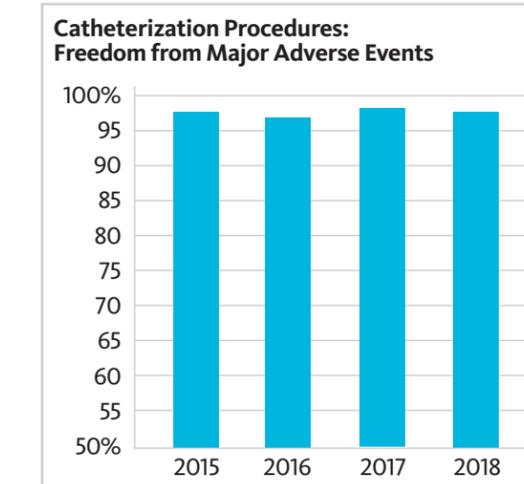
### A Look at Volume



### A Look at Volume



### A Look at Quality for 2015-18



Major adverse events as defined by IMPACT.

Patient Group	BayCare	STS Benchmark
STAT 1	0.0%	0.4%
STAT 2	0.9%	1.5%
STAT 3	1.5%	2.3%
STAT 4	6.2%	6.4%
STAT 5	11.1%	14.4%

Based on discharged patients. Lower percentage is optimal

**What is a STAT group?** Data is subdivided into five different groups depending on the level of risk. STAT Category 1 is associated with the lowest and STAT Category 5 is associated with the highest risk of mortality.

Patient Group	BayCare	STS Benchmark
STAT 1	3	7
STAT 2	4	21
STAT 3	5	16
STAT 4	11	27
STAT 5	26.5	45

LOS is expressed as a median in days. Fewer days is optimal.

BayCare	STS Benchmark
2.0%	2.9%

Lower percentage is optimal

Extubated in the OR	BayCare	STS Benchmark
All Patients	69.2%	24.8%
Neonates	13.9%	3.2%
Infants	63.2%	16.8%

Higher percentage is optimal



### Case Study

The patient was a 35-year-old male with a history of congenital aortic valve regurgitation (*likely bicuspid aortic valve*) and previous aortic valve replacement with pulmonary artery autograft, coronary artery reimplantation onto neo-aorta, and pulmonic valve replacement with a cadaveric allograft right ventricle-pulmonary artery (RV-PA) conduit (*Ross procedure*). He had multiple emergency department visits at local hospitals in the area for complaints of chest pain without any interventions being done. He eventually presented to our emergency center and had his initial consultation with the adult congenital heart disease team member due to continued chest pain and increasing dyspnea on exertion and while at rest. He underwent a diagnostic right and left heart catheterization by one

of our congenital cardiac interventionists, revealing conduit obstruction, complete left coronary artery (LCA) obstruction with collateralization from right coronary artery (RCA), biventricular dysfunction, mild aortic insufficiency and dilated aortic root. It was recommended the patient undergo RV-PA conduit change with an LCA bypass graft. The patient successfully underwent open-heart surgery to complete a RV-PA conduit replacement, as well as coronary artery bypass graft (CABG) by direction of our congenital cardiothoracic surgery team with assistance from the adult cardiothoracic surgery team. The patient is currently free of the symptoms that brought him to the hospital and is back at work and enjoying life with his wife and kids.

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*“While medical advances have made it possible for more patients with CHDs to survive into adulthood, it can be difficult for these individuals to find an adult cardiologist with the expertise to treat what was once considered only a childhood disease. The collaboration between our pediatric and adult cardiology specialists provides an easy transition between childhood and adult services for our patients with congenital heart disease.”*

~ Dr. Joel Hardin  
Adult Congenital Heart Disease Cardiologist  
St. Joseph's Hospital

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## Cardiac Rehabilitation

Cardiac rehabilitation programs are comprehensive inpatient and outpatient services involving supervised exercise, cardiac risk factor modification, nutritional planning, education and counseling. The goal is to limit the physiological and psychological effects of coronary artery disease, reduce the risk of sudden death and stabilize or reverse the atherosclerotic process. Each patient is assessed and an individual treatment plan is developed to help the patients reach their goals.

Cardiac rehabilitation is a Class 1 recommendation from the AHA and ACC for patients who have experienced a

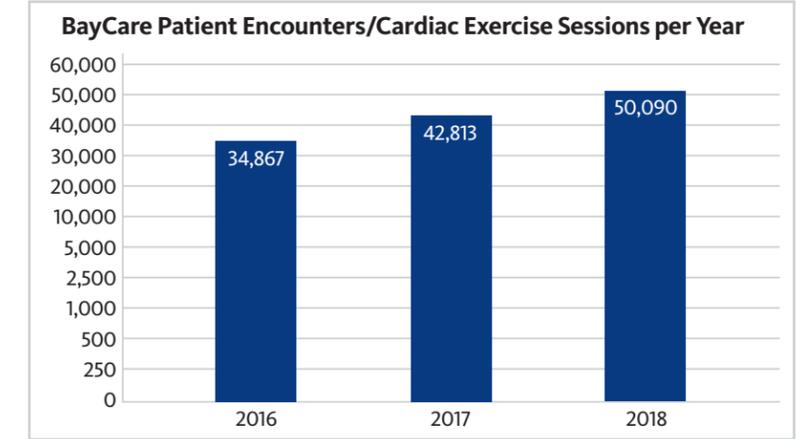
cardiac event. It's recognized as an integral component of the continuum of care for patients with cardiovascular disease.

### Diagnosis indicated for enrollment include:

- Myocardial infarction (MI)
- Percutaneous coronary intervention (PCI)
- Coronary artery bypass grafting (CABG)
- Valve repair/replacement
- Stable angina
- Heart transplant
- Heart failure

BayCare's cardiac rehabilitation programs are some of the largest in the country, offering seven locations covering a four-county area. Many of our programs are nationally certified by the American Association of Cardiovascular Pulmonary Rehab (AACVPR) and the staff are certified cardiac rehab professionals (CCRP). They have experience working with the patients who have internal cardiac defibrillator (ICD), LifeVest, sudden death syndrome (SDS), postural orthostatic syndrome (POTS) and heart failure (HF).

### A Look at Volume



Includes some volumes from programs currently working toward certification

*“A crucial component to the long-term successful outcome of the cardiovascular patient is participation in cardiac rehab. BayCare’s cardiac rehab programs have a well-established track record in improving both physical and psychosocial status in our patients.”*

~ Dr. Vanessa Lucarella  
 Medical Director, Cardiac Rehabilitation  
 Morton Plant Hospital



## Research and Clinical Trials: Currently Enrolling

Clinical research makes the latest scientific discoveries available to the BayCare community long before they become available to the general public.

Kimberly Guy, senior vice president, market leader for Hillsborough and southeast Pasco counties and leader of the cardiovascular service line across BayCare, acknowledges, “Research is a critical component of improving our community’s cardiovascular health. BayCare’s commitment to advancing new treatments encourages collaboration across clinical care teams and assures our patients have access to the most current treatments.”

According to Dr. Leslie Miller, medical director of the Heart Function Clinic at Morton Plant Hospital, “Without research, all of the important advances in medicine that we now depend on would be just observations in a laboratory. Participating in research studies is easy to do and accelerates the availability of new advances in treating common diseases not only to those who are in the trials today, but their children as well. We want to make BayCare a center for research, invite the community to learn about the research going on now, and demonstrate support for this important way to enhance the well-being of all those in the communities we serve.”

BayCare facilities currently participate in a multitude of clinical research trials for cardiovascular care. The following are the enrolling trials and the current participating facilities:

### **Advanced Structural Heart and Valve**

#### **Medtronic Transcatheter Aortic Valve Replacement in Low-Risk Patients (Evolut Trial)**

*Participating facility: Morton Plant Hospital*

The study objective is to demonstrate that the safety and effectiveness of the Medtronic TAVR system as measured by rates of all-cause mortality or disabling stroke at two years is non-inferior to SAVR in the treatment of severe aortic stenosis in subjects who have a low predicted risk of operative mortality for SAVR.

#### **Medtronic BICUPSID Low-Risk Study**

*Participating facility: Morton Plant Hospital*

Transcatheter aortic valve replacement (TAVR) with Medtronic TAVR system in patients with severe bicuspid aortic valve stenosis and at low-predicted risk of mortality with surgical aortic valve replacement (SAVR).

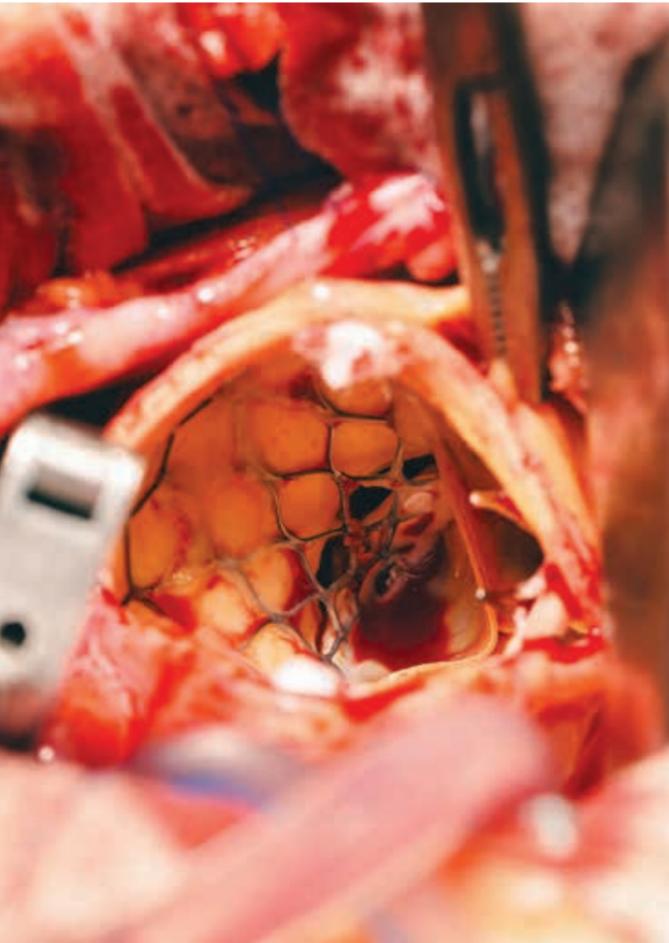
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*~ Dr. Leslie Miller  
Medical Director,  
Heart Function Clinic at  
Morton Plant Hospital*

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**For more information on our cardiovascular research and clinical trials: (844) 344-1990**



**PORTICO IDE/Portico Re-Sheathable Transcatheter Aortic Valve System US IDE Trial**

*Participating facility: Morton Plant Hospital*

The PORTICO clinical trial is a prospective, multicenter, randomized, controlled clinical study, designed to evaluate the safety and effectiveness of the SJM Portico transcatheter heart valve and delivery systems (*Portico*) via transfemoral and alternative delivery methods.

**APOLLO Trial: Transcatheter Mitral Valve Replacement with the Medtronic Intrepid™ TMVR System in Patients with Severe Symptomatic Mitral Regurgitation**

*Participating facility: Morton Plant Hospital*

Multicenter, global, prospective, randomized, interventional, pre-market trial. Subjects will be randomized on 1:1 basis to either TMVR with the Medtronic Intrepid™ TMVR system or to conventional mitral valve surgery. Subjects ineligible for randomization may be enrolled through a single-arm trial. Subjects enrolled in the single-arm cohort will be assigned to TMVR with the Medtronic Intrepid™ TMVR system.

**REPRISE IV: REpositionable Percutaneous Replacement of Stenotic Aortic Valve through Implantation of LOTUS Edge Valve System in IntermediatE Surgical Risk Subjects**

*Participating facility: Morton Plant Hospital*

To evaluate safety and effectiveness of the LOTUS Edge™ Valve System when used with the Lotus™ or iSleeve™ Introducer Sets for transcatheter aortic valve replacement (TAVR) in symptomatic subjects with severe aortic stenosis who are considered at intermediate risk for surgical valve replacement including those who have a bicuspid native valve.

**Arrhythmia**

**Product Surveillance Registry**

*Participating facilities: Mease Countryside Hospital and Morton Plant Hospital*

The purpose of this study is to provide continuing evaluation and periodic reporting of the safety and effectiveness of Medtronic market-released products. The Registry data is intended to benefit and support the interests of patients, hospitals, clinicians, regulatory bodies, payers and industry by streamlining the clinical surveillance process and facilitating leading edge performance assessment via the least burdensome approach.

**Percutaneous Coronary Intervention**

**XIENCE 28 Study**

*Participating facilities: Mease Countryside Hospital, Morton Plant Hospital, Morton Plant North Bay Hospital*

The objective of this trial is to evaluate safety of 28-day dual antiplatelet therapy (DAPT) in subjects at high risk of bleeding (HBR) undergoing percutaneous coronary intervention (PCI) with XIENCE.

**XIENCE 90 Study**

*Participating facilities: Mease Countryside Hospital, Morton Plant Hospital, Morton Plant North Bay Hospital*

The objective of this trial is to evaluate safety of three-month dual antiplatelet therapy (DAPT) in subjects at high risk of bleeding (HBR) undergoing percutaneous coronary intervention (PCI) with XIENCE.

**Heart Failure**

**CARDIAMP Heart Failure Trial**

*Participating facility: Morton Plant Hospital*

Randomized controlled pivotal trial of autologous bone marrow cells using the CardiAMP system in patients with post-myocardial infarction heart failure

**CONNECT HF**

*Participating facilities: St. Joseph's Hospital and Winter Haven Hospital*

This trial will be a large-scale, pragmatic, cluster-randomized clinical trial to evaluate the effect of two quality improvement (QI) initiatives compared with usual care on heart failure (HF) outcomes and HF quality of care metrics in the year following discharge for participants hospitalized with acute HF and reduced ejection fraction (EF).

**Emperor Reduced and Preserved EF Trials**

*Participating facility: Mease Countryside Hospital*

Two phase III randomized, double-blind trials to evaluate efficacy and safety of once daily empagliflozin 10mg compared to placebo, in patients with chronic heart failure with either reduced ejection fraction (HFrEF) or preserved ejection fraction (HFpEF).



**RELIEVE HF: REducing Lung congestIon symptoms using the v-wave shunt in adVancEd Heart Failure**

*Participating facility: Morton Plant Hospital*

This is a prospective, multi-center, 1:1 randomized, patient and observer blinded clinical study, with a Shunt Treatment arm and a non-implant Control arm. A total of approximately 400 patients will be randomized. Patients will be blinded during follow up for a minimum of 12 months to a maximum of 24 months. Control patients will have the opportunity to receive a shunt once unblinded, if they provide consent and continue to meet inclusion/exclusion criteria. All implanted patients will be followed for a total of five years from the time of the study device implantation.

**GUIDE-HF**

*Participating facility: Morton Plant Hospital*

This clinical trial is intended to demonstrate the effectiveness of the CardioMEMS™ HF system in patients with New York Heart Association (NYHA) class II, III, or IV heart failure (HF) who have an elevated N-terminal pro-brain natriuretic peptide (NT-proBNP) (or an elevated brain natriuretic peptide (BNP)) and/or a prior HF hospitalization (HFH). This clinical trial will be conducted under an investigational device exemption (IDE) and is intended

to support an expanded indication for the CardioMEMS HF system. This clinical trial is sponsored by Abbott.

**National Cardiogenic Shock Initiative (NCSI)**

*Participating facility: Morton Plant Hospital*

The aim of the NCSI is to bring together experienced centers across the nation that are experts in mechanical reperfusion therapies and have a large experience with the use of mechanical circulatory support devices to systematize care in AMICS. Our goal is to dramatically decrease the duration patients remain in cardiogenic shock and attempt to decrease total usage and duration of vasopressors and inotropic agents. We aim to further demonstrate that rapid delivery of mechanical circulatory support will improve hemodynamics, reverse the spiraling neuro-hormonal cascade associated with cardiogenic shock, allowing clinicians to decrease use of vasopressors and inotropic agents and ultimately improve survival. Health care systems that have agreed to adopt the NCSI treatment algorithm are being asked to participate in this prospective registry so that patient outcomes can be analyzed. Participating investigators will be asked to voluntarily provide data from patients completing the treatment algorithm to be included in the NCSI Registry.

**For more information on our cardiovascular research and clinical trials: (844) 344-1990**

## BayCare's cardiovascular and thoracic programs offer:

267+  
Cardiovascular  
specialists



9  
Cardiovascular  
operating suites



9  
Electrophysiology  
labs



2  
Hybrid  
operating suites

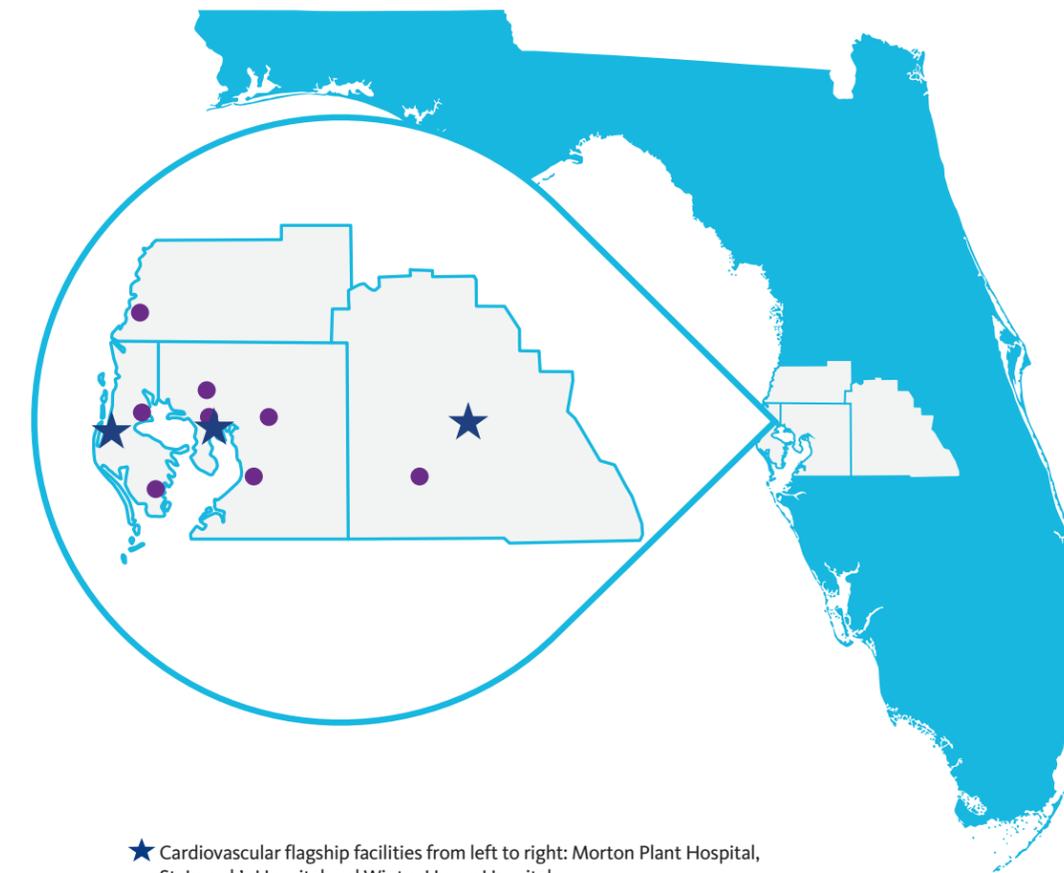


## Our Facilities

At BayCare, we take care of more hearts than anyone else in Tampa Bay. In the last year alone, we helped heal more than 24,000 hearts—that's a lot of lives. BayCare provides a multitude of cardiac services at 11 facilities located across Tampa Bay. On the following pages, you'll find a brief description of our different facilities by county.

“As technology advances, physicians have more options available to them to manage patients with complex illnesses. BayCare facilities have embraced the ‘heart team’ concept to provide optimal care to these patients to achieve the best possible outcomes,” according to Dr. Mahesh Amin, medical director, BayCare Cardiovascular Services.

**To refer a patient to any of our cardiovascular programs or facilities: (844) 344-1990**



★ Cardiovascular flagship facilities from left to right: Morton Plant Hospital, St. Joseph's Hospital and Winter Haven Hospital.

● Clockwise from top: Morton Plant North Bay Hospital, St. Joseph's Hospital-North, South Florida Baptist Hospital, Bartow Regional Medical Center, St. Joseph's Hospital-South, St. Joseph's Children's Hospital, St. Anthony's Hospital and Mease Coutryside Hospital.

## Hillsborough County

### Steve and Krista Howard Heart and Vascular Center at South Florida Baptist Hospital



### South Florida Baptist Hospital 301 N. Alexander St. Plant City, FL 33563

When the Heart and Vascular Center opened on the campus of South Florida Baptist Hospital, Plant City and the surrounding communities gained greater access to advanced heart care. The Heart and Vascular Center is the first of its kind in the area, offering state-of-the-art diagnostic services in both cardiac and interventional radiology in two hybrid cath lab suites. Interventional cardiology services provided

include percutaneous coronary intervention, peripheral angiography and intervention, cardioversions, pacemaker, implantable cardio-defibrillators (ICD) and loop recorder implants. Additionally, South Florida Baptist Hospital is a STEMI receiving facility. Our hybrid approach with a STEMI team and an IR team on call allows us to provide emergent STEMI and pulmonary embolism (PE) responses to give our patients the best possible outcomes. Staffed by expert physicians, the Heart and Vascular Center features a highly trained and experienced team of technologists and nurses, top-notch recovery rooms, advanced cardiovascular technology and dedicated waiting areas for the patients' loved ones. The Center also provides an array of diagnostic and interventional services for the treatment of vascular disease, such as peripheral artery and venous disease.

## St. Joseph's Children's Hospital



### St. Joseph's Children's Hospital 3001 W. Dr. Martin Luther King Jr. Blvd. Tampa, FL 33607

In partnership with the Heart Institute at St. Joseph's Hospital, St. Joseph's Children's Hospital is home to Tampa Bay's only comprehensive congenital heart disease (CHD) center capable of delivering full spectrum care for the CHD patient from conception to late adulthood. In 2018, the Adult Congenital Heart Association awarded the Tampa Bay Adult Congenital Heart Center at St. Joseph's Hospital the status of ACHD Accredited Comprehensive Care Center.

St. Joseph's Children's Hospital specializes in diagnosing and treating congenital and acquired heart problems in an innovative and patient-centered environment, and serves as a regional referral center for fetal, pediatric and adult congenital cardiology. The multidisciplinary team of cardiovascular, care, surgery and anesthesia specialists work in collaboration on all significant patient care decisions for patients of all ages. The CHD center includes one of the busiest congenital cardiac catheterization and electrophysiology labs in the state of Florida that provides a variety of diagnostic and interventional procedures such as angioplasty, pulmonary valve insertion, stent implantations, electrophysiology studies and implantable devices. The CHD center's surgical suites are equipped with the latest technology and staffed with an experienced cardiovascular surgical team for both pediatric and adult patients, and provide surgical intervention for a variety of conditions including arterial switch, complex valve repair and Tetralogy of Fallot.

## St. Joseph's Hospital Heart Institute



### St. Joseph's Hospital 3001 W. Dr. Martin Luther King Jr. Blvd. Tampa, FL 33607

One of the most technologically advanced centers in Florida, St. Joseph's Hospital's Heart Institute provides a multitude of specialized heart services. In 2014, the hospital opened the state-of-the-art \$20 million facility, featuring a combination of nine traditional and hybrid operating suites, cardiac catheterization labs and electrophysiology laboratories with dedicated specialized cardiac equipment. As one of the largest providers of heart attack and stroke care in West Central Florida, the Heart Institute was purposely designed to be located directly above one of the region's busiest emergency rooms, providing quick access for patient procedures.

St. Joseph's Hospital's Heart Institute offers the latest technologies for both open-heart and structural heart procedures. Advanced and minimally invasive procedures including complex valve and coronary bypass surgery, TAVR, MitraClip, extracorporeal membrane oxygenation, vascular surgery, targeted hypothermia ablation of advanced atrial fibrillation (AFib) and complex arrhythmia, and a complete suite of offerings to manage implantable cardiac devices. In addition to participating in multicenter clinical trials in arrhythmia, the Institute has recently been identified as the leading cryoballoon AFib ablation center in the world and has been designated a leading teaching facility for the convergent hybrid AFib ablation procedure, minimally invasive AFib surgery, as well as advanced 3-D cardiac mapping, hosting visitors internationally. Recognizing the need for specialization within the discipline of cardiology, the Heart Institute is also a leader in programs for advanced heart failure, cardio-oncology and women's heart disease. The Heart Institute continues to evaluate patients as part of their advanced heart failure program for VAD destination therapy and support the current medical management of LVAD patients. Also, understanding the benefits of rehabilitation, St. Joseph's Hospital's cardiopulmonary rehabilitation program is AACVPR accredited. Additional rehab programs are also available for peripheral vascular and ventricular-assist device patients.

### St. Joseph's Hospital-North



**St. Joseph's Hospital-North**  
4211 Van Dyke Road  
Lutz, FL 33558

Committed to providing advanced cardiac care, St. Joseph's Hospital-North features a highly trained and experienced team dedicated to ensuring the best possible outcomes for those in the surrounding communities of North Tampa. The team performs many advanced heart procedures for both diagnostic and treatment purposes, including diagnostic cardiac catheterizations, percutaneous coronary intervention (PCI), Impella insertion, electrophysiology studies, ablations, defibrillator/pacemaker implants, generator changes, digital loop/event recorder implants, cardioversion and other noninvasive cardiac diagnostic services such as stress testing. Echocardiogram and tilt table studies are also performed on campus. The cardiac catheterization lab at St. Joseph's Hospital-North was one of the first in BayCare to operate as a hybrid multimodality

department, performing cardiac, peripheral and electrophysiology procedures, as well as interventional radiology procedures. St. Joseph's Hospital-North is a STEMI-accredited facility and received the Intersocietal Accreditation Commission (IAC) accreditation for noninvasive cardiology.

### St. Joseph's Hospital-South



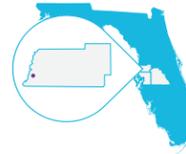
**St. Joseph's Hospital-South**  
6901 Simmons Loop  
Riverview, FL 33578

Opened in 2015, St. Joseph's Hospital-South provides advanced cardiac care to patients in Riverview, Sun City, Apollo Beach and the surrounding Southshore areas of southeast Hillsborough County. A team of expert physicians and highly trained cardiovascular technologists and nurses perform advanced heart procedures in three hybrid cardiac catheterization and interventional radiology suites, including percutaneous coronary intervention (PCI),

diagnostic cardiac catheterizations, fractional flow reserve (FFR), intravascular ultrasound (IVUS), defibrillator/pacemaker implants and generator changes, digital loop/event recorder implants, and cardioversion and transesophageal echocardiogram (TEE). Noninvasive cardiac diagnostic services include stress testing, nuclear cardiac imaging studies, echocardiogram, tilt table studies and coronary CT angiography.

### Pasco County

**Morton Plant North Bay Hospital**



**Morton Plant North Bay Hospital**  
6600 Madison St.  
New Port Richey, FL 34652

Morton Plant North Bay Hospital opened a new cardiac catheterization laboratory in October 2011, providing access to more advanced cardiac diagnostic and treatment procedures to the New Port Richey area and

surrounding communities in Pasco County. The lab includes two specialized imaging rooms and a nine-bed pre/post-procedure area. Services offered include coronary angiography, percutaneous coronary intervention, peripheral angiography and intervention, interventional radiology, cardioversions, pacemaker insertion, implantable cardiac defibrillators and loop recorder implants. Morton Plant North Bay Hospital is a nonsurgical level I Percutaneous Coronary Intervention Center. In 2016, Morton Plant North Bay Hospital opened a cardiopulmonary rehabilitation program designed to help people recover and thrive after a heart event or procedure.

### Pinellas County

**Mease Countryside Hospital**



**Mease Countryside Hospital**  
3231 McMullen Booth Road  
Safety Harbor, FL 34695

Thanks to its centralized location, Mease Countryside Hospital serves multiple communities in Pinellas, Pasco and Hillsborough counties, and is one of the busiest STEMI locations in the area. Mease Countryside Hospital now offers the Philips Azurion therapy platform as part of its cardiac catheterization lab expansion in 2017. This new platform supports the use of facility quality and safety checklists and protocols to enhance patient safety. It also offers high-quality imaging with low-dose radiation and decreased radiation scatter, providing increased safety for patients, treating physicians and staff. Today, the cardiac catheterization laboratory consists of three imaging rooms that provide a multitude of services including coronary angiography, percutaneous coronary intervention, peripheral angiography and intervention, cardioversions, pacemaker insertion, implantable cardiac defibrillators and loop recorder implants. Mease Countryside Hospital is a nonsurgical level I Percutaneous Coronary Intervention Center.

### Morgan Heart Hospital at Morton Plant



**Morton Plant Hospital**  
300 Pinellas St.  
Clearwater, FL 33756

As a leading heart hospital in Tampa Bay, Morgan Heart Hospital at Morton Plant has one of the most advanced heart care facilities in Pinellas County. The hospital is also the only hospital in the United States to have been awarded the Truven Top 50 Cardiovascular Hospital designation a record 15 times.

The facility has three cardiac catheterization labs that perform a variety of procedures including coronary angiography, percutaneous coronary intervention with Impella support for high-risk patients, peripheral angiography, peripheral intervention, carotid angiography and stenting, balloon valvuloplasty, chronic total occlusion and laser therapy.

Morgan Heart Hospital at Morton Plant has three electrophysiology laboratories that offer diagnostic EP studies, ablations and tilt table testing, and WATCHMAN procedures as well as pacemaker, defibrillator and loop recorder implantation. An 18-bed nursing unit provides pre/post-procedural nursing care.

The hospital maintains five cardiovascular surgical operating rooms including a state-of-the-art cardiac hybrid operating suite. Surgeons perform a variety of procedures including complex aortic surgery, endovascular abdominal (EVAR) and thoracic aneurysm (TEVAR) repair, CABG, minimally invasive and open surgical valve repair and replacement, transcatheter aortic valve replacement (TAVR), MitraClip, extracorporeal membrane oxygenation (ECMO), targeted hypothermia ablation of atrial fibrillation and complex arrhythmias, convergent ablation and comprehensive management of implantable cardiac devices.

Morton Plant Hospital performed the first TAVR procedure in Tampa Bay in February 2012, and has been a national leader for valve procedures and outcomes. As of 2018, the physician team has performed over 1,000 TAVR procedures. In 2014, the heart team physicians performed the first MitraClip

treatment for mitral valve repair in Tampa Bay and have subsequently treated more than 100 patients with this advanced therapy. The inpatient area contains 21 private patient rooms, allowing patients to recover in one location. Postoperatively, patients are cared for by a multidisciplinary team, which includes cardiovascular surgeons and advanced care providers, critical care physicians, nursing and ancillary team members such as social services and pharmacy.

#### St. Anthony's Hospital



**St. Anthony's Hospital**  
1200 Seventh Ave. N.  
St. Petersburg, FL 33705

St. Anthony's Hospital has long been a cardiovascular services leader in south Pinellas County, providing state-of-the-art diagnostic and treatment procedures that

achieve consistent superior outcomes and patient satisfaction. As part of the hospital's commitment to providing high-quality cardiac care and growing the cardiovascular services offered to the surrounding community, St. Anthony's Hospital and the team of surgical specialists from Morton Plant Hospital have partnered to provide patients access to advanced cardiovascular and thoracic surgical services.

St. Anthony's Hospital services include three digital cardiac catheterization labs for diagnostic and potentially life-saving interventional procedures, electrophysiology procedures including pacemaker and AICD implants and ablations, electrocardiogram and echocardiogram (EKG/ECHO) equipment to test for heart abnormalities, cardiac stress testing lab with nuclear medicine testing, cardiac rehabilitation, and education and support groups. Additional catheterization lab services have expanded the transradial approach beyond coronary interventions to include peripheral interventions for patients who would benefit from this approach. This is particularly exciting for patients who've had previous bypass surgery terminating in the groin, wounds or infections in the groin area, or who have disease preventing femoral access. The transradial approach also

greatly reduces recovery time and minimizes vascular complications post procedure. And, through the use of new devices, St. Anthony's Hospital now provides treatment of deep vein thrombosis and pulmonary embolism without the need for thrombolytic drugs typically required in the past.

#### Polk County



#### Bartow Regional Medical Center



**Bartow Regional Medical Center**  
2200 Osprey Blvd.  
Bartow, FL 33830

Bartow Regional Medical Center is an acute care hospital serving South Lakeland, Bartow, Fort Meade, Mulberry, rural south Polk County and northern Hardee County. The interventional laboratory at Bartow Regional Medical Center operates as a hybrid laboratory, performing both coronary catheterizations and interventional radiology procedures. Our specialists offer

state-of-the-art cardiovascular care from diagnosis to emergency intervention to the latest treatments and preventive education including elective PCI, diagnostic cardiac catheterizations, defibrillator/pacemaker implants and generator changes, digital loop/event recorder implantation, cardioversion, transesophageal echocardiogram (TEE), and other noninvasive cardiac diagnostic services including stress testing and echocardiogram.

#### The Bostick Heart Center at Winter Haven Hospital



**Winter Haven Hospital**  
200 Ave. F N.E.  
Winter Haven, FL 33881

The Bostick Heart Center at Winter Haven Hospital is a comprehensive cardiovascular service line designed to treat all aspects of adult cardiovascular disease from diagnosis to treatment to recovery. This comprehensive heart program provides a variety of

specialized heart services including open-heart surgery, elective or emergency coronary intervention including treatment of STEMIs, electrophysiology studies and a range of ablation procedures, heart failure care and recovery care in the form of cardiac rehab.

The Bostick Heart Center has an eight-bed, state-of-the-art cardiovascular intensive care unit (CVICU) for care after heart and vascular surgeries, a 12-bed cardiac intensive care unit (CICU) to care for patients after complex cardiac procedures as well as patients with other serious heart problems, a 32-bed cardiovascular unit (CVU), designed for those patients with complex cardiac needs that don't require ICU-level attention, and a 16-bed cardiac observation unit (COU), designed for those patients with suspected heart problems.



# Cardiovascular Surgery Data Addendum by Facility

For 2017, the risk-adjusted composite scores for BayCare as a health system were unavailable. The following is the cardiovascular surgery STS risk-adjusted data by BayCare flagship facility\* for 2017. BayCare's cardiovascular surgery composite data for 2016 and 2018 can be found in the Cardiovascular Surgery section of this book on page 5.

Risk-Adjusted Isolated CABG with Permanent Stroke				
	STS Benchmark	MPH	SJH	WHH
2017	1.4%	0.9%	1.5%	0.8%

Lower percentage is optimal

Risk-Adjusted Operative Mortality for Isolated CABG				
	STS Benchmark	MPH	SJH	WHH
2017	2.3%	3.1%	0.6%	2.6%

Lower percentage is optimal

Observed Versus Expected Mortality for Isolated CABG				
	STS Benchmark	MPH	SJH	WHH
2017	1.0	1.33	0.25	1.10

Less than 1.0 is optimal

\* MPH = Morton Plant Hospital; SJH = St. Joseph's Hospital; WHH = Winter Haven Hospital

Percent of Isolated CABG Patients Extubated in Less Than Six Hours				
	STS Benchmark	MPH	SJH	WHH
2017	54.8%	74.9%	80.0%	83.8%

Higher percentage is optimal

Isolated CABG Initial Ventilation Hours (Median)				
	STS Benchmark	MPH	SJH	WHH
2017	5.6	3.6	3.8	3.1

Fewer hours is optimal

2017 STS Major Cardiac Procedures Mortality				
	Number of Procedures	Operative Mortality	O:E	STS
Morton Plant Hospital	425	2.4% (NRA) 2.9% (RA)	1.09	1.0
St. Joseph's Hospital	308	1.0% (NRA) 1.3% (RA)	0.49	1.0
Winter Haven Hospital	320	3.4% (NRA) 2.9% (RA)	1.11	1.0

BayCare's outcomes compare favorably to regional and national outcomes for CABG, valve and valve plus CABG procedures combined. O:E ratios denote observed versus expected outcomes. NRA = Non risk-adjusted; RA = Risk-adjusted.

Risk-Adjusted Isolated CABG Prolonged Ventilation (Mechanical > 24 Hours)				
	STS Benchmark	MPH	SJH	WHH
2017	7.6%	7.0%	3.9%	2.1%

Lower percentage is optimal

Blood Utilization for CABG Surgeries: Represents Intraoperative Blood Use				
	STS Benchmark	MPH	SJH	WHH
2017	26.1%	4.2%	4.9%	19.7%

Lower percentage is optimal

Blood Utilization for CABG Surgeries: Represents Intraoperative and Postoperative Blood Use				
	STS Benchmark	MPH	SJH	WHH
2017	41.6%	23.8%	25.3%	30.3%

Lower percentage is optimal

Radial Artery Usage				
	STS Benchmark	MPH	SJH	WHH
2017	5.0%	57.3%	0.4%	0.9%

Higher percentage is optimal

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## Medical Terminology and Procedure Review

This section includes a review of some important medical terminology and procedures related to several sections in this book.

### Structural Heart and Valve Terminology and Procedures

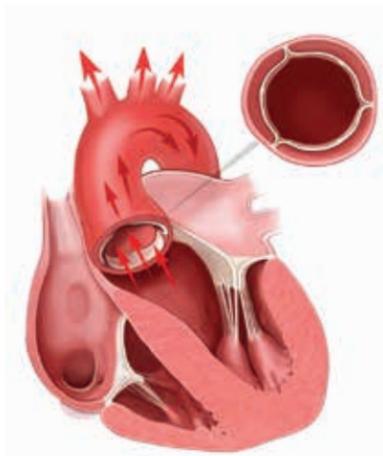
Structural heart disease may affect the heart muscle and the valves that regulate blood flow within the heart. Some structural heart abnormalities are congenital and others are the result of acquired heart disease. Many of these abnormalities ultimately result in congestive heart failure (CHF). Some of the most common conditions and their treatments are described on the following pages.

CHF may be an acute (sudden) or chronic (long-term) problem as a result of a weakened heart muscle. CHF can be a result of multiple causes including but not limited to inadequate blood flow to the heart muscle, valve abnormalities or high blood pressure. Symptoms of CHF include:

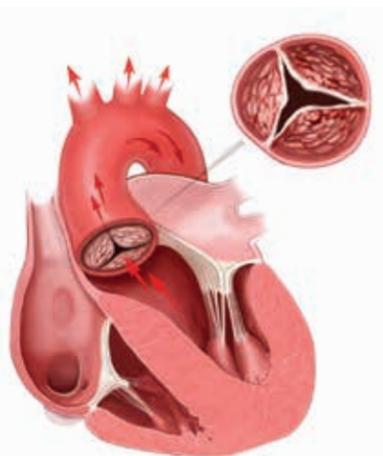
- Chest pain or pressure
- Fatigue
- Persistent cough
- Rapid or irregular heart beat
- Reduced exercise tolerance
- Shortness of breath
- Swelling (edema)
- Weight gain

Physicians categorize heart failure into four classes based on a patient's physical symptoms using the New York Heart Association (NYHA) Functional Classification system:

Class	Patient Symptoms
I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
II	Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea.
III	Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea.
IV	Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.



Aortic Valve opens widely



Aortic Stenosis opening restricted

**Aortic regurgitation or insufficiency:**

Aortic regurgitation or insufficiency is a condition in which the aortic valve allows blood to leak backward into the heart. Aortic regurgitation may also lead to symptoms similar to heart failure.

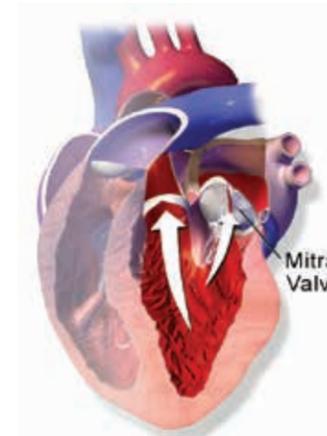
**Aortic stenosis:**

Aortic stenosis is a buildup of calcium deposits on the aortic valve. The aortic valve is the main valve between the heart and the body. Aortic stenosis is a condition in which the aortic valve is so heavily calcified that it's unable to open or close completely. This limits the blood flow from the heart to the brain and body. The heart must then work harder to push blood through the body, which can cause fatigue, shortness of breath and worsening heart function. Declining heart function and the associated symptoms are termed congestive heart failure.

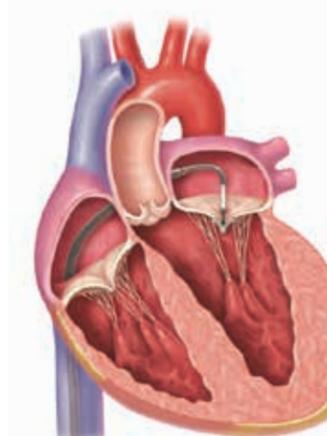
**Balloon valvuloplasty:** Many patients with degenerative valve disease are ineligible for surgery because of their high-risk status (e.g. advanced age, multiple comorbidities or end-stage disease). For these patients with valves that are too tight or restrictive, balloon valvuloplasty may be a viable alternative to TAVR or open-heart surgery to reduce symptoms. In balloon valvuloplasty, a catheter with a small, deflated balloon attached to the tip is threaded through a blood vessel. Once the catheter reaches the

damaged valve, the balloon is inflated to stretch the valve opening and allow more blood to flow. The balloon is then deflated and guided out through the vessel and removed. The patient is generally awake during this procedure, and the recovery time is considerably shorter than with traditional surgery. However, balloon valvuloplasty isn't a permanent solution and often has to be repeated at a later date. Balloon valvuloplasty can be used to treat aortic and mitral stenosis.

**Left atrial appendage closure:** The left atrial appendage (LAA) is a small pouch in the left atrium. Patients with atrial fibrillation (abnormal heart rhythm) have a high risk of blood clots forming in the LAA. These clots can dislodge and block blood flow to crucial parts of the body, including the brain (stroke). Oral anticoagulation medications may be used to reduce the risk of clots, but these medications aren't safe or appropriate for some patients. In such cases, LAA occlusion is a viable treatment option. In LAA occlusion, a catheter is used to deliver a closure device to the left atrium. The device is inserted into the LAA and expanded like an umbrella to seal off the entrance to the pouch. Management of the left atrial appendage to reduce the risk of stroke has been performed using novel occlude devices, as well as epicardial ligation devices.



Mitral Valve Regurgitation



MitraClip deployment



MitraClip – Post procedure

**Mitral regurgitation or insufficiency:**

Mitral regurgitation is a condition in which the heart's mitral valve leaflets don't close tightly. When this happens, blood flows backward from the heart's left ventricle into the left atrium. This reduces the effectiveness of the heart to pump blood to the body, which can cause fatigue.

**Mitral stenosis:** Mitral stenosis is a result of having rheumatic fever as a child, and leads to calcium deposits on the mitral valve leaflets, preventing them from opening or closing properly. This condition can lead to increased pressure in the lungs, possibly causing permanent damage.

**Percutaneous MitraClip placement for mitral regurgitation:**

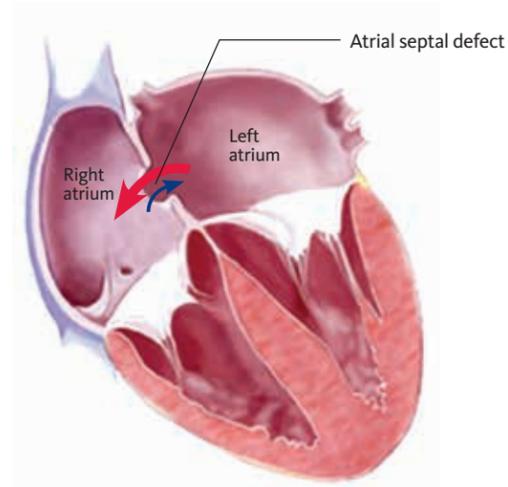
During the mitral valve clip placement procedure, a catheter is used to deliver a small clip into the heart via the femoral vein. Once in place, the clip is attached to the leaflets of the mitral valve to improve their function, and the catheter is removed. Because the procedure is minimally invasive, the recovery time is substantially shorter than with open-heart surgery, the traditional method for treating mitral valve leaks.

*“It has become very clear in the cardiac surgical literature that repairing a patient’s leaking mitral valve earlier in the disease process can have significant benefits with respect to decreasing their chances of future heart failure and increasing their overall survival. One of the most important aspects of the decision-making process is that there will be a high likelihood of successful valve repair with a high degree of safety. BayCare surgeons have proven this expertise in both the volume of valves they have repaired and their extremely low mortality rates.”*

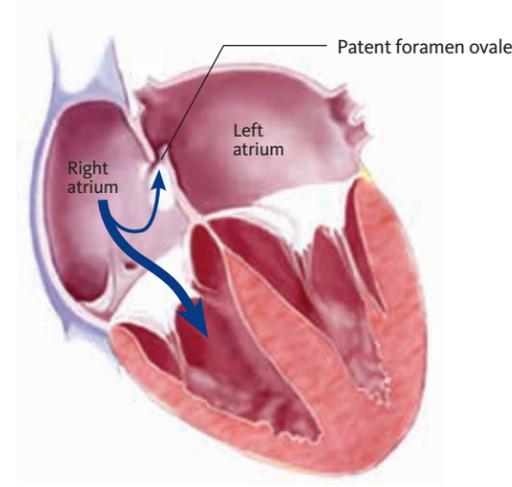
*~ Dr. Andrew Sherman  
Chief, Department of  
Cardiothoracic Surgery  
at St. Joseph’s Hospital*

**Transcatheter aortic valve replacement (TAVR):** Transcatheter aortic valve replacement is a minimally invasive procedure for people with severe aortic stenosis who may be unable to undergo traditional open-heart surgery. BayCare physicians offer minimally invasive treatment options for patients with severe aortic stenosis, a narrowing of the aortic valve opening that affects tens of thousands of people each year. The FDA has approved this treatment for high-risk and inoperable patients. Physicians at Morton Plant Hospital received approval to perform TAVR procedures for intermediate- and low-risk patients who want to participate in a research protocol. During TAVR, cardiovascular surgeons and interventional cardiologists place a new valve inside the heart without stopping the heart or opening the chest. Patients often recover more quickly from this minimally invasive approach.

**Atrial septal defect (ASD)/patent foramen ovale (PFO):** An ASD is a hole in the wall (septum) that separates the two upper (atrial) chambers of the heart. A PFO is a condition in which a small opening in the atrial septum fails to seal after birth. Some patients with a PFO can develop stroke when small blood clots cross from the right-sided collecting chamber to the left-sided collecting chamber (atrium), ultimately flowing into the brain.



In the past, people with holes in their hearts could face a lifetime of anticoagulant therapy or even open-heart surgery in order to reduce their high risk of stroke. Some BayCare facilities now offer a minimally invasive option to close a variety of cardiac holes, including atrial and ventricular septal defects and patent foramen ovals. During these procedures, a hollow catheter is threaded through a blood vessel and guided to the site of the defect. Once in place, it's used to deliver a collapsed mesh closure device and place it inside the defect. The device is then activated, expanding to block the opening and hold the device in place,



and the catheter is removed. Recovery time following placement is considerably shorter compared with traditional surgery.

**Transcatheter paravalvular leak closure:** Paravalvular leaks can occur when a suture holding an artificial valve to the heart tissue breaks, or when the heart tissues around the artificial valve weaken. This defect causes a leak around the valve. Re-operation to repair a paravalvular leak may be a very risky procedure for some patients. This minimally invasive technique uses a catheter to deliver and deploy a closure device at the site of the leak.

**Arrhythmia Terminology and Procedures**  
*Common disorders and procedures to manage them are listed below.*

**Syncope:** Syncope is the sudden and transient loss of consciousness associated with the loss of postural tone. Syncope can occur as a result of low heart rate, fast heart rate or dysfunction of the autonomic nervous system.

**Supraventricular tachycardia (SVT):** SVT, or narrow complex tachycardia, represents a group of rhythm disorders that predominantly occur in the atria. Fortunately, these arrhythmias are easily treatable. They commonly manifest with palpitations, dizziness and, at times, loss of consciousness.

**Ventricular tachycardia/fibrillation (VT/VF):** VT/VF is an arrhythmia involving the ventricles and are most commonly life threatening. Patients with compromised left ventricular function are at risk for developing ventricular arrhythmias and represent the mechanism of sudden cardiac death in these patients and patients who've had myocardial infarctions. These disorders have been historically managed with defibrillator therapy; however, with advancements in technique and equipment, ablation is now considered an acceptable method of managing this rhythm disorder.

**Atrial fibrillation (AFib):** Atrial fibrillation is an electrical disorder involving the atria and represents a chaotic electrical process that renders the atria nonfunctional. The end result is stasis of blood in the atria and appendage which can lead to stroke, loss of atrial contractility leading to decreased cardiac output, and in an uncorrected AFib myopathy as a result of chronic uncontrolled ventricular rate. AFib is categorized as either paroxysmal, persistent or chronic.

**Channelopathies:** The myocardium relies on appropriate functioning of the ion channels. In some patients, genetic abnormalities of these ion channels can result in arrhythmia; at times life threatening. Appropriate management relies on genetic testing and counseling and, in some cases, protection against ventricular arrhythmia with defibrillator therapy.

**Bradycardias:** Premature conduction disease may result in low heart rates insufficient to maintain activities of daily living and, in severe cases, loss of consciousness. Management includes removing offending agents or conditions which may cause bradycardia and, in irreversible cases, placement of a pacemaker.

**Implantable cardioverter defibrillator (ICD):** ICDs represent cardiac devices which protect against sudden cardiac death by effective treatment of ventricular arrhythmias. Traditional devices relied on endovenous wires connected to the heart. Novel devices can be placed under the skin without requiring venous punctures and may be ideal in select patients.

**Permanent pacemaker:** Traditional pacemakers rely on pacing wires connected to the heart. New generation devices are now completely implantable in the right ventricle and don't require surgery, as the device is delivered through the femoral veins.

**Hybrid AFib ablation:** Patients with advanced AFib benefit from both epicardial and endocardial ablation. BayCare is a center of excellence in managing advanced AFib using novel techniques.

**SVT ablation:** Ablation of SVTs can be safely performed using minimally invasive, catheter-based ablation. With the assistance of state-of-the-art 3-D mapping software, eradication of SVTs can be accomplished with unprecedented accuracy and efficacy.

**Pulmonary vein isolation for AFib:** Isolation of the pulmonary veins is the cornerstone of managing paroxysmal AFib and can be safely performed using both radiofrequency and cryoballoon ablation techniques.

**VT/VF ablation:** Ventricular ablations can now be safely performed with the assistance of hemodynamic support devices including Impella and extracorporeal membrane oxygenation. In rare cases, ablation can be performed in the epicardium when endocardial ablation fails.

**Lead extraction and venoplasty:** Procedural volume is critical as the main determinant of outcome. BayCare's lead extraction programs have over 20 years of experience and have the most cumulative lead extractions in the area. Typical patients who have lead extractions include patients with device-related infections and patients with multiple abandon leads. Lead extractions are performed in some cases with the assistance of advanced laser cutting sheaths. Patients who develop closure of peripheral veins with pacing leads can also be treated with balloon angioplasty.

**His bundle/biventricular pacing:** Patients who require chronic ventricular pacing or have wide QRS intervals with heart failure could benefit from cardiac resynchronization of the ventricles by pacing both chambers using dedicated right and left ventricular leads. A more contemporary technique utilizes a single lead to directly pace the His bundle to promote a narrow QRS interval with each paced beat, thereby maintaining synchrony between both ventricles and improvement in overall cardiac output.

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[BayCareHeart.org](http://BayCareHeart.org)

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