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Cardiovascular: Outcomes and Innovations Report

Maine Medical Center

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2020 | CARDIOVASCULAR

OUTCOMES & INNOVATION REPORT



MaineHealth

THE MAINEHEALTH SYSTEM

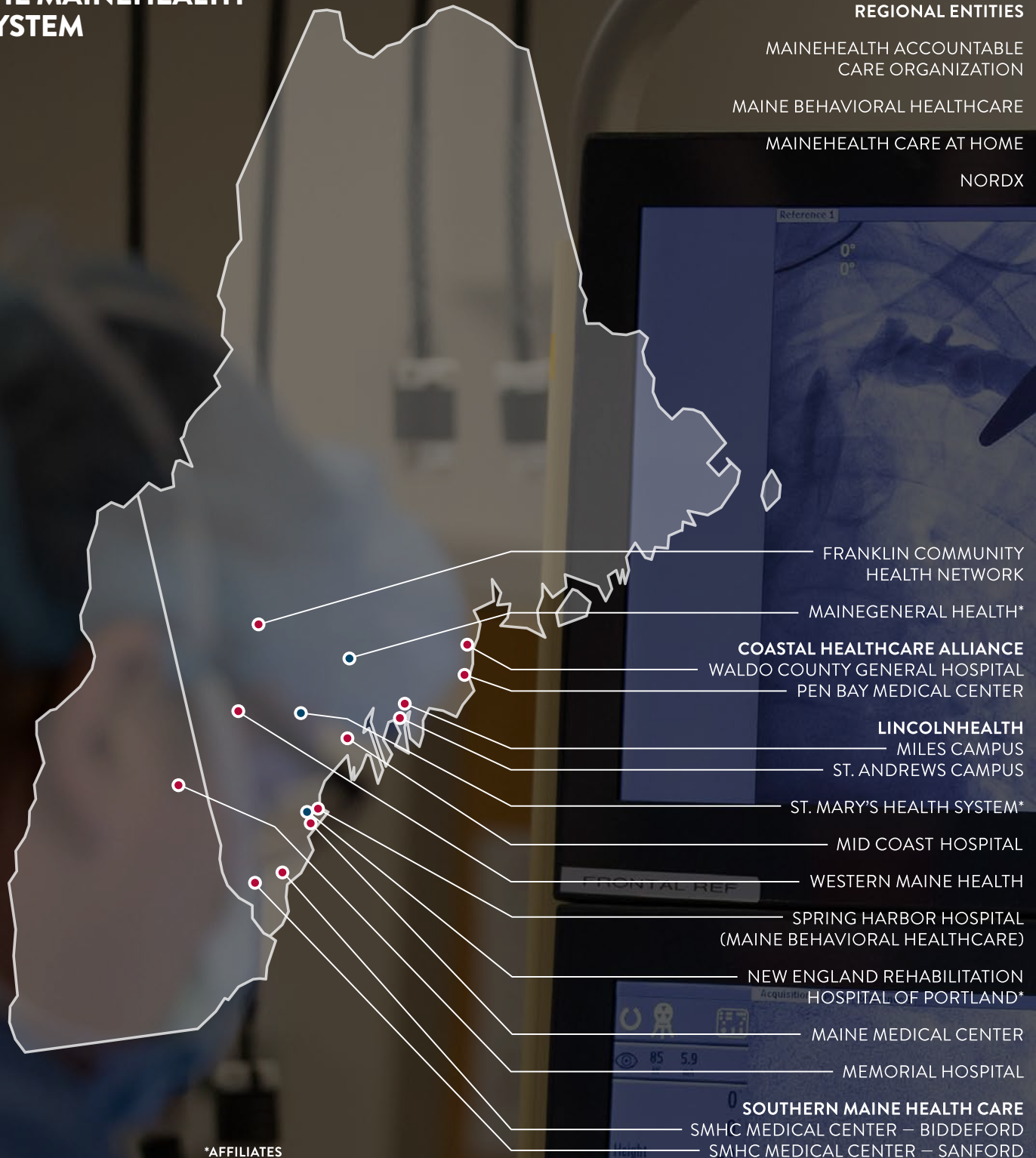
REGIONAL ENTITIES

MAINEHEALTH ACCOUNTABLE CARE ORGANIZATION

MAINE BEHAVIORAL HEALTHCARE

MAINEHEALTH CARE AT HOME

NORDX



All cardiovascular procedures present unique risks, and such risks may affect a particular patient's outcome.

Outcome report data presented in this report is from Maine Medical Center.

The photos in this report were taken prior to COVID-19 and do not reflect MaineHealth's current masking and social distancing requirements.

PICTURED ON COVER: Sunil Malhotra, MD, Director of Congenital Heart Surgery with Barb Heyl, PA-C, and Meghan Sprague, PA-C.

CARDIOVASCULAR SERVICES

The MaineHealth system is a partnership of physicians and hospitals, listed below, dedicated to improving the cardiovascular health of the residents of northern New England. Our vision includes being a premier provider of accessible, cost effective, coordinated and compassionate care; and putting our patients' needs first, delivering superior clinical outcomes and excellence in education and clinical research. The program is committed to achieving surgical outcomes that exceed national benchmarks.

CARDIOVASCULAR MEDICINE

- Advanced Heart Failure
- Cardiac Arrhythmia
- Cardio-Oncology
- Disease Prevention
- Imaging and Diagnostics
- Coronary Revascularization
- Hypertrophic Cardiomyopathy
- Sports Cardiology

CARDIOVASCULAR SURGERY

- Cardiac Valve
- Coronary Revascularization
- Advanced Heart Failure

VASCULAR SURGERY

- Aortic Disease
- Carotid Revascularization
- Comprehensive Vein
- Limb Salvage
- Rare Vascular Conditions
- Thoracic Outlet Syndrome

CONGENITAL CARDIOVASCULAR MEDICINE AND SURGERY

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Marco Diaz, MD, was named as the new Chair of the Department of Cardiovascular Medicine and Chief of the MaineHealth Cardiovascular Services in early 2020. Dr. Diaz is recognized by peers and colleagues as an outstanding clinician and educator. For the past five years, he served as Senior Medical Director, overseeing the development of a system-wide cardiology practice. At the same time, he has been a primary driver in the programmatic growth of cardiac services. Dr. Diaz continues his contribution to MMC by fostering the clinical, educational and research growth of cardiovascular medicine at the institution.

I am honored to be part of Cardiovascular Services at MaineHealth — an integrated network of hospitals, health care providers and specialists — built with patients' needs at the very center. We provide comprehensive heart care to Maine and Mt. Washington Valley residents through a coordinated system designed to achieve the best possible cardiac and vascular outcomes.

For over 60 years, we have worked diligently to become one of the premier cardiovascular networks in New England and the largest in northern New England. Our teams of dedicated physicians, advanced practitioners, nurses, clinical and technical staff and administrators takes great pride in what they do every day to provide the best care for patients. We have a long tradition and commitment to empowering caregivers at all levels to provide the highest quality patient care and service to cardiovascular patients.

Our service line combines medical and surgical services (both inpatient and ambulatory care), along with research and education, under unified clinical and administrative leadership. Our intent is to highlight our strong performance as evidenced by the data presented clearly and transparently on the following pages. This report

highlights many of our treatment offerings and leading technologies in use across MaineHealth.

For example, MaineHealth aims to help people with heart failure have the best possible clinical outcomes and quality of life. To achieve this, our organizations and partners implemented a variety of evidence-based treatments across MaineHealth and in every care setting in order to provide care as close to home as possible. This approach helps patients manage heart failure symptoms better; as a result, they need to be hospitalized less often. Care settings include patients' private homes, nursing care facilities, medical care offices, emergency departments and hospitals. Treatment options include evidence-based clinical pathways, supporting clinical decision tools, providing patients with clear and consistent plans of care and specialized care for patients with advanced disease.

To enable a more seamless transition across the care continuum, Cardiovascular Services activated our shared electronic health record, Epic's Cupid application, in February 2020. I would like to thank the cardiologists and physician leaders, along with other staff people who dedicated their time, talent and expertise to this effort. This large project included practice managers, support teams and information technology teams that invested countless hours partnering with our clinicians to ensure the readiness of the technical infrastructure, validating clinical and administrative workflow and training subject matter experts. The success of this complex implementation is the result of outstanding teamwork, project management and leadership across our hospitals and physician practices.

I invite you to collaborate and partner with us as we continue to strive to improve cardiovascular care, quality and patient access, while delivering the best health outcomes and developing a systematic approach that serves the residents of Maine and southern New Hampshire, as well as visitors to northern New England.

Marco Diaz, MD

*Chair of the Department of Cardiovascular Medicine
Chief of MaineHealth Cardiovascular Services*

“ONE PATIENT, ONE RECORD” ACROSS THE CONTINUUM OF CARE

MaineHealth achieved an exceptional milestone this year: the successful activation of our shared electronic health record. The implementation of the Epic cardiology ambulatory and Cupid applications was the culmination of a coordinated, multifaceted effort that engaged hundreds of dedicated leaders and teams across our health system.

This implementation puts the patient at the center of care. Now, any clinical caregiver of a MaineHealth cardiac patient has access to health information in one central location. This supports improved efficiencies, better transitions of care and flow of patient information and superior clinical outcomes. This milestone implementation will bring several benefits to providers and patients:

- Gives our cardiology care teams access to a fully integrated health record.
- Improves medication reconciliations and patient safety.
- Reduces variability and standardizes Epic tools and functionality already implemented at MaineHealth organizations.
- Gives all cardiac patients across our health system the ability to access their health information through MyChart.



Mike Knof,
cardiac patient

HEALTH RECORD FOLLOWS PATIENT

When it comes to delivering high-quality patient care, an integrated electronic health record that follows your patient matters. Last year, Mike Knof was out grocery shopping in Damariscotta when he experienced cardiac arrest and collapsed to the ground. After receiving chest compressions from nearby community members, he was rushed to LincolnHealth - Miles Campus, where the ER team stabilized him and transported him to MMC. Mike's medical records were already there when he arrived.

MMC cardiologist Dr. Jeremy Estrada was part of the cardiac team when Mike was rushed in. Because LincolnHealth and MMC use Epic applications, Dr. Estrada was able to see Mike's full medical history and medication list and to act quickly, using the newest technology and collective expertise of his team. He performed an angiogram and a right heart catheterization, and also used a special kind of imaging that revealed Mike's blockage had not caused a heart attack. So instead of a stent, Dr. Estrada put in a balloon pump. "Because we were on the same electronic health record, we could view Mike's full record, allowing us to anticipate and predict how sick he was," said Dr. Estrada. "This enabled us to provide him with the care he needed and the care Mike needed to heal after the procedure."

NEW ADULT CONGENITAL CARDIOLOGY PROGRAM

People with congenital heart disease need care throughout their lives. From infancy through adulthood, people with congenital heart issues are best served by specially trained clinicians who understand their complex and unique needs. Our program offers a full range of inpatient and outpatient clinical services — from diagnosis to surgical repair. We care for pediatric and adult patients with all forms of congenital heart conditions and pulmonary hypertension issues. In 2019, MaineHealth launched a new program for adult patients with any form of congenital heart condition. This includes those with newly diagnosed congenital heart defects, as well as those with complex congenital heart disease who may have received care since childhood and now may require transition to adult medical services such as family planning, genetic counseling and ongoing cardiology care.

A photograph of a surgical team in an operating room. Four surgeons in blue scrubs and masks are focused on a patient. The room is equipped with various medical devices, including monitors and IV stands. A teal semi-transparent banner is overlaid across the middle of the image.

CARDIOVASCULAR HIGHLIGHTS

HEART FAILURE AND MECHANICAL CIRCULATORY SUPPORT

Our Advanced Heart Failure Program at MMC is made up of a multidisciplinary team of cardiologists, cardiac surgeons, advanced practice providers and nurses, and supported by experts in all disciplines to manage patients throughout all stages of heart failure. The team employs the most recent medical and surgical therapies for cardiogenic shock and heart failure. These therapies include mechanical circulatory support devices such as extracorporeal membrane oxygenation (ECMO), temporary percutaneous ventricular assist devices to support both the right and left ventricles, and durable implantable left ventricular assist devices (LVAD). Durable LVADs are used to help patients with advanced heart failure restore circulation and improve functional capacity. These devices can be employed to sustain patients awaiting heart transplantation, as well as patients not able to receive transplants.

VOLUME MECHANICAL CIRCULATORY SUPPORT

| | 2017 | 2018 | 2019 |
|-------------------|------|------|------|
| LVAD IMPLANTS | 14 | 14 | 10 |
| PERCUTANEOUS LVAD | 10 | 10 | 19 |
| ECMO | 20 | 21 | 29 |

CARDIAC ARRHYTHMIAS

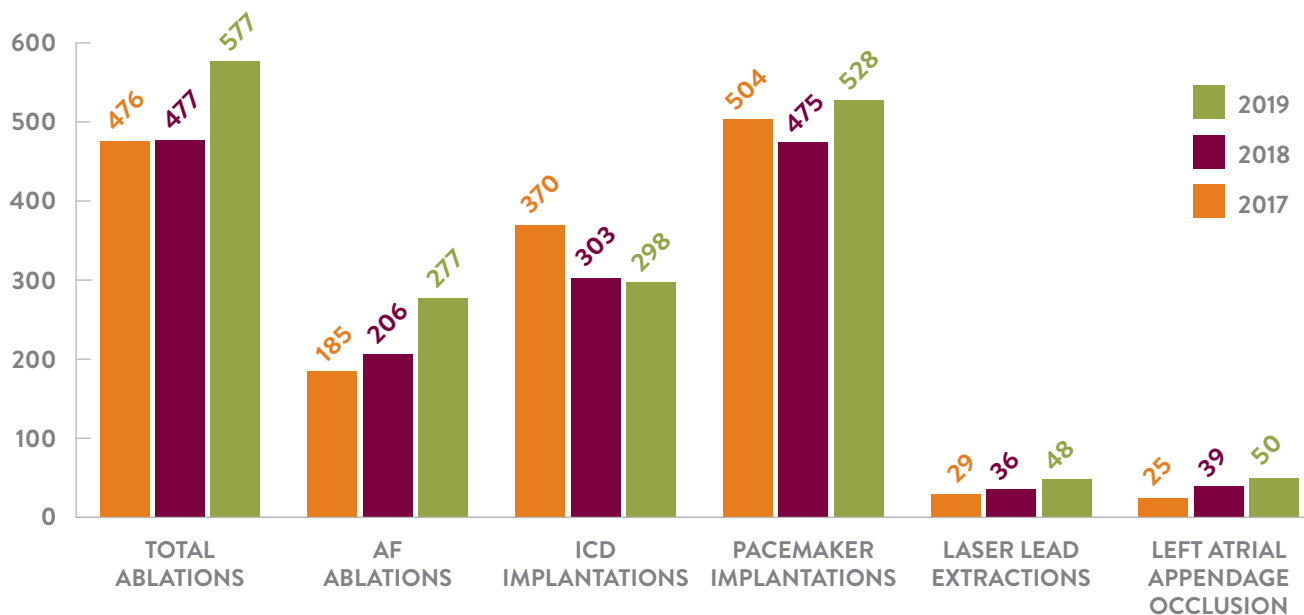
The MaineHealth Cardiac Arrhythmia Program supports patients with problems in the electrical function of the heart that cause abnormal heart rhythms (arrhythmias). The program is ever-evolving to address the changing arrhythmia needs of our communities. MMC has become a high-volume tertiary referral center for northern New England, managing both simple and complex arrhythmias including atrial fibrillation, supraventricular and ventricular tachycardia, atrial flutter, premature ventricular contractions and Wolff-Parkinson-White syndrome.

MMC achievements include:

- The first hospital in Maine to perform the convergent procedure for patients suffering with persistent atrial fibrillation (A-fib), who may have failed other treatment modalities.
- Achieved the American Heart Association's Get with the Guidelines: A-fib Gold Award for 2019.

Our electrophysiology (EP) specialists are available for consultation at MaineHealth hospitals and practice offices across the system service area.

CARDIAC ARRHYTHMIA VOLUMES



MMC was the first hospital in the state to perform the convergent procedure for patients suffering with long-standing persistent A-fib who may have failed other treatment modalities. MMC is the only hospital in Maine to offer percutaneous occlusion of the Left Atrial Appendage (LAA) with the Watchman™ device for patients at high risk for stroke and who are considered suitable for short-term Warfarin use but with reason to seek an alternative (such as high risk of bleeding). Our electrophysiology team implanted the 100th Watchman device in Maine this year.

ATRIAL FIBRILLATION ABLATION METRICS*

% OF PATIENTS IN NRS (NORMAL SINUS RHYTHM) AT 6-MONTH FOLLOW-UP 94.3%

% OF PATIENTS WITHOUT COMPLICATIONS FOLLOWING ABLATION PRIOR TO DISCHARGE 96.3%

SURVIVAL AT 6-MONTH FOLLOW-UP AFTER ABLATION PROCEDURE 100%

SYMPTOM-FREE AT 6-MONTH FOLLOW-UP 73.5%

*Source: GWTG AF Registry, Feb. 2018 to Feb. 2019

WATCHMAN METRICS*

| | MMC | % TOTAL | U.S. HOSPITALS | % TOTAL |
|---|-----|------------|-------------------|------------|
| NUMBER OF PATIENTS | 42 | 100% | 24,530 | 100% |
| ALIVE AT DISCHARGE | 42 | 100% | 24,473 | 99.8% |
| PROCESS METRICS (PROPORTION OF) | | | | |
| PATIENTS EVALUATED FOR STROKE RISK USING THE CHA2DS2-VASC SCORE | 42 | 100% | 24,463 | 99.7% |
| PATIENTS EVALUATED FOR BLEEDING RISK USING THE HAS-BLED SCORE | 42 | 100% | 24,463 | 99.7% |
| OUTCOME METRICS (PROPORTION OF) | | | | |
| LAAO (LEFT ATRIAL APPENDAGE OCCLUSION) PROCEDURES SUCCESSFUL | 39 | 92.9% | 22,370 | 91.2% |
| LAAO PROCEDURES SUCCESSFUL EXCLUDING THOSE PROCEDURES CANCELED | 39 | 95.1% | 22,370 | 93.7% |
| PATIENTS WITH A MAJOR COMPLICATION EITHER INTRA OR POST PROCEDURE AND PRIOR TO DISCHARGE | 3 | 2.1% | 647 | 2.6% |
| PATIENTS EXPERIENCING A DISABLING OR LIFE THREATENING BLEEDING EVENT INTRA OR POST PROCEDURE AND PRIOR TO DISCHARGE | 0 | 0% | 60 | 0.2% |
| PATIENTS WHO EXPERIENCE A STROKE (ISCHEMIC OR HEMORRHAGIC), OR SYSTEMIC EMBOLISM, OR MORTALITY INTRA OR POST PROCEDURE AND PRIOR TO DISCHARGE | 0 | 0% | 83 | 0.3% |
| PATIENTS WITH AN ISCHEMIC STROKE OR SYSTEMIC EMBOLISM INTRA OR POST PROCEDURE AND PRIOR TO DISCHARGE | 0 | 0% | 23 | 0.1% |
| MEDIAN LENGTH OF STAY (DAYS) | 1 | | 1 | |

*Source: NCDR LAAO Registry, Q4 2018 to Q3 2019

AMERICAN COLLEGE OF CARDIOLOGY NCDR ICD REGISTRY

Since its inception in 2005, the ICD Registry has been the national standard for understanding patient selection, care and outcomes in patients receiving implantable cardioverter defibrillator (ICD) therapy. The ICD Registry empowers EP physicians in their decision making by providing them with nationally benchmarked data on patient care and outcomes.

| | MMC | ACC NCDR 50TH PERCENTILE | Q2 2018 |
|--|-------|--------------------------------|---------|
| TOTAL PROCEDURES | 338 | | |
| COMPOSITE: PROPORTION OF ICD/CRT-D IMPLANTS PRESCRIBED ALL DISCHARGE MEDICATIONS FOR WHICH THEY WERE ELIGIBLE | 95.2% | 89.5% | 98.1% |
| PROPORTION OF ICD/CRT-D PATIENTS THAT FULFILL CLASS IA , IIA, OR IIB GUIDELINES | 90.9% | 84.6% | 97.8% |

*Source: ICD Registry Rolling Four Quarters Ending Q2 2018

CARDIAC VALVE DISEASE

We offer comprehensive management and treatment options for cardiac valve disease, including aortic, mitral and tricuspid valve disease. MaineHealth physicians are at the forefront of valve dysfunction and have worked collaboratively to build upon the traditional surgical approach with emerging less-invasive technologies (such as transcatheter) for the treatment of both aortic and mitral valves.

Open surgical aortic valve replacement/repair (SAVR) has been the standard for aortic valve disease. Transcatheter aortic valve replacement (TAVR) is a minimally invasive, catheter-based procedure to replace the aortic valve with severe aortic stenosis. As an alternative to SAVR, the TAVR procedure was developed for intermediate and high-risk patients who were not candidates for an open surgical procedure. However, TAVR is now available for lower-risk patients.

Repairing a patient's mitral valve can return the patient to the quality of life they experienced prior to the onset of mitral valve disease. Performing these repairs before the disease progresses may prevent future life-threatening conditions.

Less invasive, catheter-based approaches to mitral valve repair are now emerging, and MMC offers eligible patients a procedure that uses the commercially available MitraClip device indicated for high-risk patients with degenerative mitral regurgitation.

MITRAL VALVE CLINIC

MMC formed a mitral valve clinic in 2019 with a vision to provide advanced services spanning the continuum of care and offering cutting-edge individualized care to patients with primary and secondary mitral valve disease. According to cardiac surgeon Michael Robich, MD, the MMC clinic will build on the extensive and established experience of both Maine Medical Partners — MaineHealth Cardiology and Maine Medical Partners — Cardiovascular Surgery as regional leaders in complex surgical and minimally invasive mitral valve procedures. A multidisciplinary team is working to establish the region's first Mitral Center of Excellence to provide even more advanced surgical, minimally invasive and endovascular treatments for all types of mitral valve disease.

TAVR OUTCOMES

| | 2018 | 2019* |
|---|------|-------|
| TAVR PROCEDURES | 200 | 226 |
| IN-HOSPITAL MORTALITY (UNADJUSTED) | 0.5% | 1.0% |
| TVT REGISTRY AVERAGE | 1.3% | 1.0% |
| STROKE | 3.0% | N/A |
| TVT REGISTRY AVERAGE | 1.8% | |
| AORTIC REGURGITATION (MODERATE TO SEVERE) AT 30 DAYS | 0.0% | 0.0% |
| TVT REGISTRY AVERAGE | 0.0% | 1.0% |
| SIGNIFICANT CARDIAC EVENTS | 0.0% | 0.4% |
| TVT REGISTRY AVERAGE | 0.9% | 0.5% |

Source: STS/ACC/TVT Registry
*Rolling Four Quarters Ending Q2 2019

AMI PERFUSE

Our AMI PERFUSE (Acute Myocardial Infarction Patients Emergently Re-perfused by Facilities United for STEMI Excellence) Program has been in place since 2004, with a goal of providing the highest level of care with the best possible outcomes for patients experiencing an ST-elevation myocardial infarction, regardless of the patient's location. Approximately 65% of STEMI patients are initially seen at other hospitals and transferred to MMC for cardiac catheterization and management. In most cases, these patients are given thrombolytic medication to open their arteries and restore blood flow to the heart. STEMI patients seen at hospitals close to MMC are stabilized and transferred to the MMC cardiac catheterization lab for immediate percutaneous coronary intervention (primary PCI).

2018 STEMI CASES MEETING REPERFUSION GOALS

| | | |
|------------------------------|-------|------------------|
| D2LYTIC LESS THAN 30 MINUTES | 70.9% | 100 of 141 cases |
| D2B LESS THAN 90 MINUTES | 97.0% | 98 of 101 cases |
| FMC2B LESS THAN 120 MINUTES | 88.0% | 44 of 50 cases |

CORONARY ARTERY DISEASE AND REVASCULARIZATION

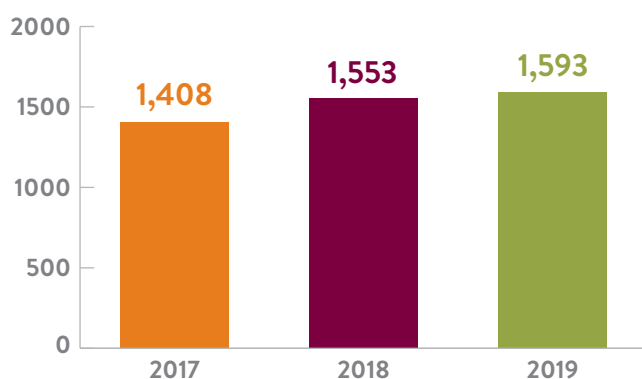
MaineHealth coronary revascularization services help people who require heart bypass surgery. We specialize in coronary artery bypass graft (CABG) procedures and percutaneous coronary intervention, such as coronary angioplasty and stent placement. Coronary revascularization services help restore blood flow to hearts with diseased arteries (coronary artery disease).

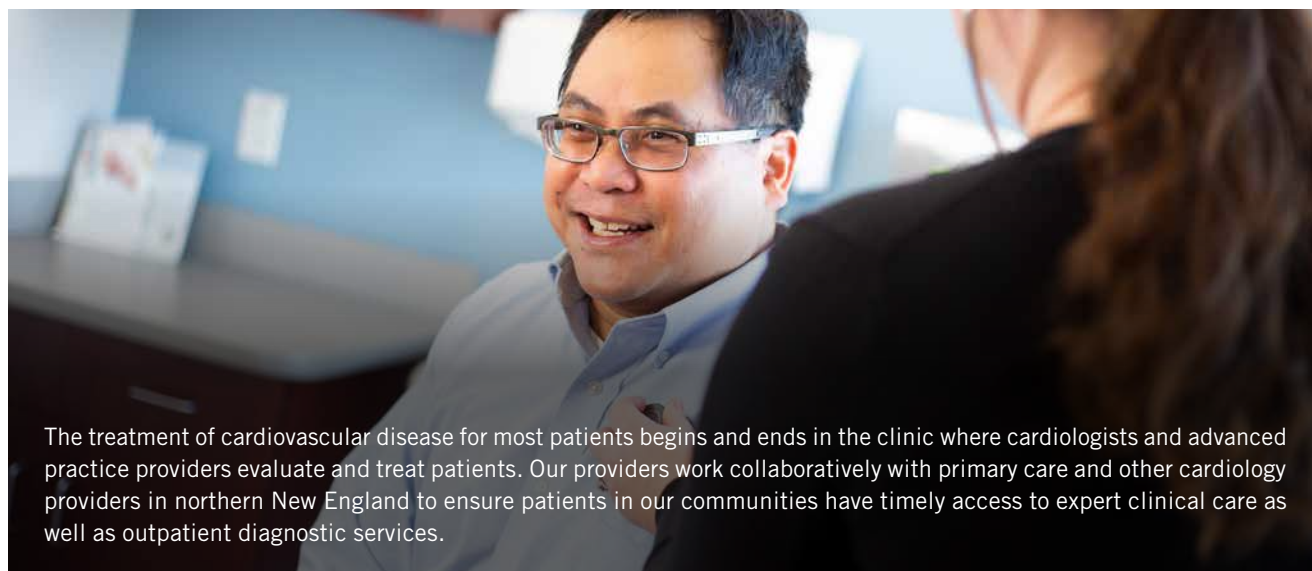
Maine Medical Center doctors performed Maine's first coronary artery bypass surgery over 40 years ago. Today, MMC not only performs more of these procedures than any other hospital in Maine, but also more than most hospitals in all New England. Many coronary artery disease cases can now be diagnosed and treated with a minimally invasive technique known as cardiac catheterization or "cath." More than 5,000 cath procedures (such as angiograms, angioplasties and stent placements) are performed each year in MMC's state-of-the-art cath lab, making it one of the highest-volume facilities in New England.

INVASIVE / INTERVENTIONAL CARDIOLOGY

Our interventional cardiologists provide other diagnostic services including hemodynamic assessments for patients with heart failure, valve disease, pulmonary hypertension and pericardial disease. Endomyocardial biopsies are performed in select patients for evaluation of cardiomyopathy and cardiac transplant rejection. The team also performs high-risk percutaneous coronary interventions including left main artery stenosis in patients at increased risk for surgery, and on those vessels with chronic total occlusion. A full range of mechanical support devices is available to prevent or treat cardiogenic shock, including Impella device and extracorporeal membrane oxygenation support with the CardioHelp system.

CORONARY INTERVENTIONS VOLUME





The treatment of cardiovascular disease for most patients begins and ends in the clinic where cardiologists and advanced practice providers evaluate and treat patients. Our providers work collaboratively with primary care and other cardiology providers in northern New England to ensure patients in our communities have timely access to expert clinical care as well as outpatient diagnostic services.

In 2019, 1,593 percutaneous coronary interventions (PCI) were performed at MMC. National trends continue to see lower numbers of PCIs, potentially due to more aggressive and successful medical management of coronary artery disease versus immediate intervention.

PCI MORTALITY

| | 2017 | 2018 |
|---|---------|--------|
| STEMI PCI | 283 | 329 |
| % TOTAL PCI PROCEDURES | 21.40 % | 19.70% |
| ACC-NCDR AVERAGE | 16.80% | 17.00% |
| STEMI RISK-ADJUSTED MORTALITY | 6.30% | 3.21% |
| ACC-NCDR 50TH PERCENTILE | 7.01% | 6.45% |
| PCI EXCLUDING STEMI RISK-ADJUSTED MORTALITY | 0.72% | 0.60% |
| ACC-NCDR 50TH PERCENTILE | 1.09% | 1.07% |
| PCI RISK ADJUSTED MORTALITY (ALL) | 1.68% | 1.04% |
| ACC-NCDR 50TH PERCENTILE | 2.03% | 1.96% |

Source: ACC-NCDR American College of Cardiology National Cardiovascular Data Registry

CARDIAC IMAGING AND DIAGNOSTICS

Our Cardiac Imaging and Diagnostics Program provides nationally recognized services to patients. The multidisciplinary team of physicians, technologists and staff provide state-of-the-art diagnostic services utilizing cutting-edge multimodality technologies. We perform the highest volume of services in the state, including the management of complex, unusual cardiovascular diseases as well as common problems, all with a focus on the patient. Our specialists have expertise in imaging for ischemic, valvular, vascular and congenital cardiovascular disease. Additionally, cardiac MRI, PET and CT services are offered. MMC has the only dedicated PET perfusion program in northern New England, imaging sarcoidosis and myocardial viability.

Many services are available at regional hospitals across our health system so that heart patients can access care close to home.

Maine Medical Partners — MaineHealth Cardiology was one of the first practices in Maine to offer in-office insertion of the Reveal LINQ Insertable Cardiac Monitor, an advanced cardiac monitor that allows physicians to continuously and wirelessly monitor a patient's heartbeat for up to three years. Physicians typically implant cardiac monitors in the hospital setting due to past reimbursement guidelines; however, new reimbursement coverage allows us to perform the procedure in the office setting. In-office procedures are another way for patients to gain access to the long-term monitoring they need.

SPORTS CARDIOLOGY

The MaineHealth Sports Cardiology Program is the only one in the state dedicated to the care of the athlete's heart. We offer specialized cardiac care to athletes and highly active individuals, whether they have symptoms suggestive of cardiovascular disease or an established cardiovascular diagnosis. Our goal is to keep athletes healthy so they can remain active in sports. In addition to training in heart disease diagnosis and treatment, our sports cardiologists have specialized expertise in the physical demands of competitive sports and the psychology of athletes. The program offers a full spectrum of diagnostic testing, including cardiac imaging, comprehensive physiologic assessment using cardiopulmonary exercise testing and access to other cardiac services. We provide recommendations for appropriate activity levels and symptom management for each athlete — helping them make decisions about when and how they can safely resume participation in their sport.



Vascular tech Ellen Bacchiocchi uses ultrasound on a heart patient



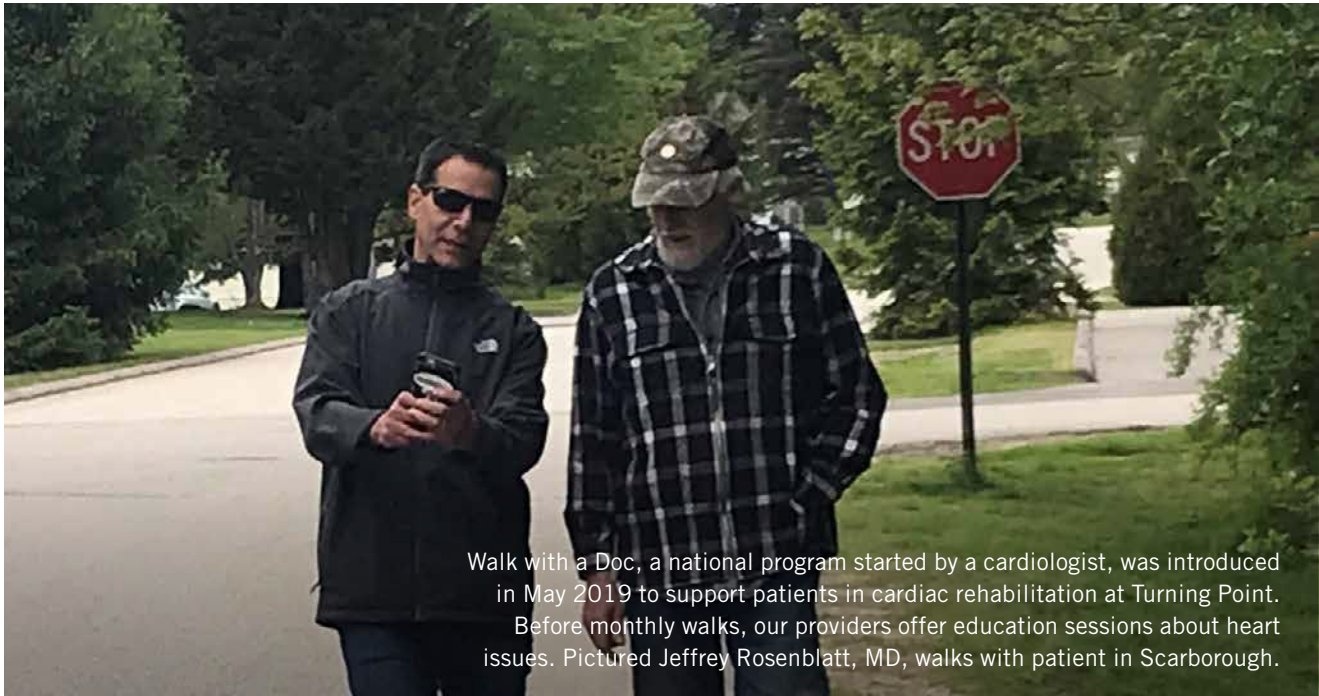
Aimee Reilly, LCSW

HEART CARE BEATS WITH EMOTIONAL SUPPORT

New program is valuable after a heart event

MMC physicians work hard every day to restore the physical health of patients with heart disease. According to Marco Diaz, MD, the “emotional challenges of being diagnosed with and living with heart conditions can be life-altering as well.” Aimee Reilly, LCSW, is helping patients, family members and physicians learn about how to restore emotional health. “Her expertise has ensured that no one faces heart disease alone or without the support they need,” said Dr. Diaz.

In our integrated program, Aimee communicates frequently with cardiologists about patients’ questions, concerns and symptoms, and updates them on patients’ behavioral health treatment goals. Research has shown that major depressive disorder rates for patients following myocardial infarction are approximately 20%, about triple the rate for the general population. A patient with depression may not be taking their medications as prescribed, may not be practicing a healthy lifestyle, or could be utilizing smoking or alcohol to cope — all of which could negatively impact the patient’s cardiac condition. “It is important for patients to know that significant changes in mood following cardiac events is common, treatable and equally as important to address as their physical needs,” Aimee explained. “The health care industry increasingly recognizes the importance of behavioral health in connection with a patient’s medical well-being. Our program expanded into cardiology as cardiologists recognized their patients’ need for behavioral support.”



Walk with a Doc, a national program started by a cardiologist, was introduced in May 2019 to support patients in cardiac rehabilitation at Turning Point. Before monthly walks, our providers offer education sessions about heart issues. Pictured Jeffrey Rosenblatt, MD, walks with patient in Scarborough.

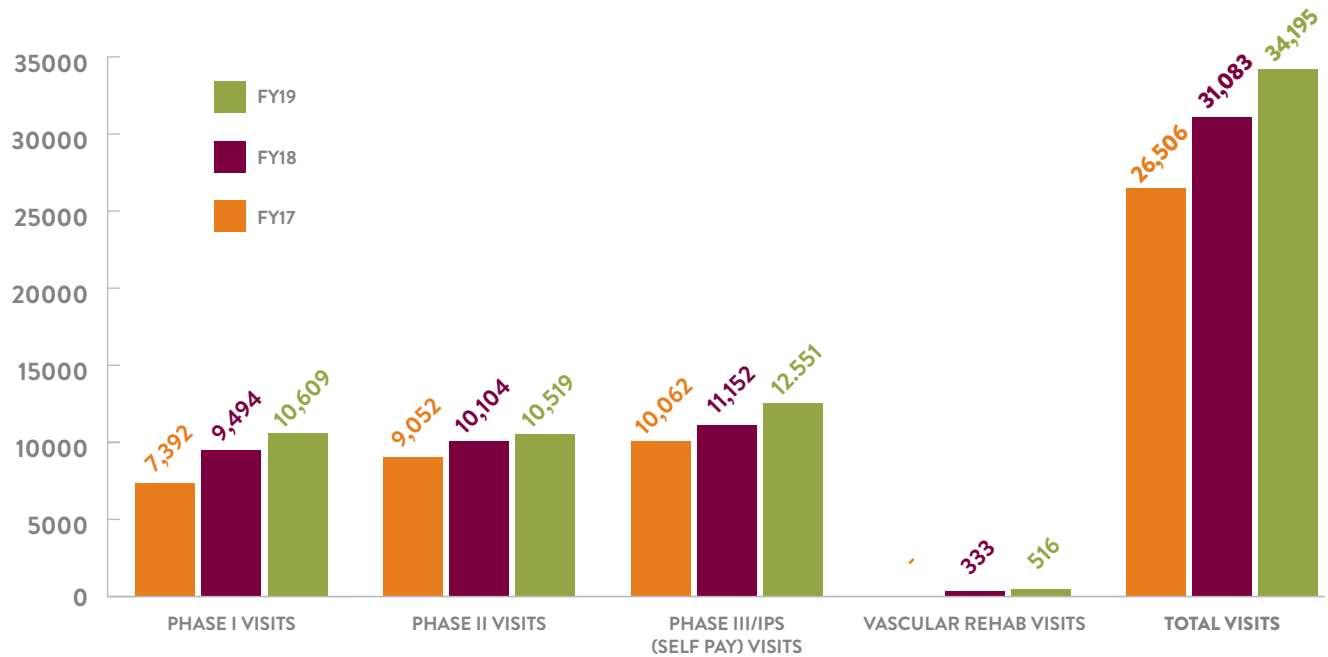
CARDIAC REHABILITATION

Cardiac rehabilitation (or rehab) programs help people with heart issues make healthy lifestyle choices to reduce the risk of future heart problems. Services include nutrition counseling, graduated exercise training, stress reduction education and more. MaineHealth offers cardiac rehab services at multiple locations across the state.

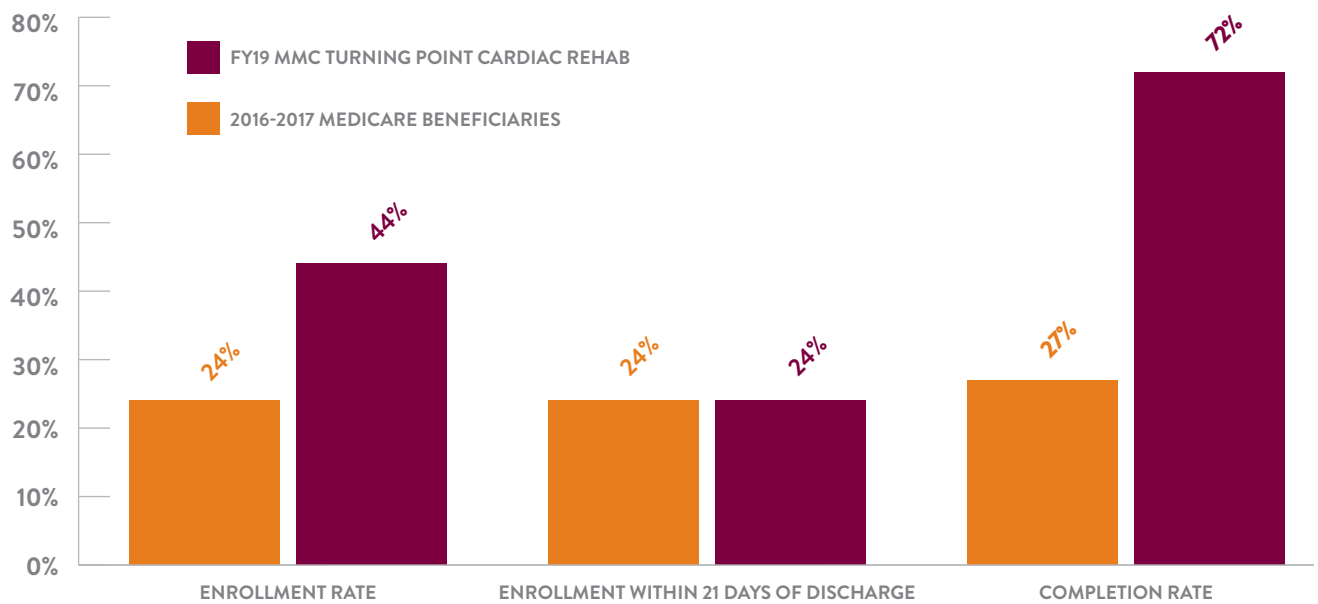
MMC's cardiac rehabilitation offering, Turning Point, is an outpatient program located at Maine Medical Partners — MaineHealth Cardiology in Scarborough. The program consists of four phases:

- Phase 1 is a visit to inpatients at MMC for education on risk-factor modification and outpatient cardiac rehab program enrollment.
- Patients return to our facility in Scarborough, or the closest facility our team can assign, to initiate Phase 2, a program of outpatient services that includes education and exercise sessions three times per week.
- We offer a Phase 3 outpatient program to Phase 2 graduates, or others with specific medical conditions who may benefit from a medically supervised exercise program.
- Finally, we encourage all our patients to participate in Phase 4, a program of independent exercise at a community-based fitness center or gym.

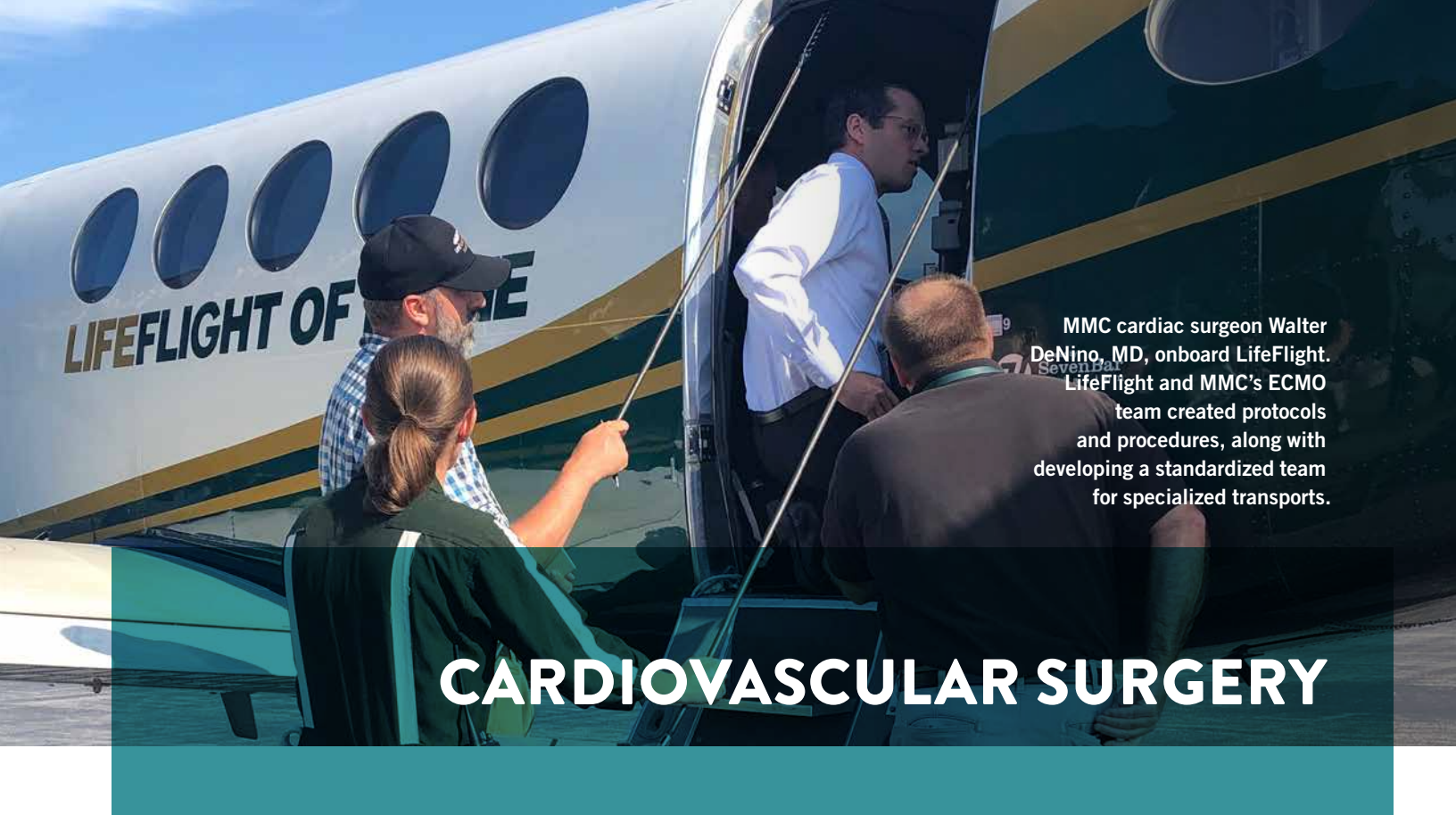
VOLUME GROWTH AT TURNING POINT CARDIAC REHABILITATION



PARTICIPATION DATA: NATIONAL VS LOCAL



Source: Circ Cardiovasc Qual Outcomes 2020; 13:e005902. DOI: 10.1161/CIRCOUTCOMES.119.005902 January 2020



MMC cardiac surgeon Walter DeNino, MD, onboard LifeFlight. LifeFlight and MMC's ECMO team created protocols and procedures, along with developing a standardized team for specialized transports.

CARDIOVASCULAR SURGERY

MaineHealth offers the state's most comprehensive resources for cardiac surgery. Our highly skilled cardiothoracic surgeons provide each patient with an individualized plan of care to best suit that patient's needs. The cardiac surgical team consists of cardiac surgeons who work with cardiac anesthesiologists, perfusionists, physician assistants, cardiac operating room staff and nursing and critical care staff who care for the patient after the operation. Our program has been recognized by U.S. News & World Report as a Best Regional Hospital and "high performing" in bypass and aortic valve surgery.

- Other areas of expertise include our elective and emergent thoracic aortic procedures, mechanical circulatory support and surgery for atrial fibrillation. We manage all aspects of this progressive disease, including acute and chronic cases, and patients with known or suspected connective tissue diseases.
- MMC is the only hospital in Maine performing EKG-gated CT angiography, which offers the most accurate assessment of the thoracic aorta.
- High surgical volume has been shown to improve the outcomes in transcatheter valve procedures. Cardiac surgeons at MMC have unparalleled experience in heart valve surgery, performing more of these surgical procedures than at any other hospital in Maine.
- The advanced valve team is comprised of cardiologists and surgeons who work closely with heart failure specialists, radiologists and palliative care staff to deliver personalized care whether that involves surgery, transcatheter treatments or optimal medical management. The team is available to assess patients who are high- or prohibitive-risk candidates for intervention.

CARDIAC SURGERY BY TYPE

| | 2017 | 2018 | 2019 |
|---|------------|------------|------------|
| ISOLATED CORONARY ARTERY BYPASS GRAFT (CABG) | 481 | 483 | 523 |
| CAB + AORTIC VALVE REPLACEMENT (AVR) | 69 | 77 | 82 |
| CAB + MITRAL VALVE REPLACEMENT (MVR) | 12 | 8 | 3 |
| CAB + MITRAL VALVE REPAIR | 22 | 17 | 23 |
| ISOLATED AORTIC VALVE REPLACEMENT | 85 | 81 | 86 |
| TRANSCATHETER AORTIC VALVE REPLACEMENT (TAVR) | 159 | 193 | 239 |
| ISOLATED MITRAL VALVE REPLACEMENT | 19 | 10 | 19 |
| AORTIC VALVE REPLACEMENT + MITRAL VALVE REPLACEMENT | 7 | 8 | 7 |
| MITRAL VALVE REPAIR | 37 | 57 | 63 |
| OTHER | 252 | 201 | 213 |
| TOTAL CORONARY ARTERY BYPASS GRAFT | 584 | 585 | 631 |
| TOTAL VALVE | 410 | 451 | 522 |

CARDIAC SURGERY OUTCOMES RISK-ADJUSTED OPERATIVE MORTALITY

| | 2017 | 2018 |
|--|-------|--------|
| ISOLATED CORONARY ARTERY BYPASS GRAFT (CABG) | 2.80% | 2.30% |
| STS* AVERAGE | 2.30% | 2.20% |
| ISOLATED AORTIC VALVE REPLACEMENT (AVR) | 0.00% | 1.30% |
| STS AVERAGE | 2.00% | 1.90% |
| AVR + CABG | 1.40% | 2.10% |
| STS AVERAGE | 3.70% | 3.80% |
| ISOLATED MITRAL VALVE REPAIR (MVRP) | 3.70% | 1.70% |
| STS AVERAGE | 1.20% | 1.10% |
| MVRP + CABG | 0.00% | 11.10% |
| STS AVERAGE | 5.30% | 4.50% |

*The Society of Thoracic Surgeons

Elizabeth Blazick, MD, Maine Medical Partners — Surgical Care, discusses carotid artery disease with a patient. We provide patients with carotid artery disease access to comprehensive, state-of-the-art treatments including carotid endarterectomy, artery stenting (trans-femoral and TCAR), artery aneurysm surgery, body tumor surgery and artery fibromuscular dysplasia.

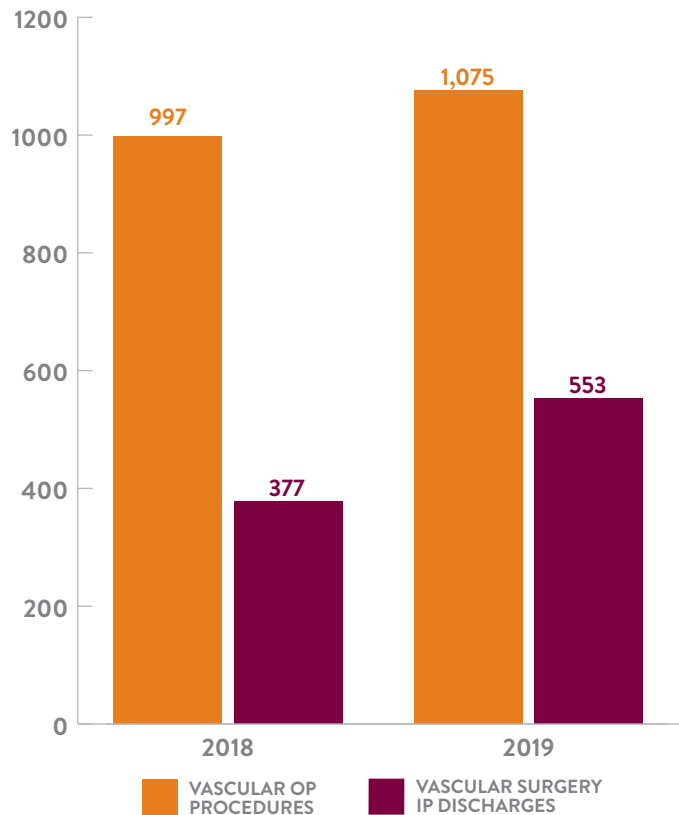
VASCULAR DISEASE AND SURGERY

AORTIC, PERIPHERAL AND INTERVENTIONAL RADIOLOGY

Our vascular services staff is committed to continuous improvement. To aid with this effort, we subscribe to nine registries that allow us to benchmark our performance against our peers across the U.S.: Carotid Artery Stent, Carotid Endarterectomy, Endovascular AAA Repair, Lower Extremity Amputation, Infra-inguinal Bypass, Supra-inguinal Bypass, Open AAA, Peripheral Vascular Intervention and Thoracic and Complex EVAR (including Endovascular Thoracic Stenting and treatment for penetrating aortic ulcers and dissections). An important aspect of improving the quality of vascular care is achieved through a commitment to seeing the patient at a long-term follow-up visit, nine to 21 months after one of these procedures.

Patients are treated in state-of-the-art facilities, such as our cutting-edge hybrid operating suite, and have access to the most advanced treatments, including clinical trials of new medications, devices and surgical techniques.

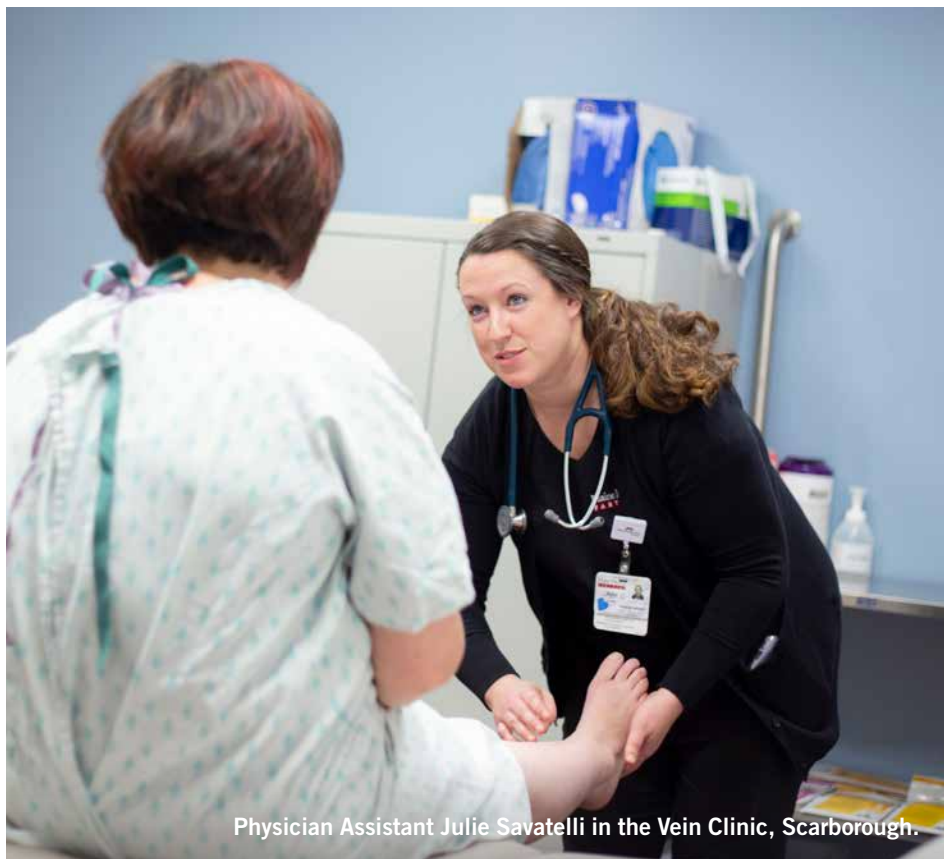
VASCULAR VOLUMES



MaineHealth offers the most-advanced vascular surgery services in Maine — both open and endovascular. Our team of highly skilled specialists includes cardiologists, vascular surgeons, interventional radiologists and diagnostic radiologists, all working together to evaluate and treat each patient. Vascular surgery includes treatment for thoracic aortic aneurysms, abdominal aortic aneurysms and aneurysms of the arteries.

QUALITY MEASURES

| | 2018 | 2019 |
|---|----------------|----------------|
| ALL AAA REPAIRS / DEATH DURING HOSPITALIZATION | 86 / 5.8% (5) | 70 / 2.9% (2) |
| ALL CAROTID REVASCULATION / NEW STROKE | 203 / 3.4% (7) | 256 / 2.7% (7) |
| LOWER EXTREMITY / AMPUTATION DURING HOSPITALIZATION | N/A | 499 / 2.9% (9) |



Physician Assistant Julie Savatelli in the Vein Clinic, Scarborough.

NEW JOINT VEIN PROGRAM

Our medical Vein Clinic in southern Maine is a joint partnership between Maine Medical Partners — MaineHealth Cardiology and Maine Medical Partners — Surgical Care/Vascular Surgery. Services include laser vein ablation, radiofrequency vein ablation, ClariVein, phlebectomy, ligation and sclerotherapy.



Pictured, left to right,
Julie Salvatelli, PA;
Kimberly Malka, MD;
Nathan Aranson, MD;
Cameron Donaldson, MD; and
Samip Vasaiwala, MD.

CARE TEAMS—ADVANCED PRACTICE PROVIDERS, CARDIAC ANESTHESIOLOGY AND NURSING

Advanced practice providers (APPs), including nurse practitioners and physician assistants, are an integral component of the ambulatory and hospital care teams within Cardiovascular Services. Team-based care is paramount to transforming cardiovascular care and improving heart health. As more patients receive team-based care from both a physician and an APP, research indicates the joint approach may improve quality of care as well as access to care for patients.

Cardiac surgery APPs provide 24/7 comprehensive care in the operating room as first assistants, in the cardiothoracic intensive care unit and in the cardiac surgery step down unit. Vascular surgery APPs provide care for patients in the hospital setting, including OR first assist and patient care in the surgical units as well as pre- and post-hospital care in the ambulatory setting. Cardiology APPs provide direct care and support to cardiology inpatients (both medical and procedural), while a separate group of APPs provides direct care to cardiology patients seen in the cardiology ambulatory setting.

The **cardiac anesthesiology** group is comprised of physicians providing around-the-clock specialty anesthesia services for our cardiac surgery patients. All are experts in managing the special needs of the cardiac patient who requires anesthetic care. Furthermore, our cardiac anesthesiologists have proven special competence in advanced intraoperative echocardiography and provide real-time intraoperative imaging services. Our anesthesiologists work closely with cardiac surgeons and cardiologists in order to ensure patient safety and well-being in the perioperative period.

Cardiovascular nurses and the interprofessional team work to create an environment rich in quality-care improvements, professional experience and progressive learning opportunities. A shared governance model ensures that nurses and interprofessionals who practice patient care have a strong voice in decisions that affect their practice. As a three-time Magnet-recognized facility, MMC is in the top two percent in the country and our nurses pursue excellence in their care of patients.



OR team (with Surgical Technologist Susan Nelson facing) preparing for a pediatric cardiac surgery



PATIENT CHANGES CAREER, INSPIRED BY THE DOCTOR WHO SAVED HER LIFE

Monica Salamone is a mother of two, and it wasn't long after the birth of her younger son that her life took a dramatic turn. Monica was living with a congenital heart condition that hadn't caused any major issues. One day at home she collapsed, and her husband called 911. Monica's heart was struggling to beat. Within her chest, the inner layer of the aorta (the large blood vessel branching off the heart) had torn. Blood was surging through the tear, causing the inner and middle layers of the aorta to separate — a very serious and usually fatal condition called an aortic dissection. Because Monica needed emergency open-heart surgery, she was transported from Southern Maine Health Care (SMHC) to MMC by ambulance. Cardiothoracic surgeon

Scott Buchanan, MD, performed Monica's operation. He later told her the team at SMHC and the paramedics who responded to her husband's 911 call had done everything perfectly right, and that their actions were key to saving her life. Monica benefitted from a coordinated system of care within the MaineHealth family of providers.

Monica had a chance to go back to school and decided to change the course of her career. She recently became a cardiovascular radiologic technologist and part of the MMC cardiovascular team. Monica now works alongside the doctor who saved her life.

RESEARCH HIGHLIGHTS

Cardiovascular Services at MaineHealth is a leader in education and research in northern New England. MMC has a long tradition of excellence in education with a full complement of residency and fellowship programs, along with ACGME-accredited training programs in Cardiovascular Medicine and Vascular Surgery. Our physicians, nurses and scientists participate in clinical trials. We are actively involved in multidisciplinary research efforts in basic and translational science at the Maine Medical Center Research Institute (MMCRI), population science and epidemiology at the Center for Outcomes Research (CORE) and education research at the Maine Institute for Teaching Excellence (MITE). This year our highlights include:

- **Access to Cardiac Clinical Trials in Rural Areas**

Robert Kramer, MD, Director of Cardiac Surgery Research and Quality Improvement at MMC, and Alexander Iribarne, MD, MS, cardiac surgeon and Director of Cardiac Surgery Research at Dartmouth-Hitchcock Medical Center (DHMC) are principal investigators on a \$3.9-million grant from the National Institute of Health's National Heart, Lung and Blood Institute (NHLBI). This grant will establish a collaborative network to increase access to cardiac surgery clinical trials among rural populations. MMC and DHMC are now linked Clinical Research Centers that support the NIH Cardiothoracic Surgical Trials Network. The grant will have a significant impact on rural cardiac surgery patients in Maine and New Hampshire, states with the oldest populations in the nation, according to the most recent U.S. Census data. Maine is also the state with the highest percentage of its population living in rural or non-metropolitan areas. People residing in rural areas of northern New England have higher-than-average rates of cardiovascular disease.

- **\$1.9M Awarded to Study Cardiac Cell Therapy in Maine**

Medical Center Chief Academic Officer, Doug Sawyer, MD, PhD, and MMCRI Faculty Scientist Calvin Vary, PhD, are the principal investigators on a \$1.9-million grant from the NHLBI to study how certain adult stem cells might be used to reverse heart failure when injected into the heart. The research team is looking into whether certain kinds of heart cells might be more effective than others in regenerating heart tissue when injected into a failing heart.

- **Anti-Aging Diets Impact Vascular Health**

Obesity is a risk factor for the accelerated development of cardiovascular disease, and a steady increase in obesity, particularly in youth, has made this condition a major public health problem. MMCRI faculty scientist Lucy Liaw, PhD is taking a closer look at diets and cardiovascular disease, thanks to her recent Transformational Project Award from the American Heart Association (AHA). The major problem the lab will address is why obesity and fat expansion lead to greater occurrence or severity of vascular disease. This research will study how anti-aging diets impact fat surrounding blood vessels and vascular health. Long-term results from studies like Dr. Liaw's could lead to potential therapies to increase health and reverse the effects of cardiovascular disease.

- **Can Resveratrol Help Patients with Diabetes and Heart Disease?**

Diabetes prevents efficient metabolism of fuel, causes inflammation and vascular disease that blocks normal blood flow and inhibits the function of the heart after injury. These changes make diabetics more susceptible to heart attacks and heart failure. AHA leads the fight against diabetes and heart disease. MMC cardiac surgeon Michael Robich, MD, received a Mentored Clinical & Population Research Award from the AHA, with Dr. Doug Sawyer serving as mentor. This project is a unique collaboration among cardiologists, cardiac surgeons and other scientists. In the first phase of this study, physicians have been safely collecting tissue from the hearts of patients undergoing heart surgery. In 2019 the second phase of the study began, which included enrolling patients to examine how resveratrol changes the metabolic profile of the heart. Understanding how the heart is impacted by diabetes and reversing its negative effects could lead to decreased rates of heart failure and death in diabetic patients and could offer new treatment options.



COORDINATION OF CARE KEEPS PATIENT MOVING

John “Kenny” Kramer is the kind of guy who just doesn’t stop moving. He never had any major health issues until one day, after carrying ten 40-pound bags of wood pellets into his shed, he collapsed at the kitchen sink. Almost immediately, Kenny regained consciousness. But his wife arranged for an ambulance to take him to the SMHC Emergency Department for a CT scan. Once the scan was complete, Dr. Sarah Shepherd determined Kenny was suffering from a large, ruptured abdominal aortic aneurysm, at which point he was airlifted to MMC for emergency surgery led by vascular surgeon Paul Bloch, MD. Kenny had an enlarged blockage in his abdomen that was preventing crucial blood flow, and it needed attention right away.

The surgery saved Kenny’s life. The next morning he was on his way home, and within a month he was back to walking two miles a day. “I had no symptoms whatsoever,” Kenny says. “I remember going to the ED in Sanford, and that’s about it until I spoke with Dr. Bloch at MMC. The coordination between the care teams was wonderful.”

PROVIDER RESOURCES AND RECOGNITION

MaineHealth is committed to knowledge sharing and the ongoing discussion of our cardiovascular best practices, clinical guidelines, research and outcomes. In the past year, we've organized valuable resources for both our regional network of cardiovascular care providers and for other health care professionals who are interested in referring a patient to our care. For more information, visit:

<https://mainehealth.org/services/cardiovascular/provider-resources>

- Care protocols and referral guidelines
- Innovation videos
- Provider interviews and case studies
- Outcomes reporting
- Provider education



MAINEHEALTH HAS RECEIVED SYSTEMWIDE ACCREDITATION FOR OUR ECHOCARDIOGRAPHY SERVICE



MAINE MEDICAL CENTER RECOGNITION



ABDOMINAL AORTIC
ANEURYSM REPAIR



AORTIC VALVE
SURGERY



HEART BYPASS
SURGERY



HEART FAILURE



PRACTICE DIRECTORY

CARDIOLOGY

MAINE MEDICAL PARTNERS – MAINEHEALTH CARDIOLOGY

| | |
|-------------|--------------|
| Scarborough | 207-885-9905 |
| Lewiston | 207-777-5300 |
| Augusta | 207-430-4321 |
| Rockport | 207-596-6410 |
| Waterville | 207-872-1800 |

LINCOLN MEDICAL PARTNERS CARDIOLOGY, MILES CAMPUS

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| Damariscotta | 207-563-4811 |
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MAINE MEDICAL PARTNERS CARDIOLOGY, ST. ANDREW'S CAMPUS

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| Boothbay | 207-885-9905 |
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MEMORIAL HOSPITAL (MAINE MEDICAL PARTNERS)

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| North Conway, NH | 207-885-9905 |
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FRANKLIN MEMORIAL HOSPITAL (MAINE MEDICAL PARTNERS)

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| Farmington | 207-779-3120 |
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SOUTHERN MAINE HEALTH CARE (MAINE MEDICAL PARTNERS)

| | |
|-------------------|--------------|
| Biddeford/Sanford | 207-282-3666 |
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WALDO COUNTY MEDICAL PARTNERS CARDIOVASCULAR MEDICINE

| | |
|---------|--------------|
| Belfast | 207-505-4675 |
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STEPHENS MEMORIAL, WESTERN MAINE HEALTH (MAINE MEDICAL PARTNERS)

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| Norway | 207-885-9905 |
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REDINGTON-FAIRVIEW GENERAL HOSPITAL (MAINE MEDICAL PARTNERS)

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| Skowhegan | 207-872-1800 |
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MID COAST CARDIOLOGY

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| Brunswick | 207-729-7939 |
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VASCULAR SURGERY

MAINE MEDICAL PARTNERS – SURGICAL CARE (VASCULAR)

| | |
|-----------------------------------|--------------|
| Portland/Lewiston/ Scarborough | 207-662-8900 |
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SOUTHERN MAINE HEALTH CARE VASCULAR SERVICES

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| Biddeford | 207-282-3666 |
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MAINE MEDICAL PARTNERS VEIN PROGRAM

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| Scarborough | 207-662-0909 |
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CARDIOVASCULAR SURGERY

MAINE MEDICAL PARTNERS – CARDIOVASCULAR SURGERY

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| Portland/Lewiston | 207-773-8161 |
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CONGENITAL HEART

MAINE MEDICAL PARTNERS – CONGENITAL HEART

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|----------|--------------|
| Portland | 207-883-5532 |
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MaineHealth

[MAINEHEALTH.ORG/CARDIOVASCULAR](https://mainehealth.org/cardiovascular)

