

Supplement to



Optimizing Efficiency in the Valve Clinic: A Review of Best Practices in Screening and Treating Severe Symptomatic Aortic Stenosis

In order to fulfill this educational activity, please visit <https://www.naccme.com/program/TAVR> to complete the post-test/evaluation and obtain your certificate.

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This journal-based activity is designed for interventional cardiologists, radiologists, clinical cardiologists, vascular medicine specialists, cardiac and vascular surgeons, nurse practitioners, cath lab technologists, and other health care professionals with a special interest in the field of interventional and vascular medicine.

LEARNING OBJECTIVES

After completing this activity, participants should be able to:

- Understand how to set up a functioning valve clinic to maximize capacity while maintaining patient care and satisfaction
- Implement best practices and appropriate process for screening patients within the clinic in a timely, yet effective, fashion
- Identify the best treatment approach for patients with ssAS utilizing a multispecialty heart team

ACTIVITY OVERVIEW

Participants will obtain a CME Supplement to the September 2019 Issue of Cath Lab Digest.

Release Date: September 2, 2019
Expiration Date: September 2, 2020
Estimated time to complete: 1 hour

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Overview

The goal of this educational article will be to help our readers identify the all-around best practices within a valve clinic. We will identify experts in the field, from a variety of sites, who will explain to our readers and learners how to effectively set up and manage a valve clinic, identify the best screening processes for maximum capacity, and identify the best treatment approaches for the patient in the clinic to allow for the utmost patient satisfaction and outcomes.

Transcatheter aortic valve replacement (TAVR), the catheter-based delivery and implantation of an aortic bioprosthesis, has been available in the United States (US) since 2011. Currently, patients with severe symptomatic aortic stenosis who are at prohibitive or extreme, high, or intermediate risk for conventional surgical aortic valve replacement (SAVR) can be considered for TAVR based on a decision made by a multidisciplinary heart team that includes interventional cardiology and cardiothoracic surgery.¹

The Centers for Medicare & Medicaid Services (CMS) has delineated criteria that centers must meet to receive reimbursement for TAVR procedures.² Criteria include: on-site surgery for heart valve procedures, on-site interventional cardiology, and an intensive care unit with personnel experienced with care of patients who have undergone SAVR. In addition, prospective TAVR programs must meet procedure volume thresholds of:²

- >50 open heart cardiac surgeries in the prior year,
- >20 SAVRs or related procedures in the past two years,
- >300 percutaneous coronary interventions (PCIs) each year,
- At least two cardiac surgeons with privileges at the facility, and
- At least one interventional cardiologist.

Cardiac surgeons and interventional cardiologists must also meet volume criteria. Surgeons must have performed >100 cardiac surgeries (of which at least 25 should have been for AVR) during their career. Interventional cardiologists must have performed at least 100 structural heart disease procedures during their career or 30 left-sided structural procedures annually. In addition, interventional cardiologists are required to undergo device-specific training from the manufacturer of a

given transcatheter aortic valve. Of note, CMS' 2019 decision memo on TAVR removes the requirement that two cardiac surgeons must assess a patient prior to a treatment decision.²

New techniques that may optimize TAVR outcomes have recently been introduced. For instance, transcaval access to the coronary vasculature through the abdominal aorta is an emerging technique for patients who are contraindicated for a transfemoral approach. Other non-transfemoral approaches include transapical, transaortic, subclavian, transcarotid, and transaxillary. Transcaval access may lower the morbidity associated with transapical and transaortic access. Compared to access through the axillary, carotid, and subclavian arteries, transcaval TAVR could lower the risk of surgical dissection and brachial plexus injury. Transcaval TAVR may also have better ergonomics for the operating physician and less tortuosity for the sheath.³

Bioprosthetic or native Aortic Scallop Intentional Laceration to prevent Coronary Artery obstruction (BASILICA) is another new technique used to reduce the incidence of post-TAVR coronary obstruction, which is associated with a 50% mortality rate and four times as likely following valve-in-valve TAVR compared to TAVR of a native aortic valve. In BASILICA, a guidewire is positioned near the hinge point of the scallop of an aortic valve leaflet. Short bursts of radiofrequency energy are applied to the guidewire while tension is applied to both ends of the guidewire. This slices the leaflet of the in vivo bioprosthetic or native valve. After implantation of the transcatheter heart valve (THV), blood can flow through the cells of the THV to the coronary artery. BASILICA has been tested on different THVs.⁴

Against this backdrop of requirements and evolving techniques, the efficiency of a valve clinic may be overlooked and is not addressed in multi-society consensus documents or clinical guidelines on valvular heart disease.^{1,5} The purpose of this article is to describe practices developed by three facilities to assist healthcare providers (HCPs) who are seeking to establish or refine a TAVR program. Staffing levels, screening processes, and ways to maximize throughput while maintaining patient satisfaction are presented.

Penn Medicine

David Brian Jones, MSN, CRNP, BC

Acute Care Nurse Practitioner
Program Manager - Penn Medicine Heart Valve Services

Heart & Vascular Center at Penn
University of Pennsylvania Health System
Philadelphia, Pennsylvania

Tell us about your institution and TAVR program.

Penn Medicine is a multi-hospital health system based in Philadelphia, Pennsylvania. Currently, Penn Medicine operates six hospitals, 10 multi-specialty care centers, as well as several office and clinic sites. Currently, three of the hospitals offer TAVR as a treatment modality for aortic valve disease and treat ~ 800 patients annually. The heart valve center network provides local access points to such treatment therapies.

Describe your staffing model.

Each entity has its own staffing model to fit the needs of its patient population. At Hospital of the University of Pennsylvania (HUP), there are five cardiac surgeons and five interventional cardiologists, along with a dedicated team of 3.5 nurse practitioners (NPs), one nurse/data coordinator, one data coordinator, and two administrative assistants who secure the day-to-day operations. There is no dedicated valve clinic coordinator. Our team of advanced practice providers (APPs) work with the data coordinators and administrative assistants. Each has a specific role of input into the patient journey. Through communication in the electronic health record (EHR), the heart team provides care from initial referral to postoperative follow-up.

Does someone assist with the screening process within your program?

Who participates in the screening process?

Everyone on the dedicated heart valve team has a hand in the screening process, from the administrative staff to the APPs. Furthermore, through education of referring providers as well as the community, the screening process now often begins prior to requesting consultation at HUP.

Describe your institute's screening process.

There are several paths by which referrals come to the heart valve center at Penn Medicine. From direct communication to

phone consults to text and email consults to EHR consult orders, the means by which each referral is operationalized is the same. Each consult—whether by direct interaction, phone, text, or email—is communicated to the team through the EHR. At the time of initial intake, the administrative assistant team obtains basic information, e.g., demographic, health insurance, healthcare provider, pharmacy, etc. They also obtain the referring physician's documentation on the patient and diagnostic results, including images. The goal is to obtain this information in 24 to 48 hours. The APP team reviews all information and provides instruction on additional required testing to be completed at the time of the consultation. This allows for a comprehensive consultation and expedites the decision for the most appropriate treatment plan.

A full itinerary of consultation details is provided to the patient and their support structure by various means (email, mail, etc.). This itinerary includes details of the involved providers and testing as well as non-clinical information, such as directions, parking, nearby food, prices, etc., to decrease any unnecessary anxieties that can arise with a multi-specialty cardiovascular team consultation.

How have you changed your screening process to make it more efficient?

With the growth of TAVR, efficiency is the backbone of any successful heart team. Over the past several years, the screening process has not changed much. However, technology—specifically the electronic transfer of records—has expedited the screening process. Reducing the time between consult to patient evaluation is critical given the increased demand for TAVR.

How many patients have you screened for TAVR since opening the program? How many ended up receiving a TAVR or surgical AVR?

Thousands of patients have been screened since 2007, when Penn Medicine first engaged in TAVR technology. The majority of those evaluated continue on a pathway to the most appropriate clinical therapy. As of July 2019, over 3,200 patients have been treated with TAVR between the HUP and Penn Presbyterian Medical Center (PPMC) campuses.

What are the biggest challenges with setting up a TAVR program?

It has been several years since our program was established. Since that time, much has changed with respect to not only the TAVR procedure, but also the guidelines by which programs can either be established or continue to operate (existing programs). The financial aspect of this technology has also changed. All of these factors are key to evaluating whether to expand TAVR to our other community campuses.

How have you prepared for future growth of your structural heart program, including other procedures?

The efficiency of the TAVR process from the preoperative to perioperative and post-operative phases has initiated conversations regarding adaptation of the same structure to other aspects of valvular heart disease such as the mitral, pulmonary, and tricuspid anatomies. Because of these conversations, we continually strive to incorporate provider and patient satisfaction as well as quality outcomes with each encounter. All of this has led to expanded access of our heart team into the community, and rendered a way to increase our presence and capacity for treatment of such disorders.

From screening to diagnosis to treatment, what sets your facility apart from others and makes the process exceptional?

Efficiency of the screening process and emphasis on customer service are key differentiators for Penn Medicine. As several clinical and non-clinical personnel have a hand in this customer service process, Penn Medicine has ensured that customer service is a top priority, not only in cardiovascular diseases, but across its health system as a whole. Additionally, we are fortunate to have individually invested members of the heart valve team who make customer service and efficiency top priorities. This, coupled with the quality clinical outcomes, will continue to set the foundation for the heart valve center at Penn to remain a top-tier program.

How do you maximize the number of patients seen and treated while maintaining a positive patient experience and satisfaction rate?

With the continued in-take efficiencies and customer service provided with this population, we opted to shift our focus away from particular days and locations for evaluation. We now consult with outpatients each weekday, which has been enabled by evaluating patients at our community centers, not

just at our centers that offer TAVR. With these extensions closer to the patient's home and closer to the referring providers' locations, we have added another layer of patient and provider satisfaction while increasing the number of patients seen. However, it is also crucial to understand that there must be an efficient infrastructure to handle the increased screenings. With this comes increased hybrid operating room (OR)/cath lab availability, increased bed availability, and increased staffing. For us, hybrid OR capabilities remain essential. Currently, having access to one of three hybrid ORs on any given day has facilitated the increased volume.

To ensure patient satisfaction, each individual is asked throughout the process for feedback [and to complete] the surveys they may receive from the health system. This feedback helps us understand where modifications may be necessary sooner than later. For referring provider satisfaction, we select various practices every six to eight months and include a brief questionnaire to ensure their satisfaction. Additionally, we have regular monthly meetings with both Penn and non-Penn providers at each of our campuses, which also identify needed operational modifications.

Memorial Health University Medical Center Dale Daly, MD

Cardiovascular Disease, Interventional Cardiology
Memorial Health University Medical Center
Savannah, Georgia

Tell us about your institution and TAVR program.

Memorial Health University Medical Center, a 612-bed hospital located in Savannah, Georgia, is part of HCA Healthcare's multinational network. The TAVR program, which was established in 2016, has screened nearly 600 patients to date. In 2017, the number of TAVR procedures rose by 23%. Growth accelerated to 42% in 2018.

Describe your staffing model.

For the TAVR program at Memorial Health, we have one cardiac surgeon, one interventional cardiologist, and one registered nurse who is the nurse coordinator. We recently added a nurse practitioner. The nurse coordinator facilitates all aspects of pre- and post-TAVR care and interacts with the many HCPs involved with the patient:

Figure 1. Memorial Health: SAVR and TAVR Volume

Year	AV Surgical Volume	TAVR Volume	Vol. Pts. Screened
2016	52	60	112
2017	69	74	143
2018	74	105	179
2019*	34	79	113
Total	229	318	547
		58% (318/547)	

AV = Aortic valve. *As of June 2019.

primary care physicians (PCPs), nephrologists, hematologists, dentists, pharmacists, etc. In addition, the care coordinator acts as the liaison to families and caregivers.

Does someone assist with the screening process within your program? Who participates in the screening process?

The nurse coordinator manages the screening process under the direction of the physicians. The heart team embraces a multidisciplinary approach with input from cardiac surgeons, cardiologists, radiologists, interventional radiologists, and nephrologists, among others.

Describe your institute’s screening process.

We have a pre-screening process. The nurse coordinator works with the referring physician to obtain the patient’s history and test results. Most patients have had an echocardiogram test (echo) prior to their referral, but sometimes the echo needs to be repeated. The need for a pulmonary function test is determined on a case-by-case basis during pre-screening. The coordinator facilitates the scheduling of office visits, computed tomography angiography (CTA), cardiac catheterization, carotid ultrasound, and other testing as needed. A pharmacologic nuclear stress test is done as a substitute for CTA if the patient has high or prohibitive risk for surgical aortic valve replacement (SAVR) or if the patient has stage IV chronic kidney disease (CKD). Based on creatinine results, we discuss completing the CTA and cardiac catheterization during the same visit for patients with normal kidney function. This includes a discussion of contrast dye and dye loads, as well as pre-hydration and post-hydration periods (two hours and four hours, respectively).

On the day of evaluation, all patients undergo assessment of frailty, a mini mental state examination (MMSE), and a 5-minute

walking test (5MWT). For patients who can undergo CTA and cardiac catheterization on the same day, the nurse coordinator meets with the patient and families during the pre-hydration period to complete education with brochures, videos, and discussion. The Kansas City Cardiomyopathy Questionnaire (KCCQ) is completed at this time, along with MMSE, 5MWT, and grip testing.

During cardiac catheterization, contrast use is kept to a minimum. Carotid ultrasound is performed in the post-hydration period after cardiac catheterization and CTA have been completed.

How have you changed your screening process to make it more efficient?

We dedicate one day each week for patient screening at our centrally located structural heart clinic. We initiated the single screening day for patient convenience, as some patients have to drive 120 miles to visit the center. Some patients can’t afford to make multiple visits or stay overnight in the area. Now, the patient sees the cardiac surgeon and interventional cardiologist on the same day and undergoes any testing that has not yet been performed. As a result, a decision can be quickly made as to the best treatment option for the patient. Our goal is to have the patient’s third visit be for surgery prep. The patient meets with the both the interventional cardiologist and cardiac surgeon in the same office space 2-3 weeks later to discuss evaluation results, recommended treatment, and next steps.

How many patients have you screened for TAVR since opening the program? How many ended up receiving a TAVR or surgical AVR?

Since the program’s inception in 2016, we have screened nearly 600 patients for TAVR. Nearly 60% of patients have undergone TAVR, with the remainder having SAVR or not having anything done

for a variety of reasons. Initiating a TAVR program has had a positive effect on our SAVR volumes, which increased 32% in 2017.

What are the biggest challenges with setting up a TAVR program?

There were several challenges with setting up a TAVR program, including development of a hybrid angiography suite, coordination with all involved departments, streamlining of necessary diagnostic tests, and educating referring physicians. It’s essential that you have a core team of interventional cardiologists and cardiothoracic surgeons who are dedicated to the TAVR program. Their ownership and belief in the program translates to the rest of the team as well as the patients. A solid, experienced cath lab team is critical.

Having a nurse coordinator who is dedicated to the program and patients is also key. The nurse coordinator ensures that relevant departments and HCPs are informed of a patient’s status and expedites testing.

Finally, establishing a rapport with referring physicians is critical. In the beginning, we hosted lunches and dinners with referring physicians. One-on-one conversations were also important to educate our referring physicians.

How have you prepared for future growth of your structural heart program, including other procedures?

We adopted a minimalist approach to percutaneous interventions in 2017. This includes using monitored anesthesia care instead of general anesthesia, and less-invasive equipment. Foley catheters aren’t used unless required. In most cases, patients only need an overnight stay at the hospital. The minimalist approach has increased our efficiency and decreased the length of stay. It has had a positive effect on patient satisfaction and driven word-of-mouth advertising for our program.

We have evolved into a comprehensive structural heart program and offer procedures for percutaneous left atrial appendage (LAA) occlusion, patent foramen ovale (PFO) closure, and mitral valve disease. We added a nurse coordinator for our LAA occlusion program and recently hired a full-time nurse practitioner.

From screening to diagnosis to treatment, what sets your facility apart from others and makes the process exceptional?

Since the inception of our TAVR program, we've had the same heart team who feels ownership of, and commitment to, the program. We also view our program as a concierge service. Our aim is to offer one-stop shopping for structural heart disease.

Most importantly, it is our focus on patient satisfaction. Our entire team tries to reduce stressors on our patients. Having a point person for patients to contact with questions positively impacts how the patient views his or her experience. Patients are seeking personal attention from the medical team. They don't want to be just a number and a birthdate. We are proud of our prompt response to our patients. They have a direct line to our nurse coordinator who, in turn, has a direct line to the interventional cardiologist and the surgeon.

How do you maximize the number of patients seen and treated while maintaining a positive patient experience and satisfaction rate?

Knowing roles and responsibilities, along with communication, is key to optimizing throughput in a TAVR program. The nurse coordinator plays an important role in facilitating office visits and diagnostic tests, as well as being a liaison with other HCPs and families. The minimalist approach to TAVR also enables us to maximize the number of patients treated and to enhance patient satisfaction. We actively seek patient feedback and ask patients to rate their satisfaction and fill out discharge surveys.

Mid-Atlantic Permanente Medical Group Benjamin Galper, MD, MPH

Interventional Cardiology
Director, Structural Heart Disease Program
Mid-Atlantic Permanente Medical Group
McLean, Virginia

Tell us about your institution and TAVR program.

Partnering with Kaiser Permanente of the Mid-Atlantic States, Mid-Atlantic Permanente Medical Group (MAPMG) cares for nearly 800,000 patients over a large geographic area, which includes Virginia, Maryland, and Washington, DC. We have performed 230 TAVRs since the program's inception in January 2016. We perform all TAVRs for the entire mid-Atlantic region at Virginia Hospital Center (VHC), which is located in Arlington, Virginia. A challenge is to ensure that the experience of a patient who lives north of Baltimore (100 miles from VHC) is the same as the patient who lives a few blocks from the hospital.

Describe your staffing model.

We have one interventional cardiologist who performs TAVR, and two cardiac surgeons. We recently hired a full-time structural heart coordinator who has been a tremendous resource for our patients and our program. Through regular contact with structural heart patients from initial referral to more than one-year post-TAVR, she not only makes sure that patients are doing well clinically, but that they and their families have a clear understanding of the TAVR evaluation process, the procedure itself, and post-procedure follow-up. As a result, patients from across our region feel they have an advocate and personal adviser that can help them through the logistics of their TAVR evaluation, and serve as a resource for any questions or concerns they may have.

Additionally, we have a coordinator at VHC who assists with scheduling cases, ensuring our inventory is well-stocked, and coordinating care of patients between MAPMG and VHC. Lastly, we have an incredibly strong group of nurses and cath lab techs who are involved in every TAVR case.

Does someone assist with the screening process within your program? Who participates in the screening process?

We employ a regional process, engaging primary cardiologists and using technology to expedite screening. Patients with severe symptomatic aortic stenosis are identified by their primary cardiologist and their chart is then routed via a secure message system in our electronic medical record for evaluation. Patients are then contacted, and frequently a conference call is set up with their families. Occasionally we will perform video visits with the patient and family. During these conversations, we discuss the patient's symptoms, the natural history and prognosis of severe aortic stenosis, options for treatment (including TAVR and surgical aortic valve replacement), the TAVR evaluation process, and the risks and benefits of TAVR.

The structural heart coordinator then organizes the details of the TAVR evaluation, including scheduling, answering questions related to the details of the evaluation process, and addressing any additional concerns the patients may have. The structural heart coordinator serves as the quarterback for our patients and works with them at every step of the evaluation, from referral to post-implant follow-up. Patients are given the structural heart coordinator's

work cell phone. Having direct access to the coordinator allows the patients to feel cared for and sets a tone that we will support them through every step of what is a daunting and anxiety-provoking experience for many patients.

Describe your institute's screening process.

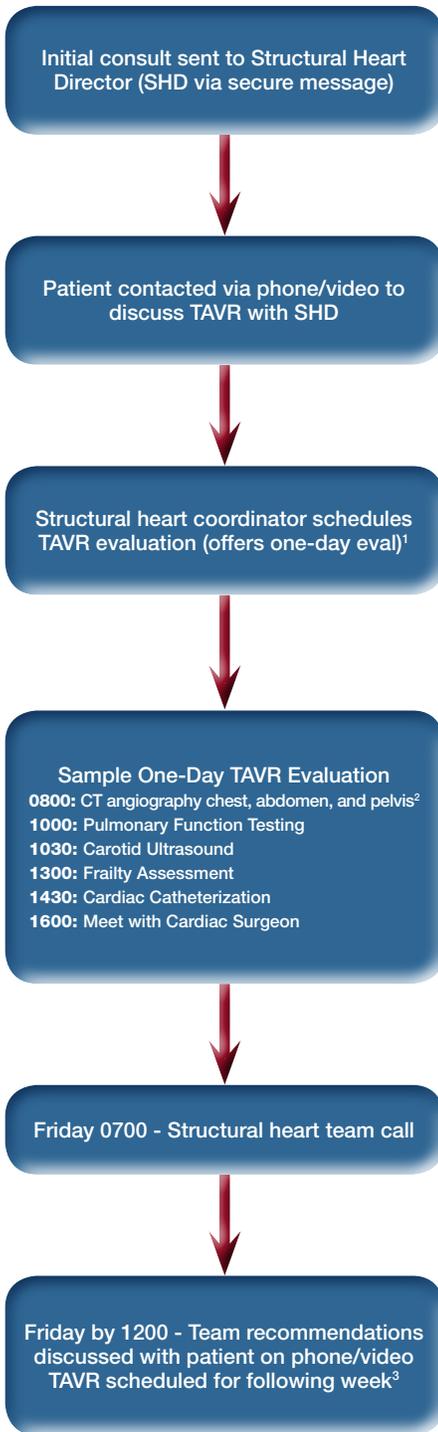
Given our large regional network, our initial screening process is typically done completely virtually with phone and video conferences with patients and families to discuss TAVR prior to scheduling a TAVR evaluation. Respecting the far distance some of our patients need to travel, we created a one-day TAVR evaluation where all testing and consultations are performed in one setting and our patients know the plan for treatment less than 24 hours after their testing.

The one-day TAVR evaluation includes meeting with the cardiac surgeon and the interventional cardiologist. Frailty and quality-of-life testing is performed by our VHC TAVR coordinator. Other tests performed during the one-day evaluation include: CTA; chest, abdomen, and pelvis non-invasive testing, including pulmonary function testing and carotid doppler ultrasound; and right and left heart catheterization. Patients with severe kidney disease undergo non-contrast cardiac magnetic resonance imaging (MRI) and transesophageal echocardiography (TEE) for valve sizing. Little to no contrast is used during cardiac catheterization for patients with severe kidney disease. Evaluations occur at our Northern Virginia office hub and at VHC.

The next day, the structural heart team discusses patients being considered for TAVR on a conference call. The call includes interventional cardiology, cardiac surgery, both the MAPMG and VHC TAVR coordinators, and structural heart team nurses and cath lab staff. The optimal treatment strategy is determined for each patient. Patients and their families are contacted that morning through a pre-arranged conference call or video visit to discuss the recommendations of the structural heart team and to schedule TAVR, if appropriate. Thereafter, our structural heart coordinator organizes scheduling of TAVR or other treatment. Our time from initial contact to TAVR implant is 16.8 days. Our goal is to perform TAVR within five days of the one-day evaluation.

How have you changed your screening process to make it more efficient?

Figure 2. MAPMG One-Day TAVR Evaluation



¹ One-day evaluation is default evaluation pathway. Patients may choose to undergo evaluation over more than one day.

² Patients with severe kidney disease also undergo one-day evaluation, which consists of cardiac MRI, TEE, and intravascular ultrasound of iliac and femoral arteries during cardiac cath.

³ For patients who desire to schedule TAVR implant as soon as possible, TAVR is typically scheduled for the Tuesday following their one-day evaluation. If that Tuesday is full, patient would be scheduled for following Thursday (goal is for TAVR implant within one week of evaluation).

Making our TAVR screening process efficient is a top priority. Because of the wide geographic distribution of our patients, their overall frailty, and the large number of family members involved in a patient's care, we felt that it was important to create a system that minimizes travel and disruptions in the lives of patients and their families. As a result, we created the one-day TAVR evaluation process as discussed above. We are currently developing plans that would allow one-day evaluations to occur in our Baltimore center, so patients who live farthest from VHC can undergo evaluation closer to home.

How many patients have you screened for TAVR since opening the program? How many ended up receiving a TAVR or surgical AVR?

To date, we have screened 363 patients with aortic stenosis in our structural heart program and we have performed 230 TAVRs. Of patients evaluated, 63% have undergone TAVR, 19% have undergone surgical AVR, 17% were declined for intervention because they were deemed too frail or had other co-morbidities (such as advanced cancer), 7% are still undergoing evaluation, and 4% had other procedures (such as balloon aortic valvuloplasty).

What are the biggest challenges with setting up a TAVR program?

The biggest challenge, in general, to a successful TAVR program is ensuring that all members of the diverse structural heart team are invested in the concept of TAVR and the growth of the program. Cardiologists and surgeons are all equal and active members of the structural heart team focused on ensuring optimal outcomes for every patient.

Another challenge is the cost and investment needed to start a program, given the relatively low level of reimbursement compared to the cost of the valve. It may seem logical when starting a program to focus less on efficiency and more on performing as many tests and providing as many clinical services as possible for each patient to ensure optimal outcomes. To be successful and sustainable, the program needs to focus on both efficiency and realizing the highest-quality outcomes for patients.

We started our program with a focus on minimalist TAVR, in which procedures were performed using moderate conscious sedation instead of general anesthesia, reducing the use of central lines, and performing cases

in the cath lab, not the OR. Shortly after starting our program, we also instituted a fast-track protocol in which patients recovered outside of an intensive care unit setting. In general, patients are out of bed and walking by the evening of their TAVR procedure, with a goal of next-day discharge. As a result, our patients are happy and home in their beds with their families sooner, and we have saved substantial money as a program.

How have you prepared for future growth of your structural heart program, including other procedures?

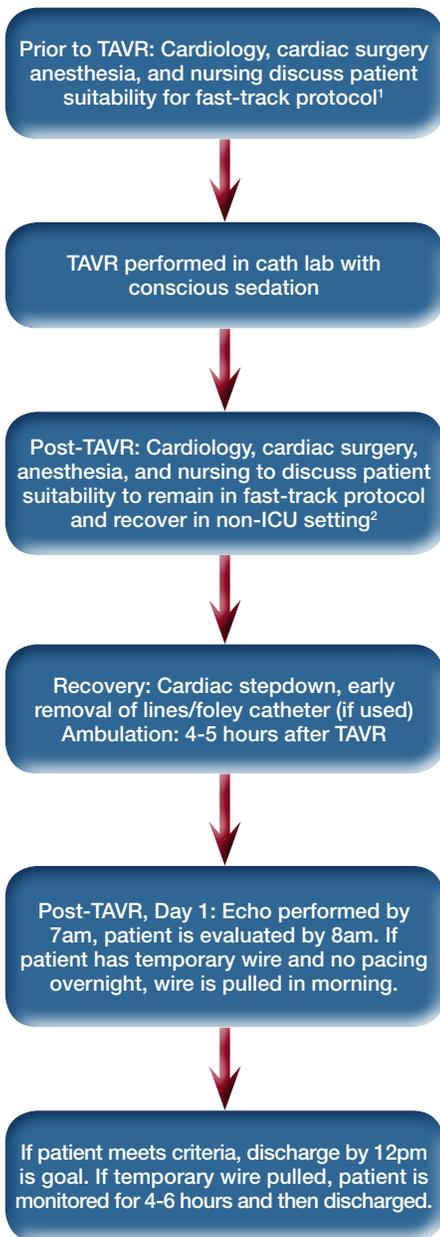
Since starting our TAVR program in 2016, our structural heart program has rapidly expanded. Over the last two years, we have added percutaneous LAA occlusion and mitral valve procedures. We have also performed more complex approaches to TAVR, including transcaval access and BASILICA. We have added valve-in-valve and valve-in-ring transcatheter mitral valve replacement (TMVR), and transcatheter pulmonic and tricuspid valve-in-valve replacement. All of our structural heart procedures focus on efficiency and use a minimalist approach, so even our first BASILICA patient and TMVRs went home the day after their procedure.

From screening to diagnosis to treatment, what sets your facility apart from others and makes the process exceptional?

The MAPMG structural heart disease program serves a geographically distributed patient population in a highly efficient, truly regionalized manner. Our TAVR evaluation condenses a process that can sometimes take more than a month in some valve centers into a single day. Our rapid turnaround from first point of contact with the valve team to TAVR implant of about 17 days is weeks shorter than many other valve programs.

Additionally, our post-TAVR care fast-track protocol is unique and has led to TAVR being performed in a minimalist manner with a focus on patient comfort and early discharge. Our average length of stay is 1.4 days, with two-thirds of patients discharged the next day. As our relatively new program continues to grow and expand both in terms of case volume and complexity, we have continued to focus on our goal of being an efficient, high-quality, regional program with an emphasis on patient comfort, quality of life, and excellent outcomes.

Figure 3. MAPMG Fast-Track TAVR Protocol



¹ Fast-track protocol is default pathway for TAVR. Exclusion criteria for fast-track protocol are severe left ventricular dysfunction (LVEF <35%), severe right heart failure, severe pulmonary hypertension, BMI >50, and non-femoral TAVR access.

² Patients with major procedural complications and those who required primary arteriotomy closure, vasopressors, or pacemaker support were considered protocol failures and would recover in ICU.

³ Criteria for next-day discharge include patient having stable vitals off pressors and supplemental O₂ (unless on home O₂), ability to ambulate on their own or at their baseline functional status, stable labs, no need for cardiac pacing for 24 hours, and access site without hematoma or bleeding. Patients excluded from fast-track protocol who meet criteria can still be discharged next day.

How do you maximize the number of patients seen and treated while maintaining a positive patient experience and satisfaction rate?

A focus of our program is patient satisfaction and rapid throughput from referral to TAVR implant. To maximize the number of patients seen and treated, we perform much of the TAVR evaluation process remotely with phone and video conferences with patients. By the time patients present for evaluation, they are well-informed about TAVR and are excited to move forward with the procedure. The one-day TAVR evaluation process, our post-TAVR care fast-track protocol, and regular contact with the structural heart team have led to our patients being highly satisfied with our program.

Since establishing our fast-track post-TAVR care protocol, our length of stay after TAVR has been reduced to 1.4 days, more than two-thirds of patients are discharged the next day, and we have saved more than \$5,500 per case, all while demonstrating excellent short- and long-term outcomes. Given the thin margins on TAVR in general, focusing on achieving excellent clinical results as well as on efficiency and cost savings will allow a new TAVR program to flourish, and lead to higher patient satisfaction and long-term financial sustainability of the program.

Summary

Commitment from the heart team (interventional cardiology and cardiac surgery) is critical for establishing a TAVR program. Staffing models vary but many programs benefit from having a valve coordinator. Regardless of the staffing model, team members need to understand their roles and responsibilities; communication with other team members is essential. Many programs benefit from having a valve coordinator who often is the point person for record retrieval, scheduling office and test visits, and day-to-day interaction with patients and their families.

Patient satisfaction is a priority for successful TAVR programs. Minimizing patient stress and anxiety is important, which can be achieved through patient education and reducing obstacles to patient evaluation. Having a contact person to answer questions, such as a valve coordinator or a dedicated allied professional, can greatly relieve patient anxiety and enhance satisfaction. An expedited screening process, scheduling treatment (TAVR or SAVR) as

soon as possible, and a short hospital stay are also associated with increased patient satisfaction. Successful TAVR programs actively seek patient feedback and refine operations as needed.

Efficiency is mandatory for optimizing the number of patients who can be evaluated and treated. Technology (EHRs, video conferencing, etc.) is widely used to expedite patient screening. Newer programs became more efficient by establishing a one-day patient assessment, during which a candidate can be seen by the heart team and complete necessary tests such as CTA and cardiac catheterization. More established programs have educated referring physicians to perform some pre-screening and offer formal patient evaluation at different sites each weekday. Adopting the minimalist approach to TAVR procedures can maximize use of procedure rooms and hospital beds. Many of the tools and protocols developed for optimizing a TAVR program can be applied to other percutaneous structural heart procedures.

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