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Improving Preadmission Testing Nurses' Knowledge of Aortic Stenosis and Transcatheter Aortic Valve Replacement

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The American Heart Association (2016) reports aortic stenosis (AS) is one of the most serious and common valvular disease problems. In the U.S., an estimated 2.7 million people over the age of 75 have AS. Representing a prevalence of AS of 12.4%, severe AS is present in 3.4% of this population (Osnabrugge et al., 2013). According to the US Census Bureau, adults age 65 and older are projected to increase to 74 million by 2030 (Colby & Ortman, 2015). Patients with AS may remain asymptomatic for many years. Nevertheless, once patients become symptomatic, there is a mortality rate of approximately 50% in the following one to two years without aortic valve replacement (Chizner & Pearle, 1980). Critical AS can result in sudden death (McGhee, 2015).

Surgical aortic valve replacement (SAVR) was the traditional method of valve replacement. Unfortunately, 30%–40% of patients are not eligible for SAVR due to multiple co-morbidities (Bourantas & Serruys, 2014). In 2002, the first non-surgical aortic valve replacement was done in France using a transcatheter delivery system. Following European and Canadian clinical trials, the transcatheter aortic valve replacement (TAVR) procedure received FDA approval in 2011 for inoperable patients and for high surgical risk patients in 2012 (Dvir et al., 2012). Aortic valve disease is one of the most serious and common valvular disease disorder, especially among the elderly. Transcatheter aortic valve replacement has become an effective and increasingly prevalent method of treating severe aortic stenosis.

Clinical Leadership Theme

The clinical leadership theme of this project is one of the Clinical Nurse Leader (CNL) as an educator and information manager in the care environment, educating healthcare professionals to provide care that is patient-centered and evidence-based (American Association of Colleges of Nursing, 2013). The global aim of this project is to improve the PreAdmission Testing (PAT)

nurses' knowledge of care needs for patients with severe AS who will be undergoing a TAVR procedure at Mills-Peninsula Health Services. The process begins with the initial referral of the patient to the interventional cardiologist who then refers the patient to the Valve Clinic Coordinator. The process ends with the patient discharge from the hospital. By working with the nurses involved in this procedure, I expect nurses to gain greater knowledge of severe AS, the TAVR procedure, patient selection, and expected patient progress thus decreasing the knowledge gap, improving nurses' knowledge satisfaction, and productivity leading to improved quality of patient care. Gaps in nursing knowledge have been identified and are impacting nurses' satisfaction in providing care for this specific patient population, decreasing productivity, and has led to inconsistent care.

The integration of new knowledge and evidence-based research into nursing care practice is an ongoing challenge. At Mills-Peninsula Health Services, a new structural heart program was developed to provide cutting edge treatment of severe AS for patients with moderate to high operative risk. Transcatheter aortic valve replacement provides an alternative treatment modality for patients who previously only had a surgical option for aortic valve replacement. Poor decision making leading to ineffectiveness and inefficiency has been cited as one of the main reasons for variation in practice and optimal care delivery failures (International Council of Nurses, 2012).

The American Association of Colleges of Nursing (AACN, 2013) recognizes the CNL functions as an educator to facilitate learning by using current information, materials, and technologies in conjunction with appropriate teaching strategies and principles. As information manager, the CNL possess the knowledge regarding current research findings and health information resources (AACN, 2013). Using this knowledge, the CNL can integrate technology

and information systems to put "knowledge at the point of care" (AACN, 2013, p. 38) to improve care provision and outcomes. "Intentional training and development of all staff is key to professional formation and optimal contributions to the microsystem" (Nelson, Batalden, & Godfrey, 2007, p. 22). This project was undertaken as an evidence-based change of practice project at Mills-Peninsula Health services and as such was not formally supervised by the Institutional Review Board.

Statement of the Problem

Mills-Peninsula Health Services' new TAVR program for patients with severe AS has had rapid growth while developing program processes. Pollak, Mack, and Homes (2014) describes TAVR as "a transformative technology for the treatment of aortic stenosis" (p. 610). This rapidly changing advancement in technology and treatment of severe aortic stenosis has contributed to knowledge gaps in nursing practice. With fast development and expansion of this relatively new technology and a constantly evolving TAVR program, there has been minimal time for staff education and development on the care and education required for this specific patient population. Staff have struggled with understanding their unique role and contribution to the patient's care. This has resulted in care that at times is fragmented, education that is conflicting, and staff who are frustrated due to lack of adequate knowledge of the disease process, TAVR procedure, and progressive care expectations. International Council of Nurses (2012) reports one of the main reasons for failure of optimal care delivery and variation of practice that contributes to inefficiency and ineffectiveness is poor decision making.

My project examines the impact of an educational program for PAT nurses on their satisfaction with their knowledge of severe aortic stenosis and TAVR procedure including patient selection. While Balas and Boren (2000) report that it often takes up to 17 years for

research findings to be incorporated into clinical practice, a goal of the TAVR program is to be on the forefront of innovation and evidence-based practice implementation. McCaughan et al. (2002) note despite availability of evidence-based guidelines and current evidence, there continues to be barriers to implementing recommendations into practice. Thomson (1998) reports a knowledge gap often exists between research and practice, with education as a method to bridge the gap.

Project Overview

Through the development and implementation of a staff educational program for PAT nurses about severe AS and TAVR procedure including patient selection, the revised goal of this project is following the implementation of a staff education program for PAT nurses, there will be a 10% improvement in nursing knowledge of the pathophysiology of severe AS, TAVR patient selection criteria, TAVR procedure, and care needs provided to TAVR patients by PAT nurses by October 24, 2016. A secondary goal of the project is a 10% improvement in the PAT nurses' satisfaction with their knowledge when providing care to TAVR patients. It is hoped that a tertiary goal of decreasing the time needed to complete a PAT appointment by 10% for this patient population will also be realized. Project implementation will be through a series of informal and formal educational sessions developed and refined through Plan-Do-Study-Act (PDSA) cycles.

Beginning with three regular, seasoned PAT nurses, then spreading to include to an additional five PAT nurses, specific aims of the educational projects are as follows:

- individual one-on-one training sessions with the three main TAVR PAT nurses about the overall TAVR procedure, including viewing of a short animated video on the procedure by September 30, 2016;

- informal teaching with current TAVR PAT nurses on patient educational information packets for preprocedure and postprocedure care, including the provision and training on wall posters depicting AS and TAVR procedure by October 7, 2016; and
- formal one-hour comprehensive inservice with all available PAT nurses covering the pathophysiology of severe AS, patient selection for treatment with TAVR procedure, the TAVR procedure essentials, and specific care requirements for patients eligible for TAVR procedure by October 24, 2016.

Employing a multi-phase approach using various teaching strategies over time provides the PAT nurses with the opportunity to internalize the material and incorporate it into their care routine. Targeting the three regular PAT nurses who currently perform the preprocedure TAVR patient interview and teaching allowed me to enlist them as unit champions for this project.

Rationale

Gaps in nurses' knowledge leads to inconsistent practice that is not evidence–based that leads to nurse dissatisfaction, suboptimal quality of patient care, and potential patient safety issues. AACN (2013) reports CNLs translate and integrate scholarship into practice by leading "change initiatives to decrease or eliminate discrepancies between actual practices and identified standards of care" (p. 14). The TAVR clinical microsystem (Appendix A) is an interdisciplinary group of staff who work together on a regular basis providing care to patients being evaluated for TAVR, through the TAVR process, and post-procedure. For this project, a subsection of the microsystem, the PAT nurses, was chosen as they are involved in the preprocedure care of the patient and can set the tone for the entire patient experience. Through a needs assessment, the data analysis revealed a gap in the nurses' knowledge identified through discussions with the PAT nurses and project pre-implementation surveys (Appendix B). Furthermore, the PAT nurses

have expressed frustration and dissatisfaction in their lack of knowledge in caring for this specific patient population. Initial results of pre-implementation surveys corroborated the lack of knowledge and dissatisfaction associated with providing nursing care for TAVR patients (Appendix C). Discussions with the PAT nurses also revealed nurses felt the quality of care they provided to TAVR patients would be improved if they had a better understanding of the disease pathology and this treatment modality.

Projected cost analysis is primarily based on the cost of the development and implementation of the educational program. Student time involved in project research, development, implementation, analysis, and reporting is estimated to be 180 hours and is valued at $12,600 (180 x $70 = $12,600). Training materials such as video, handouts, brochures, and posters are provided by TAVR vendor at no cost. For this project, most of the education is provided during downtime (nonproductive time), except for formal educational presentation lasting one hour. One-hour educational presentation for eight PAT nurses has an estimated cost of $560.

The projected total monetary benefit to the employer is calculated to be between $331,320 and $539,320 (Appendix D). Indirect employer benefits may include increased nurse retention and recruitment, increased customer acquisition due to increased patient satisfaction, and increased facility reputation due to process improvements in this highly visible and innovative procedure. A stable nursing staff environment is associated with better patient outcomes, increased collaboration and teamwork and therefore additional anticipated benefits would include improved patient care quality and decreased safety issues. Harmon et al. (2003) concluded a satisfied staff population accounted for a patient’s decreased length of stay as well as increased staff retention. Avalere (2015) reports for each percentage point of annual nurse

turnover, the hospital has an estimated loss of approximately $300,000. With an average nurse turnover rate of about 16%, this equates $5 million annually in costs associated with turnover.

The Centers for Medicare and Medicaid Services (CMS) has developed the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, which collects measures of patient perceptions on various aspects of their inpatient care. Three broad goals have shaped the HCAHPS survey. First, the survey is designed to produce comparable data on the patient's perspective on care that allows objective and meaningful comparisons between hospitals on domains that are important to consumers. Second, public reporting of the survey results is designed to create incentives for hospitals to improve their quality of care. Third, public reporting will serve to enhance public accountability in health care by increasing the transparency of the quality of hospital care provided in return for the public investment. (HCAHPS, n.d.).

In theory, the use of public reports should facilitate three key functions. First, this data should help consumers make informed and improved choices about where to obtain health care for themselves and their family. Second, this data should stimulate quality improvement among provider groups as a way to protect or enhance their market share, especially in more competitive markets if they perceive that performance data may affect consumer choice. Finally, access to this data should encourage providers to improve their quality of care and encourage purchasers and health plans to use higher-quality providers in their networks (Dehmer et al., 2014).

Medicare reimbursement can be affected by patient satisfaction on HCAHPS surveys as CMS may withhold 1% of reimbursement (Rau, J., 2011). National average payment for TAVR procedure in 2016 was between $38,720 and $50,772 (Edwards, 2016). A 1% reduction in

payment could amount to between $387.20 and $507.72. Based on an annual TAVR patient census of 100 patients, this could amount to between $38,720 and $50,772 annually.

A root cause analysis of contributing factors leading to gaps in PAT nurses' knowledge was performed. A cause and effect diagram helped to further evaluate possible causes for gaps in nurses' knowledge. Understanding the contributing factors can aid in the development of a plan to address and correct these issues. Categorized into four main areas (systems, skills, supplies, and surroundings) helped to organize the various elements that support this problem (Appendix E). This CNL project was able to address a number of the causes related to systems, skills, and supplies. However, factors associated with surroundings were beyond the influence of this project.

The progression of patient movement through the TAVR process requires a multidisciplinary approach and is one that is constantly evolving. A process map was constructed to visually depict the patient's journey through the TAVR process (Appendix F). Nelson, Batalden, Godfrey, and Lazar (2011) advise the process map not only helps to identify the current state but can also help in the planning of improvement activities. This clinical microsystem is a complex adaptive system that is constantly altering to meet shifting demands thereby creating a continuous process of transformation (Davidson, Ray, & Turkel, 2011).

The process currently begins with a referral of a patient with severe AS, from either the primary physician or cardiologist, to the interventional cardiologist who performs the TAVR procedure. After an initial assessment to determine if the patient is appropriate for the TAVR procedure, the patient is either declined for TAVR (and may be referred for SAVR) or moves forward to evaluation by the Valve Clinic Coordinator. The Valve Clinic Coordinator is responsible to assist the patient in obtaining further diagnostic assessments, arranging

appointments including Valve Clinic visits, patient/family education, and if the patient is found to be an appropriate candidate for TAVR, arranges the TAVR and preprocedure appointments. Following the TAVR, the Valve Clinic Coordinator provides postprocedure follow-up and education. Due to the intimate knowledge of all steps in the TAVR patient's journey, the Valve Clinic Coordinator is an excellent resource for the other members of the TAVR team.

Strength, weaknesses, opportunities, and threats (SWOT) analysis was conducted (Appendix G). SWOT analysis is an organized, systematic process for identifying internal and external factors that can promote or impede the success of a project. There were several strengths identified with staff engagement and commitment as well as administrative support for the success of the TAVR program being the two strongest factors. This project addresses numerous known weaknesses, mostly related to lack of education. Additionally, this project supports all of the opportunities for improved education, communication, and efficiency. Time constraints was the largest threat to this project, but with collaboration with the unit director overcame this threat.

The stakeholder analysis (Appendix H) identified the interventional cardiologist has the most power and interest in the TAVR program. This physician is involved in some informal staff education, but often only reactively, not proactively. Patients and family members had high interest, but less power. The administration and the healthcare corporation are not involved in the daily activities of the program, but must be kept satisfied. Thus, if patient care were to be negatively impacted by the nurses' knowledge gap, the leaders might then move to a more active interest in the program.

Methodology

The site for this project is Mills-Peninsula Health Services, a not-for-profit hospital in the San Francisco Bay Area. Mills-Peninsula Health Service is one of three hospitals in the Sutter Health system offerings TAVR. The specific area of focus of this project is the knowledge and satisfaction of the PAT nurse in caring for AS patients undergoing TAVR procedure.

The PAT nurse meets with the TAVR patient approximately two to seven days preprocedure. During this visit, the PAT nurse obtains the necessary preprocedure tests, such as laboratory, cardiology, and radiology testing. Additionally, a significant portion of the visit is spent educating the patient about the preprocedure preparation and the actual procedure itself. Despite having prior extensive education by the Valve Clinic Coordinator, patients often forget much of the TAVR education provided, possibly due to stress or their advanced age. Therefore, the PAT nurse plays a critical role in the preparation of the TAVR patient and their family.

Following completion of a pre-implementation survey, the initial project execution included PAT nurse education through individual training sessions, which included viewing a procedure video with time for questions and answers. The initial three PAT nurses were identified as project champions and enlisted for further project support. Next, detailed printed material from the valve vendor was obtained and provided that included a brochure on what the patient could expect prior to, during, and following a TAVR procedure. The educational plan includes providing posters that detail aortic stenosis and the TAVR procedure along with a formal one-hour educational presentation. The ASSURE model (Bastable, 2013) provided an organized method for planning and implementing an educational program (Appendix I). Utilizing this model in the development of the educational program, the goal of the ASSURE model is more effective teaching and learning. It provides the opportunity to use a variety of teaching tools and technology while requiring learner participation. Incorporating a mixture of

teaching techniques helps to address the various learning styles, such as visual, auditory, and tactile/kinetic, while keeping the staff engaged. Following the formal one-hour educational presentation, a post-training survey (Appendix J) was conducted. All surveys were anonymous to encourage staff to be open and honest in their answers and comments.

The objective was a 10% increase of knowledge of preadmission testing nurses in the understanding of the pathophysiology of severe aortic stenosis, patient selection for treatment with TAVR procedure, the TAVR procedure essentials, and specific care requirements for patients eligible for TAVR procedure and an overall 10% increase in nurses' satisfaction with their knowledge of aortic stenosis and TAVR procedure.

The selected change strategy for this project is Kotter's (2012) accelerated eight-step change model incorporating the some of the eight accelerators. Kotter's change model is appropriate as the sequential steps "often overlap, run in parallel, and interact with one another" (Nelson, Batalden, and Godfrey, 2007, p. 82). The accelerator change model is a concurrent and dynamic model with more flexibility than the more static model of the traditional eight-step model of change. The TAVR program is continually and rapidly evolving. By applying Kotter's principles from both change models as a dynamic cyclical force, additional program changes can be optimized to quickly incorporate and spread thus allowing the Mills-Peninsula Health Services to maintain its competitive edge. As the project lead and change agent, the following actions were taken during implementation based on the change model.

Kotter's (1996) traditional eight-step model integrating Kotter's 2012 accelerators includes:

1. Create a sense of urgency around a specific big opportunity. The TAVR program is relatively new and MPHS is only one of three Sutter Health facilities designated for this

program. Successful implementation is vital to further expansion of the structural heart program.

2. Form and maintain a powerful coalition. Enlist informal staff nurse leaders as project advocates who can direct and influence other nurses to support this project.
3. Create a strategic vision for change and develop change initiatives. With enhanced understanding of aortic stenosis and TAVR, PAT nurses can provide improved patient care and impact patient outcomes.
4. Communicate the vision and strategy to create buy-in. Staff education plan has been communicated to PAT nurses and their supervisor who are supportive of this endeavor.
5. Enable action by removing the obstacles. Education has begun during downtimes as one-on-one sessions. Implementation of formal inservice was planned during regular staff meeting and inservice times.
6. Generate short-term wins to provide momentum. Initial education has resulted in reduced anxiety by PAT nurses involved in the preoperative preparation of TAVR patients. They have expressed increased confidence in answering patient questions and providing detailed preoperative instructions.
7. Sustain momentum by building on change. Additional educational opportunities have been provided based on PAT nurse feedback.
8. Anchor the changes into the organizational culture. The goal is to ultimately have a standard process for the preoperative preparation of TAVR patients.

There is a potential opportunity in the further development of a comprehensive structural heart program that might become the "Cedars-Sinai Heart Institute" of northern California. While this is a future vision, by utilizing a change model that supports rapid integration of changes, the

organization can help embed prompt change into the workflow. Kotter International (2015) reports "innovation is less about generating brand-new ideas and more about knocking down barriers to making those ideas a reality" (slide 20).

Preliminary data collection results have demonstrated that PAT nurses are more comfortable and confident in the preparation of TAVR patients following the initial educational interventions. After the formal educational inservice, a repeat survey was collected to check for project effectiveness and to help guide future educational sessions. I expect that there will be at least a 10% increase in nurse knowledge and satisfaction following the full implementation of this project based on post-implementation survey results.

Data Source/Literature Review

Initial data for project was obtained through conversations with PAT nurses. A formal assessment of knowledge and satisfaction was achieved using a survey. Results of both PAT nurse conversations and surveys validated there was a knowledge deficit about aortic stenosis and TAVR procedure, care, and patient selection. Furthermore, the PAT nurses' dissatisfaction related to knowledge gap was confirmed.

A multiple database literature search was performed using the words patient, education, transcatheter, TAVR, aortic, stenosis, valve, nurse, nursing, knowledge, perioperative, preoperative, and gap. Articles obtained were assessed for relevancy and applicability to discovering the impact of an educational program on increasing nurses' understanding and decreasing knowledge gap related to AS and TAVR. No research articles were found specifically addressing knowledge gaps related to AS and TAVR, therefore articles focusing on nursing knowledge gaps were used. Four articles supporting this project were found ranging in date from 2000 to 2009.

Jolley (2000) conducted a non-experimental descriptive correlational study of 45 nurses using questionnaires assessing their knowledge of factors related to postoperative nausea and vomiting. This study is applicable in that Jolley found a gap in nursing knowledge that was impacting the nurses' ability to provide optimal patient care. With education, patient care was not only improved but there was an increase in nurses' motivation to further improve their knowledge base. Lewthwaite (2009) performed a non-experimental descriptive correlational study involving 146 nurses in a postoperative hospital setting also examining nurses' knowledge about postoperative nausea and vomiting. The study found a gap in nursing knowledge. Results of the study were used to create an educational program. A limitation to the study was it lacked a post-test assessment following the educational session. However, an unexpected outcome was the "creation of a culture of learning" (p. 112) with increased interdisciplinary collaboration.

McCaughan, Thompson, Cullum, Sheldon, and Thompson (2002) examined barriers to implementing research into nursing practice in a cross-case analysis involving 108 nurses in three large hospitals in England. This study revealed four main perspectives on research implementation barriers including research interpretation and use was too complex, lack of organizational support, lack of clinical credibility and direction, and lack of nurses’ skill to use research. Implications from these findings included educators need to develop best teaching methods to promote understanding and manager can promote information dissemination through existing roles, such as a CNL. Finally, Melnyk et al. (2004) utilized a descriptive survey of convenience sample of 160 nurses from four US states to evaluate nurses’ knowledge, beliefs, skills, and needs regarding evidence-based practices (EBP). This study also examined the major barriers and facilitators to the use of EBP information. Findings included only 46% of current practices were evidence-based and 42% identified barriers to EBP implementation citing lack of

time, access to resources, knowledge, and support. They found education and administrative support, including the use of mentors were key in moving towards EBP nursing practice. Bastable (2013) reports healthcare is presently outcomes focused and it is essential for nurses to have current knowledge and skills to "competently and confidently render care" (p. 4). By providing education based on the newest evidence-based guidelines, the PAT nurses will be in a better position to educate patients about AS and TAVR.

Since the inception of the TAVR program, guidelines have changed for patient care and patient selection criteria. There has been no formal education about severe/critical aortic stenosis, patient selection for TAVR, the TAVR procedure, or the specific care needs of the TAVR patient, both preprocedure and postprocedure including after discharge. Hambridge (2012) reported nursing education was essential in reducing gaps in nursing knowledge of current recommendations that leads to inconsistent nursing practice that is not evidence based. In a non-experimental descriptive correlational study, Jolly (2000) concluded greater knowledge can improve nursing skills. Lewthwaite (2009) identified gaps in nursing knowledge through the administration of a survey in a non-experimental descriptive correlational study. This study found an unexpected positive outcome of the educational project, which was increased teamwork between nurses and pharmacists as well an increased collaboration with other healthcare providers. In a descriptive survey of a convenience sample of nurses, Melnyk et al. (2004) described nurses' knowledge of evidence-based practice may be increased through interactive educational programs.

Holmes et al. (2012) emphasize a multidisciplinary team approach to the care of the TAVR patient. Hawkey et al. (2014) advises TAVR program success and positive patient outcomes necessitates the development of a comprehensive and collaborative program to address

the multidisciplinary requirements and complexities of this patient population. Thomson (1998) found educational meetings that were interactive were a consistently effective strategy in reducing the gap between nursing research and practice. In a literature review on gaps between knowledge and nursing practice, Ajani and Moez (2011) cited lack of opportunities for continuous education as a factor responsible in promoting the gap between theory and nursing practice.

The PICO question was developed using the following criteria.

- P – (Patient, population, problem): PAT nurse knowledge about AS and TAVR;
- I – (Intervention): Development and presentation of an educational program;
- C – (Comparison): Comparison of pre- and post- educational surveys of knowledge and satisfaction;
- O – (Outcome): Knowledge and satisfaction improvement.

PICO question is "What is the impact of an educational program for PAT nurses on their knowledge and satisfaction with their knowledge of AS and TAVR?"

Timeline

This project began the final week of August 2016. Implementation phase concluded in the end of October 2016 with project analysis and conclusion completed by November 20, 2016. The timeline can be viewed on the Gantt Chart in Appendix K and L. Multiple PDSA cycles (Appendix M) were performed simultaneously but with different groups of PAT nurses.

Expected Results

The result that I expected were there would be a greater than 10% increase in nursing knowledge and satisfaction, and decrease in PAT appointment time. Furthermore, I expect that these results would further benefit the organization in improved PAT nurse retention, decreased

overtime, and improved patient satisfaction with the TAVR preparation process. Additional anticipated outcomes from this project included dissemination of information about aortic stenosis and TAVR to other nursing staff resulting in requests for education and resources, improved patient satisfaction, and reduced length of stay as patient expectations are more aligned with discharge goals.

A conclusion that might emerge from this study is by reducing nursing knowledge gaps, not only is nurse satisfaction, quality of care, and ultimately patient satisfaction improved, patient length of stay and adverse safety events can be reduced thus promoting an improved financial bottom-line for the organization. Additionally, I feel this project can support an argument for investing in improvements in nurse education to improve quality, safety, satisfaction (both patient and nurse) and financial viability thus resulting in a positive result for the patients, staff, and organization. This has particular importance and relevance as new and emerging technologies are introduced into the healthcare arena.

Designed on multiple PDSA cycles, the education program was simple to initiate and builds on previous instruction. An advantage of multiple PDSA cycles is the staff have been able to trial the use of the material in their patient care and education while tailoring it for each individual patient. Routinely connecting with the staff and observing how the education is incorporated, allowed me the ability to further customize the project based on their needs. Initial results demonstrated improved knowledge, improved nursing time utilization, and improved nurse satisfaction. A few nurses initially hesitant in becoming involved with the TAVR patients, are now showing interest.

Rogers explains “diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system” (Cain & Mittman,

2002). Applying Roger's relative advantage element of innovation diffusion to the TAVR program, it has been clearly demonstrated that for the correct patient population, TAVR offers advantages over surgical valve replacement. The most obvious is TAVR is less invasive, has a quicker recovery, and less complications as compared to surgical aortic valve replacement (Heuvelman, 2015). The educational program offered the nurses a variety of options for patient education, thus allowing the nurse the opportunity to trial various methods for teaching. Furthermore, during the formal one-hour inservice, the staff had the opportunity to observe how the TAVR video is used for teaching purposes. By enlisting the early adopters as my unit champions, they helped to promote this project. Creehan (2015) notes "effective champions show leadership characteristics and have a sense of empowerment to improve clinical outcomes" (p. 32). Besides being early adopters, these three PAT nurses are experienced, well-respected, and recognized informal leaders. Through them, communication channels were established to spread the education. Providing patient education materials including large wall posters, video links, brochures, and educational packets will help to support the infrastructure of the PAT environment in providing care to the TAVR patient population.

Nursing Relevance

Addressing gaps in clinical knowledge and the integration of evidence-based requires a coordinated, multifaceted approach (Tagney & Haines, 2009). Though less invasive, TAVR can create postoperative events and complications that are different from SAVR. To meet the nursing care needs of this unique patient population, comprehensive knowledge of TAVR should be obtained by nurses to achieve optimal patient outcomes (Zhang & Melander, 2014).

Decreases in nursing knowledge gaps of evidence-based practice care has been shown to improve patient outcomes. Just as Jolley became a leading authority on gaps in nursing

knowledge about postoperative nausea and vomiting after publishing the results of a small survey, I hope that the information gained from this project will lead to increased insight about nursing knowledge related to AS and TAVR. I have planned on expanding this project to other units and nursing teams who provide care for this patient population including preoperative, intensive care, step-down intensive care, case managers, and discharge planners. As experience and outcomes are gathered about this procedure, it is thought that one day, TAVR could possibly be an outpatient procedure.

Summary Report

The global aim of this project has been to reduce gaps in nursing knowledge through the provision of targeted staff education to PAT nurses at Mills-Peninsula Health Services providing care to patients scheduled for TAVR. The specific goal was by October 24, 2016 following the implementation of a staff education program for PAT nurses was there would be a 10% improvement in nursing knowledge of aortic stenosis, TAVR patient selection and procedure, and care needs provided to TAVR patients. A secondary goal of 10% improvement in PAT nurse satisfaction in their knowledge of AS and TAVR.

A series of PDSA cycles was used in this project. The first cycle included a microsystem assessment, development of a survey tool, pre-education survey of nurses about their knowledge and satisfaction, and the development of an educational plan based on survey results. Baseline data initially revealed targeted PAT nurses were not satisfied with their understanding and knowledge of AS and TAVR with initial questions about satisfaction and knowledge levels were rated as poor to average. When additional PAT nurses were surveyed before project implementation, the overall rating was also between poor and fair with 14% poor, 16% fair, 55% average, 14% good, and 0% excellent (Appendix N).

The second PDSA cycle began with identifying and enlisting three regular PAT nurses as project champions while creating a sense of urgency, which was easy to accomplish since there was an existing need for education about AS and TAVR. Individual training sessions using the valve manufacturer's internet link to an animation of the TAVR procedure was shown and explained. Additional valve manufacture training materials were also provided including a brochure about AS (Appendix O) and a written brochure (Appendix P). A plan for further education of PAT nurses was developed.

The third PDSA cycle included obtaining additional training materials, explaining and distributing the materials, obtaining feedback, and further educational development. Additional materials included wall posters about AS and TAVR (Appendices Q & R). The fourth and final PDSA cycle for this project began with using the PAT champions to generate enthusiasm amongst other PAT staff for the coming educational project. Two formal one-hour training sessions with included all the PAT staff were conducted with 19 PAT nurses attending, which exceeded the initial goal of eight. During this training session, the aforementioned resources were used in addition to a heart model depicting TAVR valve deployment (Appendix S), use of aortic valve models and wheels (Appendix T) to demonstrate reduced compliance of aortic valve leaflets with calcific aortic stenosis, and a slide presentation on AS and TAVR (Appendix U) that was developed for this project.

Anonymous surveys were obtained both before and after the inservice presentation. There was enthusiastic staff interaction with lots of discussion and questions. The unit director had an additional meeting planned following the inservice but abruptly cancelled it due to staff interest and engagement during the inservice, commenting "This is much more helpful to the staff than what I had to say" (J. MacDougall, personal communication, October 25, 2016). Following the

inservice, staff commented that they found the information very helpful and would like additional inservices. Many staff commented they wished the inservice was longer.

Following full educational program implementation, overall average rating improved much greater than the 10% goal. Ratings of poor and fair both were 0%, with 8% average, 41% good, and 51% excellent overall average ratings (Appendix V). These scores represented a 14% reduction in poor, 16% reduction in fair, 47% reduction in average, 29% increase in good, and 49% increase in excellent (Appendix W). While the project goal was set at a modest 10% overall improvement, I felt confident that this goal would be exceeded. However, I am excited to have a much greater improvement than I anticipated. Additional benefits being realized are a noticeable reduction in PAT nursing time with TAVR patients and a decreased length of stay for patients undergoing TAVR. Unofficially, there has been movement towards a single night stay following TAVR, which this project has helped to support.

As news of this project and educational inservices travels throughout the hospital, I have had other units contact me to have this program presented to their staff. These additional units include Surgery Center, Intensive Care Unit, Stepdown Intensive Care Unit, Case Managers/Discharge Planners, and most surprisingly, Auxiliary. Furthermore, the staff in the cardiology offices who often send referrals have requested this educational program. I am in the process of arranging with various units for a date and time to present this program. There is a great deal of excitement, as well as knowledge deficits, about AS and the TAVR procedure. Thus, sustaining this plan for at least the next year is already beginning to develop. My long-term vision for this project is it will be incorporated into the training of critical care nurses and eventually also become a part of new nurse hire orientation. Furthermore, I would like to be

involved in the development and presentation of training as additional interventional valve procedures are added to the structural heart program.

Functioning at the microsystem level, the Clinical Nurse Leader acts as a lateral integrator of patient care across care continuums and as part of a multidisciplinary team (Stanhope & Turner, 2006). Through education, knowledge gap can be reduced, nursing practice will become more consistent and evidence-based leading to improved quality and safety of care along with improved nurse satisfaction. Nelson et al., (2003) reports intelligent action is guided by information and developing an information-enriched environment to promote core competencies and core processes are essential for quality care delivery. By transforming new knowledge into clinically useful practices that are effectively implemented and measured, performance can be enhanced and patient care outcomes can be improved (Stevens, 2013). One of the ways to overcome the challenge is to identify and address gaps in nursing knowledge. Education helps to decrease the gap between knowledge and practice with the ultimate goal of increasing the quality of patient care (Ajani & Moez, 2011; & Thomson, 1998).

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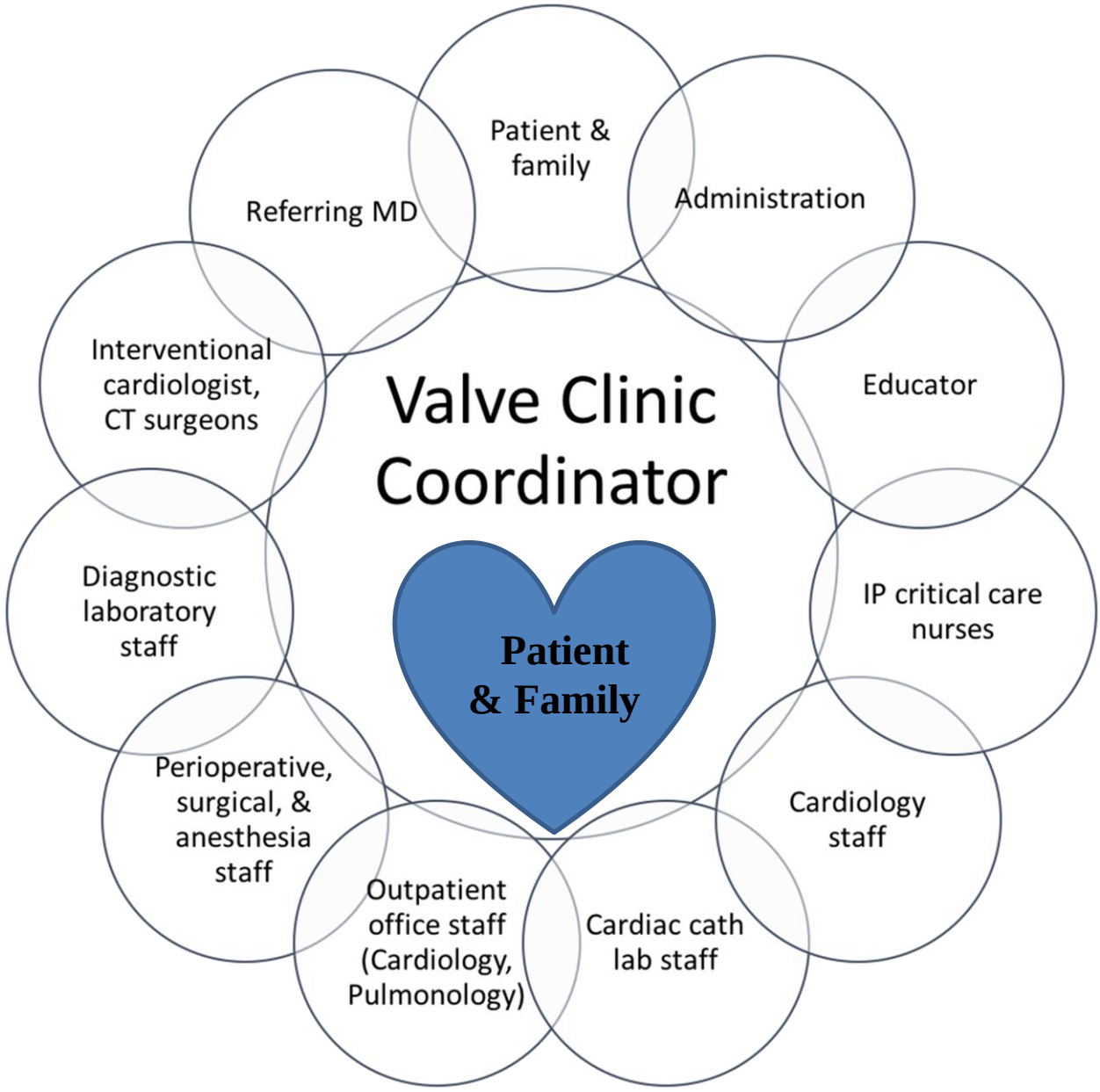
Appendix A

TAVR Microsystem



Potential/Actual TAVR Patient microsystem

Appendix B

Transcatheter Aortic Valve Replacement Survey: PRE-CLASS

SELF EVALUATION OF CLINICAL KNOWLEDGE

Thank you for your participation in the Aortic Stenosis (AS) & Transcatheter Aortic Valve Replacement (TAVR) program staff education needs assessment. Your answers will help me to tailor an educational programs specific for your department. Additional comments would be very valuable and appreciated.

DO NOT PUT YOUR NAME ON THIS SURVEY. I would like you to be as open and honest as possible.

PLEASE RATE THE FOLLOWING:

1. Your overall satisfaction with your current knowledge about AS & TAVR?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

2. Your specific understanding of severe/critical aortic stenosis?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

3. Your specific understanding of the TAVR procedure?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

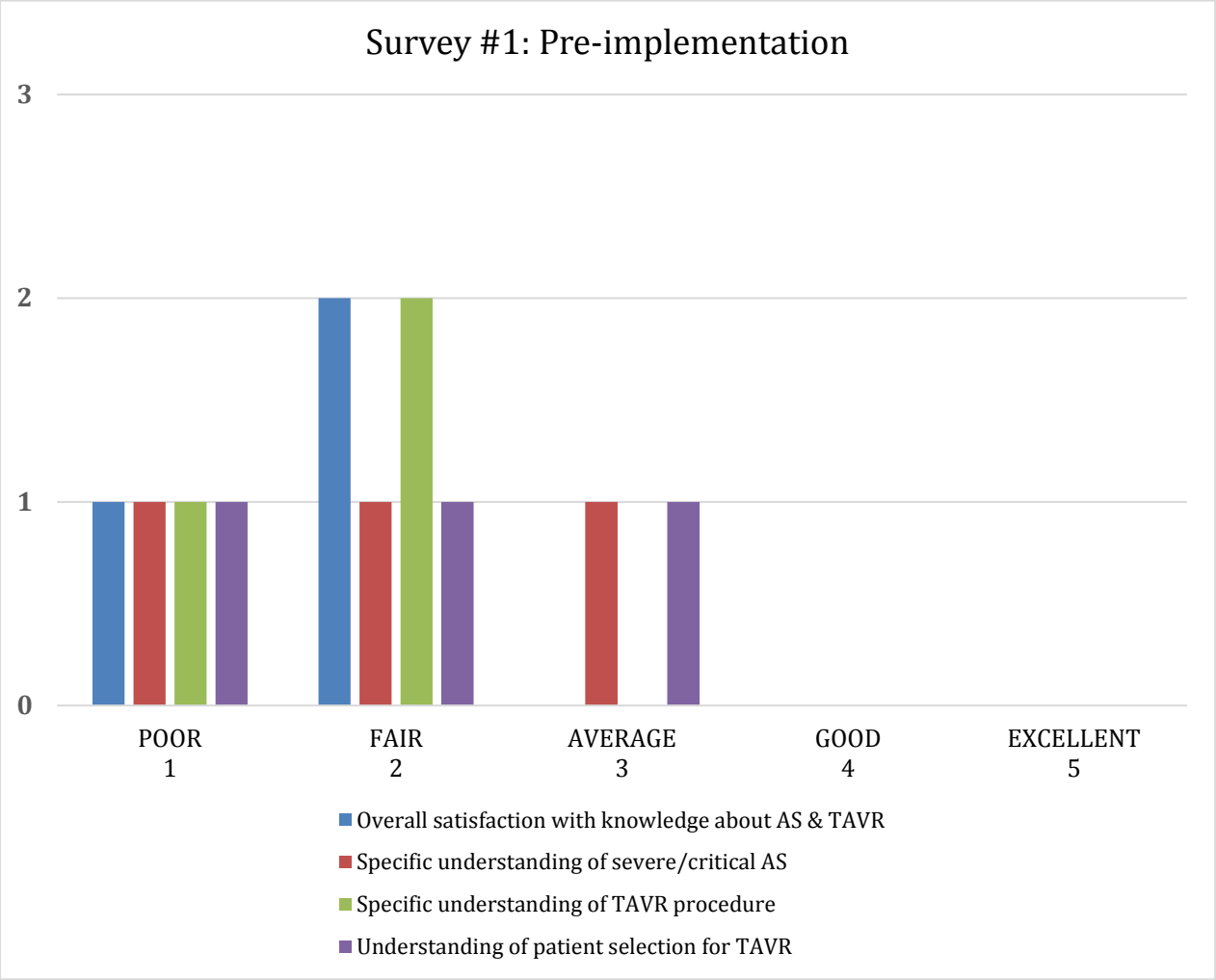
4. Your understanding of patient selection for TAVR?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

Additional comments:

Appendix C

Survey #1: Pre-implementation



Appendix D

Projected costs

One-hour educational presentation for 8 preadmission testing RNs = $70 x 8 = $560.

Projected employer benefits:

1. TAVR patient length of stay in ICU reduced by one day on average = $3000-$5000 average hospital cost (direct & indirect) per day in savings = 2 days/week = $312,000-$520,000 annual cost savings
2. Length of time for PAT RN to process TAVR patient decreased by 30 minutes/patient (4 patients x 0.5($70) = $140/week x 52 weeks = $7280 annually
3. Improvement in nurses' satisfaction.
4. Improvement in patient satisfaction.

Student time involved in project research, development, implementation, analysis, and reporting is estimated to be 180 hours and is valued at $12,600 (180 x $70 = $12,600).

Training materials such as video, handouts, brochures, and posters are provided by TAVR vendor at no cost.

Potential direct monetary cost savings to hospital annually are as follows:

Annual patient stay savings:	$312,000 - 520,000
Decreased PAT nursing time with patient:	$7,280

Additional added value:

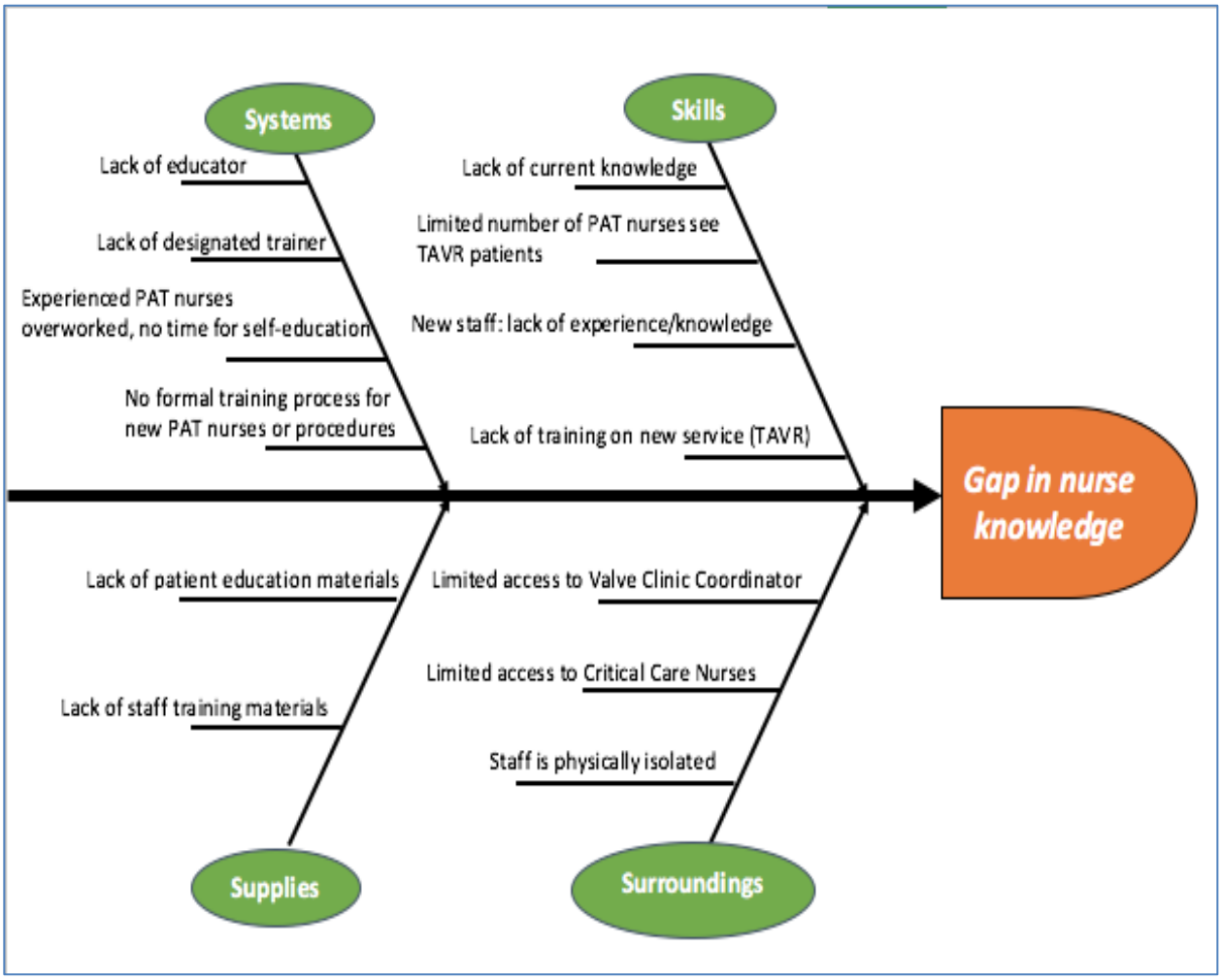
Education development and presentation:	$12,600

Hospital cost:

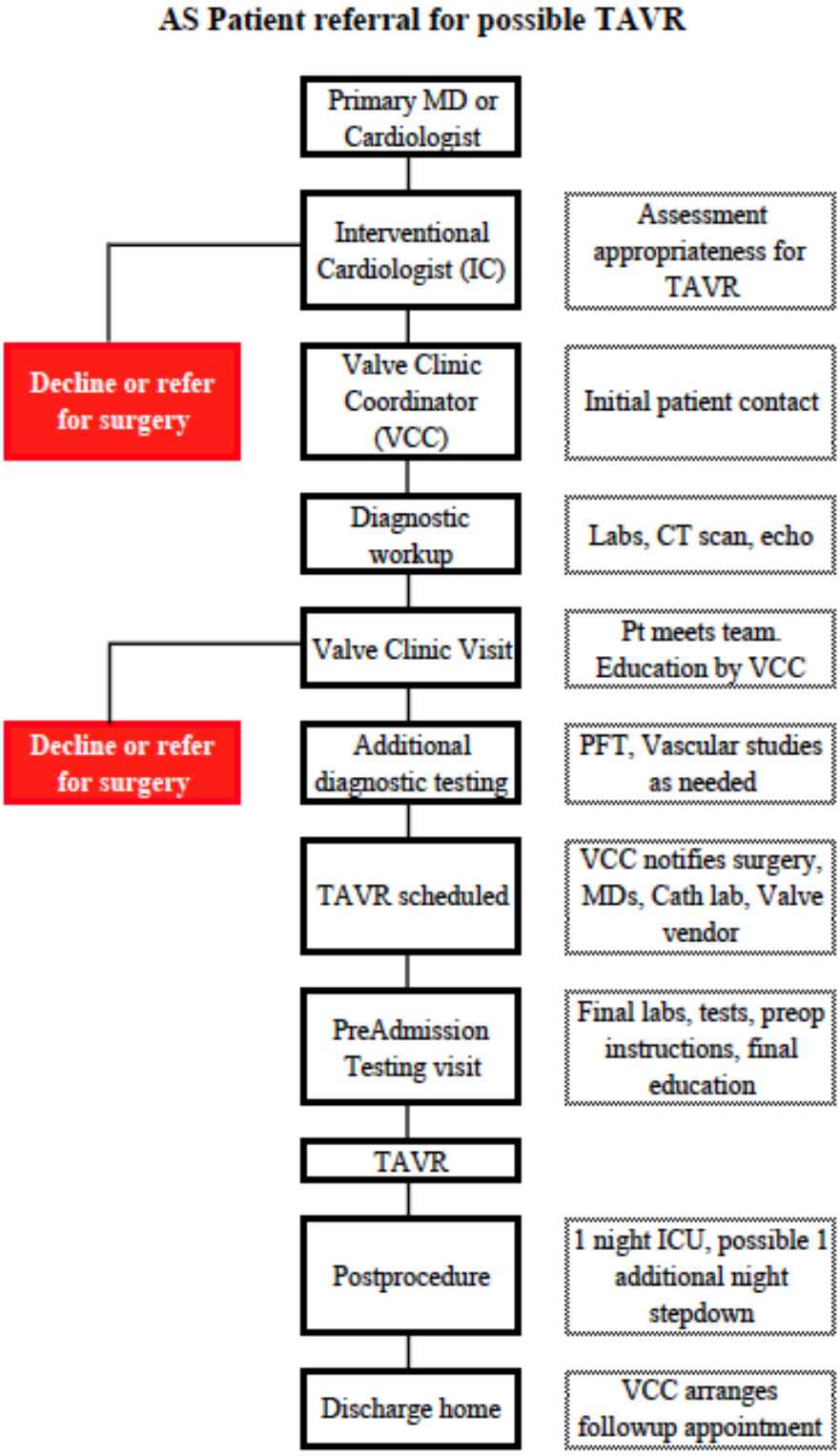
One-hour education for 8 PAT RN (salary):	$560
TOTAL monetary benefit:	**$331,320-539,320**

Appendix E

Root Cause Analysis



Appendix F

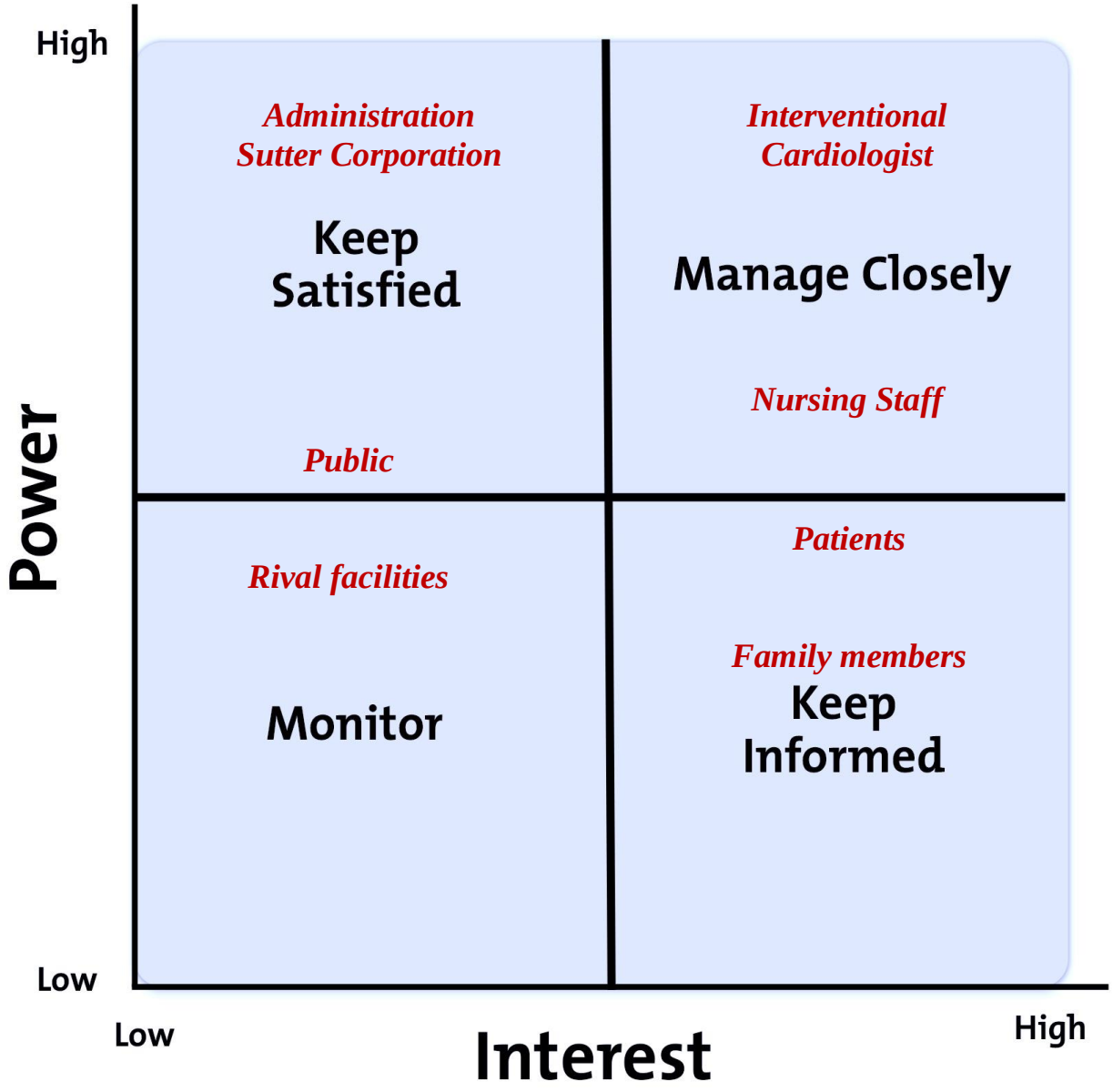

AS Patient referral for possible TAVR
Primary MD or Cardiologist
Interventional Cardiologist (IC)
Assessment appropriateness for TAVR
Decline or refer for surgery
Valve Clinic Coordinator (VCC)
Initial patient contact
Diagnostic workup
Labs, CT scan, echo
Valve Clinic Visit
Pt meets team. Education by VCC
Decline or refer for surgery
Additional diagnostic testing
PFT, Vascular studies as needed
TAVR scheduled
VCC notifies surgery, MDs, Cath lab, Valve vendor
PreAdmission Testing visit
Final labs, tests, preop instructions, final education
TAVR
Postprocedure
1 night ICU, possible 1 additional night stepdown
Discharge home
VCC arranges followup appointment

Appendix G

SWOT analysis

Appendix H

Stakeholder Analysis



Appendix I

ASSURE Model

A: Analyze learners - conduct surveys

S: State goals and objectives - create custom-tailored objectives

S: Select instructional methods and media - choose technology tools that align with goals

U: Utilize media and technology - test run technology tools and materials

R: Require learner participation - get learners involved

E: Evaluate teaching plan and revise as needed- understand that strategy must be adapted to changing learner needs

Appendix J

Transcatheter Aortic Valve Replacement Survey: POST-CLASS

SELF EVALUATION OF CLINICAL KNOWLEDGE

Thank you for your participation in the Aortic Stenosis (AS) & Transcatheter Aortic Valve Replacement (TAVR) program staff education program. Your answers will help me assess the effectiveness of this program and in the development of future programs. Additional comments would be very valuable and appreciated.

DO NOT PUT YOUR NAME ON THIS SURVEY. I would like you to be as open and honest as possible.

PLEASE RATE THE FOLLOWING:

1. Your overall satisfaction with your current knowledge about AS & TAVR?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

2. Your specific understanding of severe/critical aortic stenosis?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

3. Your specific understanding of the TAVR procedure?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

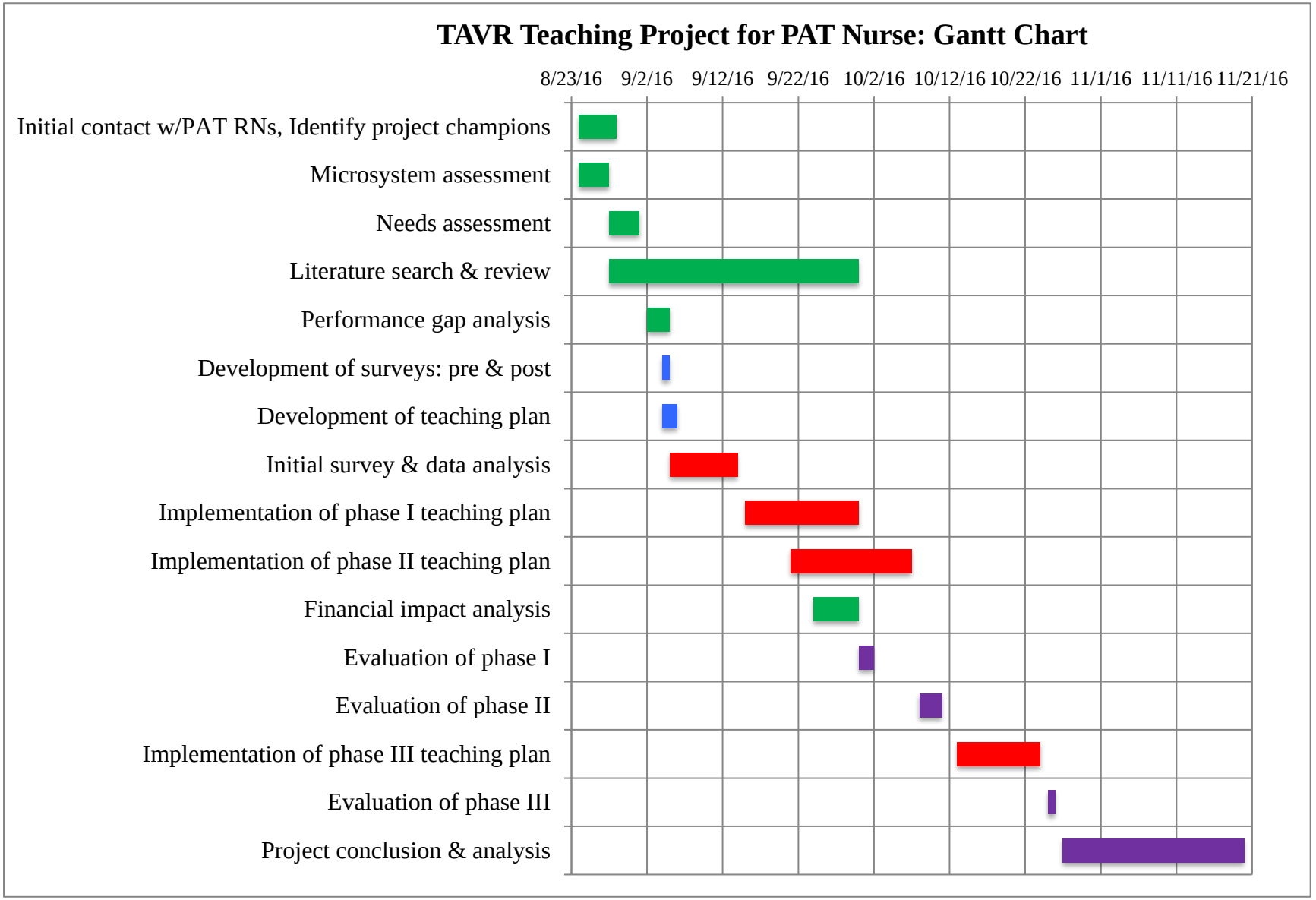
4. Your understanding of patient selection for TAVR?

Poor	***Fair***	***Average***	***Good***	***Excellent***
1	***2***	***3***	***4***	***5***

Additional comments:

Appendix K

Timeline



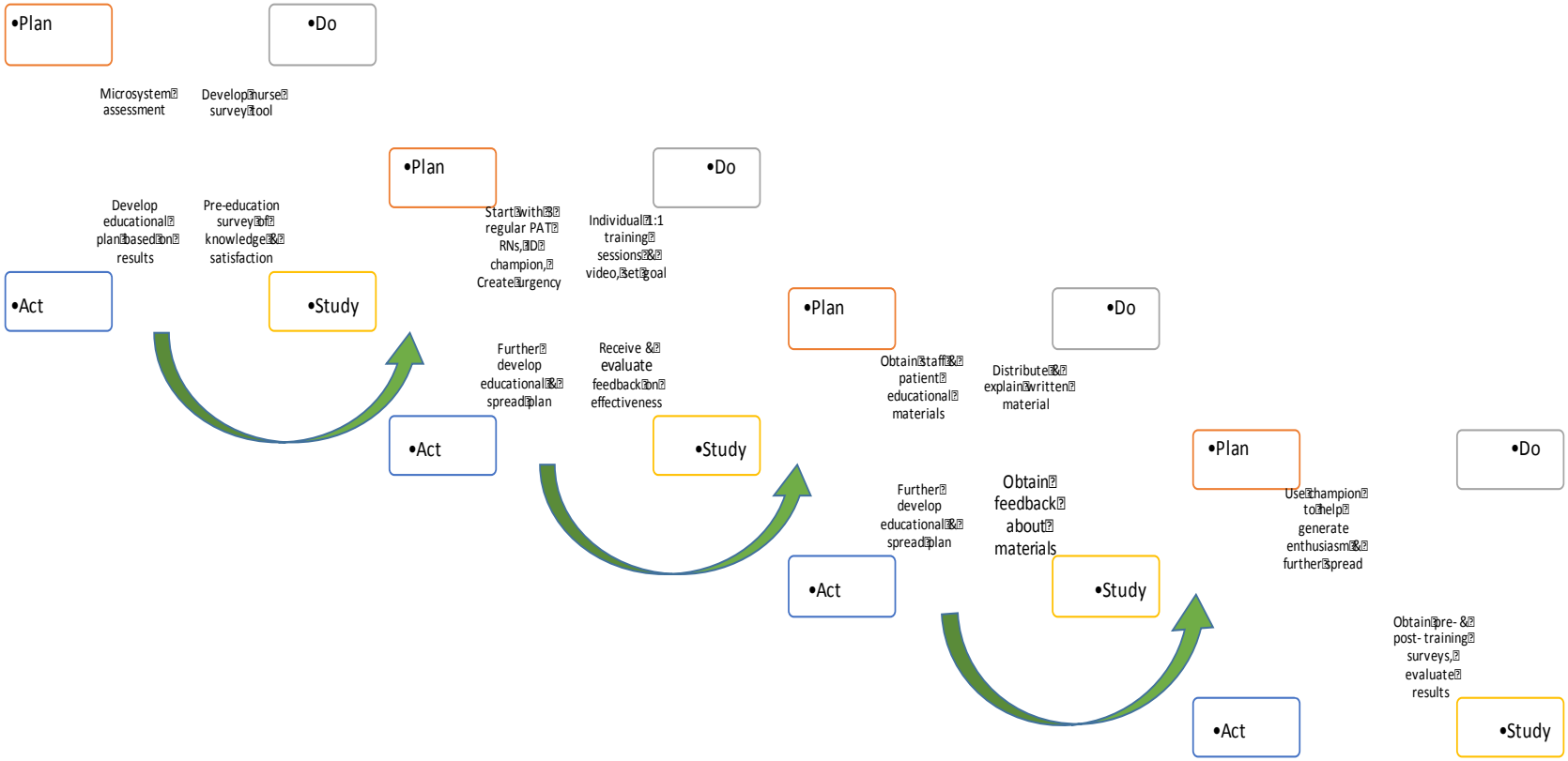
Appendix L

Timeline details

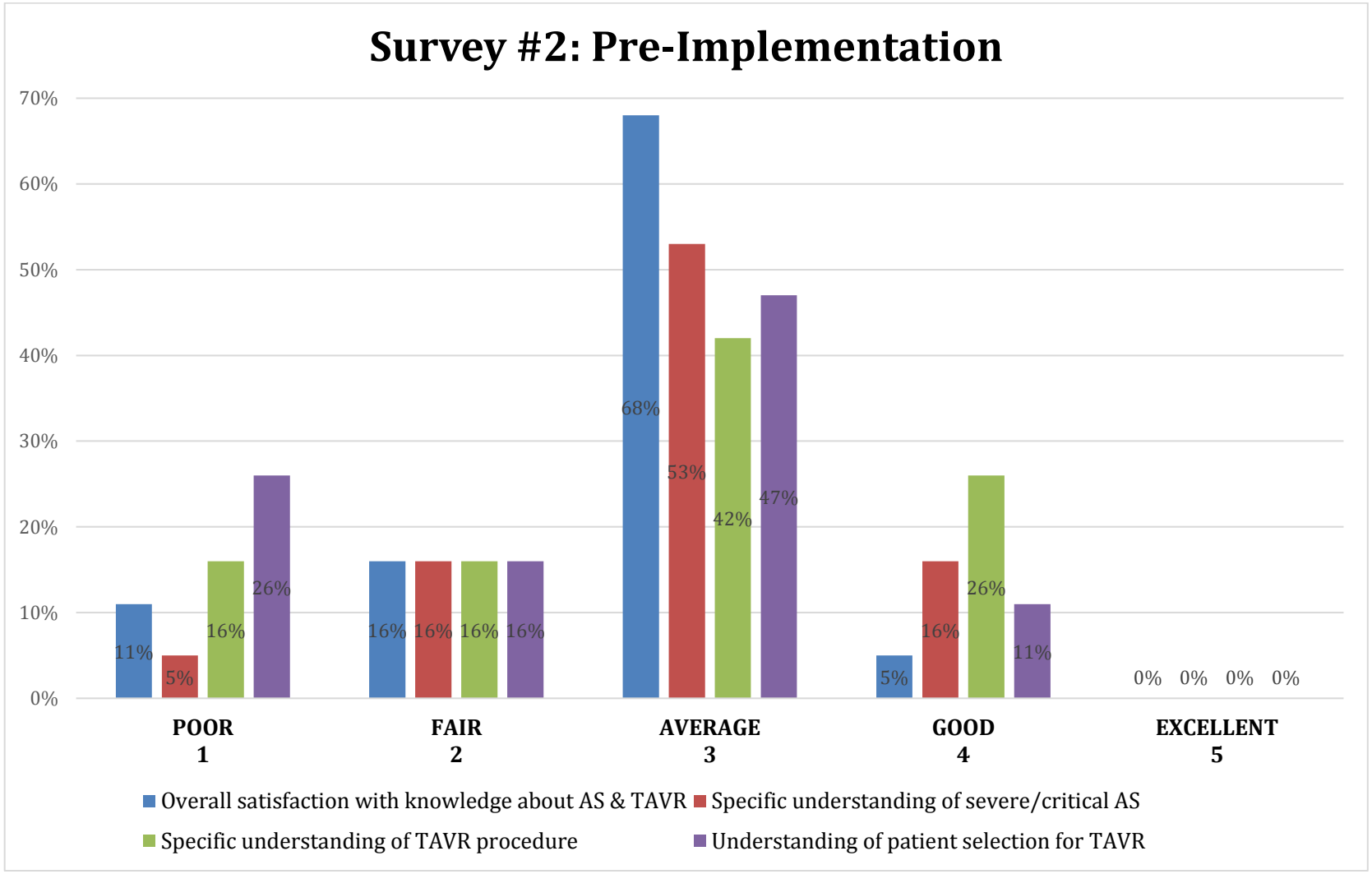
Task Name	Start	End	Duration (days)
Initial contact w/PAT RNs, Identify project champions	8/24/16	8/29/16	5
Microsystem assessment	8/24/16	8/28/16	4
Needs assessment	8/28/16	9/1/16	4
Literature search & review	8/28/16	9/30/16	33
Performance gap analysis	9/2/16	9/5/16	3
Development of surveys: pre & post	9/4/16	9/5/16	1
Development of teaching plan	9/4/16	9/6/16	2
Initial survey & data analysis	9/5/16	9/14/16	9
Implementation of phase I teaching plan	9/15/16	9/30/16	15
Implementation of phase II teaching plan	9/21/16	10/7/16	16
Financial impact analysis	9/24/16	9/30/16	6
Evaluation of phase I	9/30/16	10/2/16	2
Evaluation of phase II	10/8/16	10/11/16	3
Implementation of phase III teaching plan	10/13/16	10/24/16	11
Evaluation of phase III	10/25/16	10/26/16	1
Project conclusion & analysis	10/27/16	11/20/16	24

Appendix M

PDSA Cycles

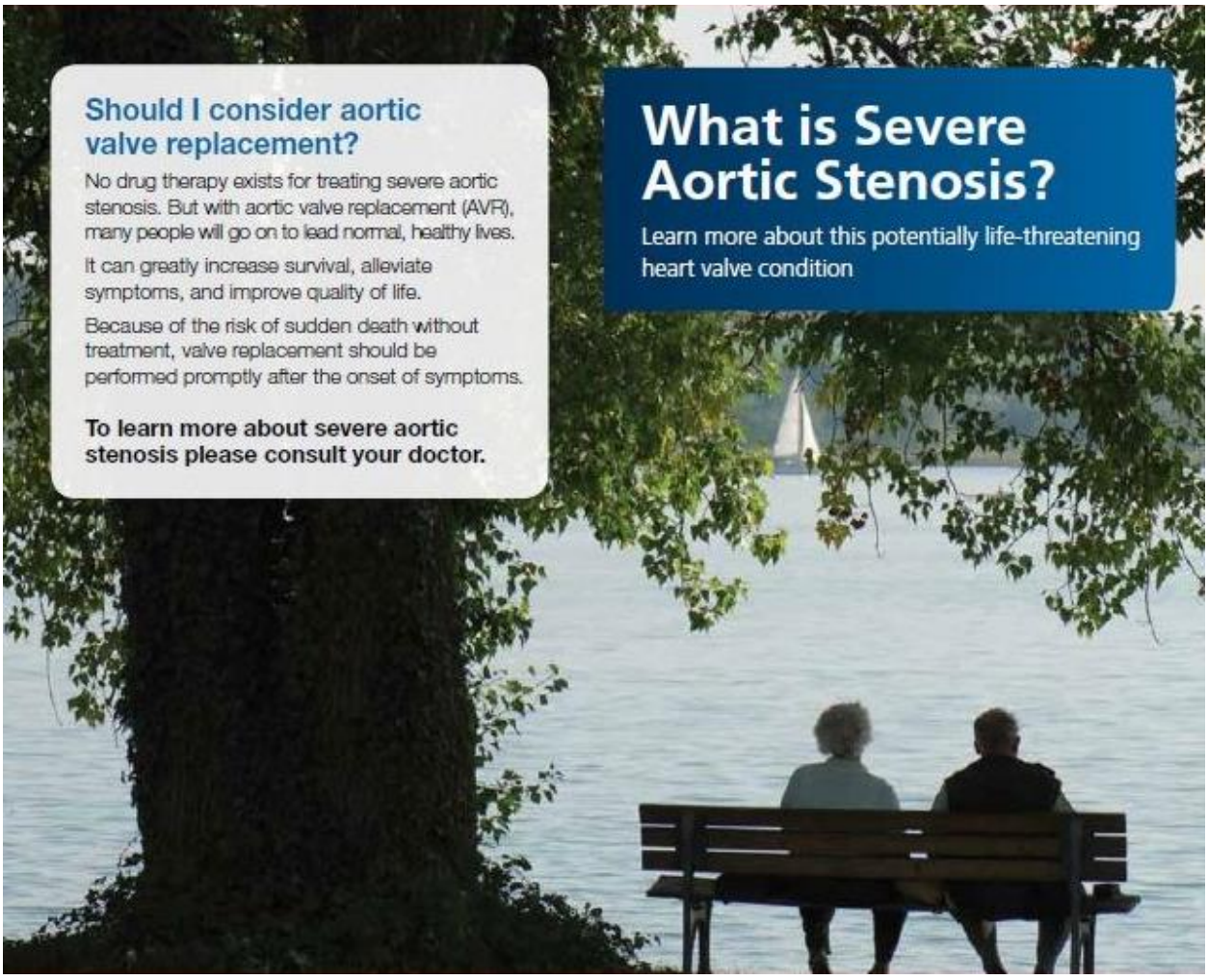


Appendix N


Survey #2: Pre-Implementation
70%
60%
50%
40%
30%
20%
10%
0%
11%
5%
16%
26%
16%
16%
16%
16%
68%
53%
42%
47%
5%
16%
26%
11%
0%
0%
0%
0%
POOR
1
FAIR
2
AVERAGE
3
GOOD
4
EXCELLENT
5
Overall satisfaction with knowledge about AS & TAVR
Specific understanding of severe/critical AS
Specific understanding of TAVR procedure
Understanding of patient selection for TAVR

Appendix O

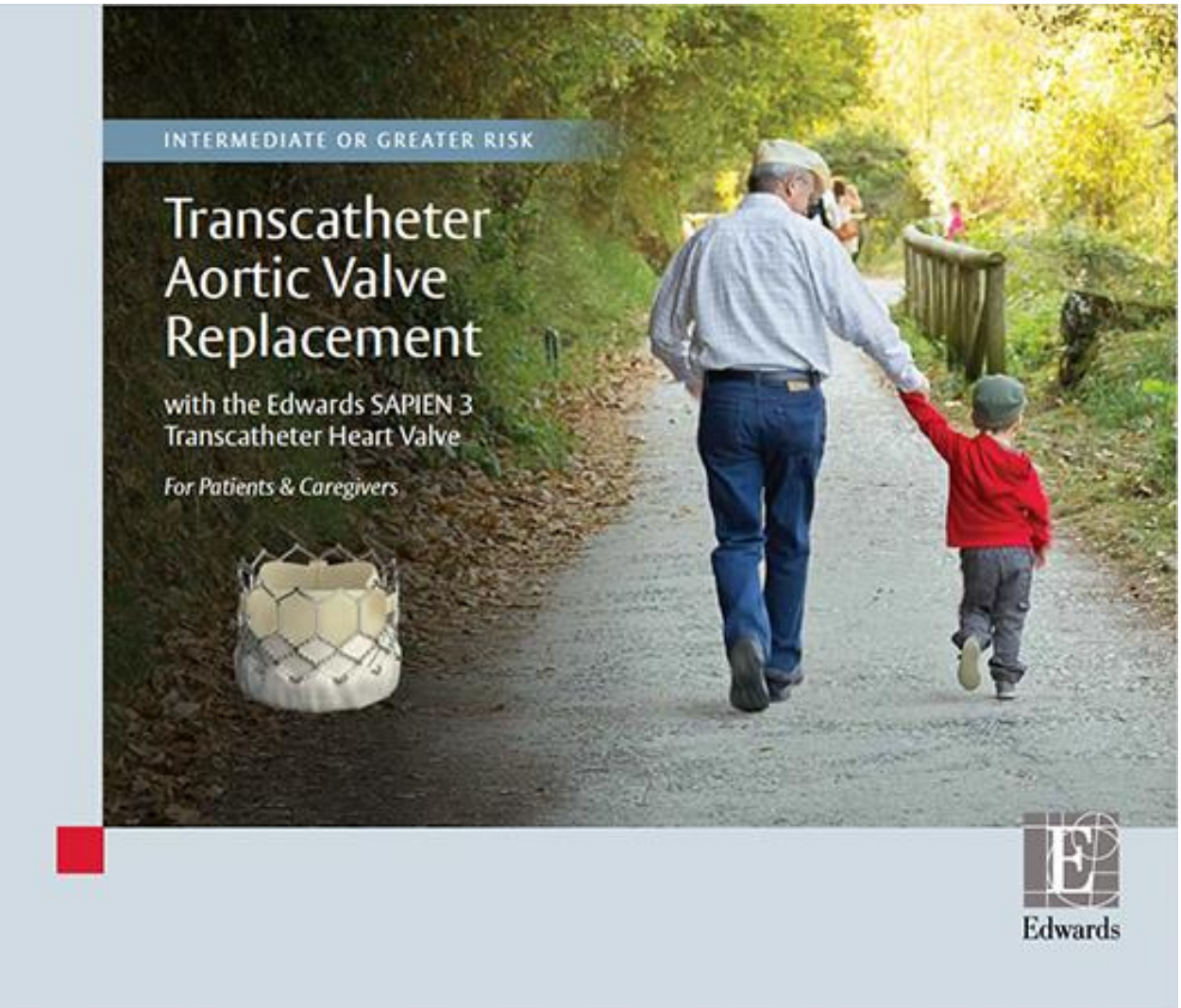
Aortic Stenosis Brochure



Courtesy of Edwards LifeSciences

Appendix P

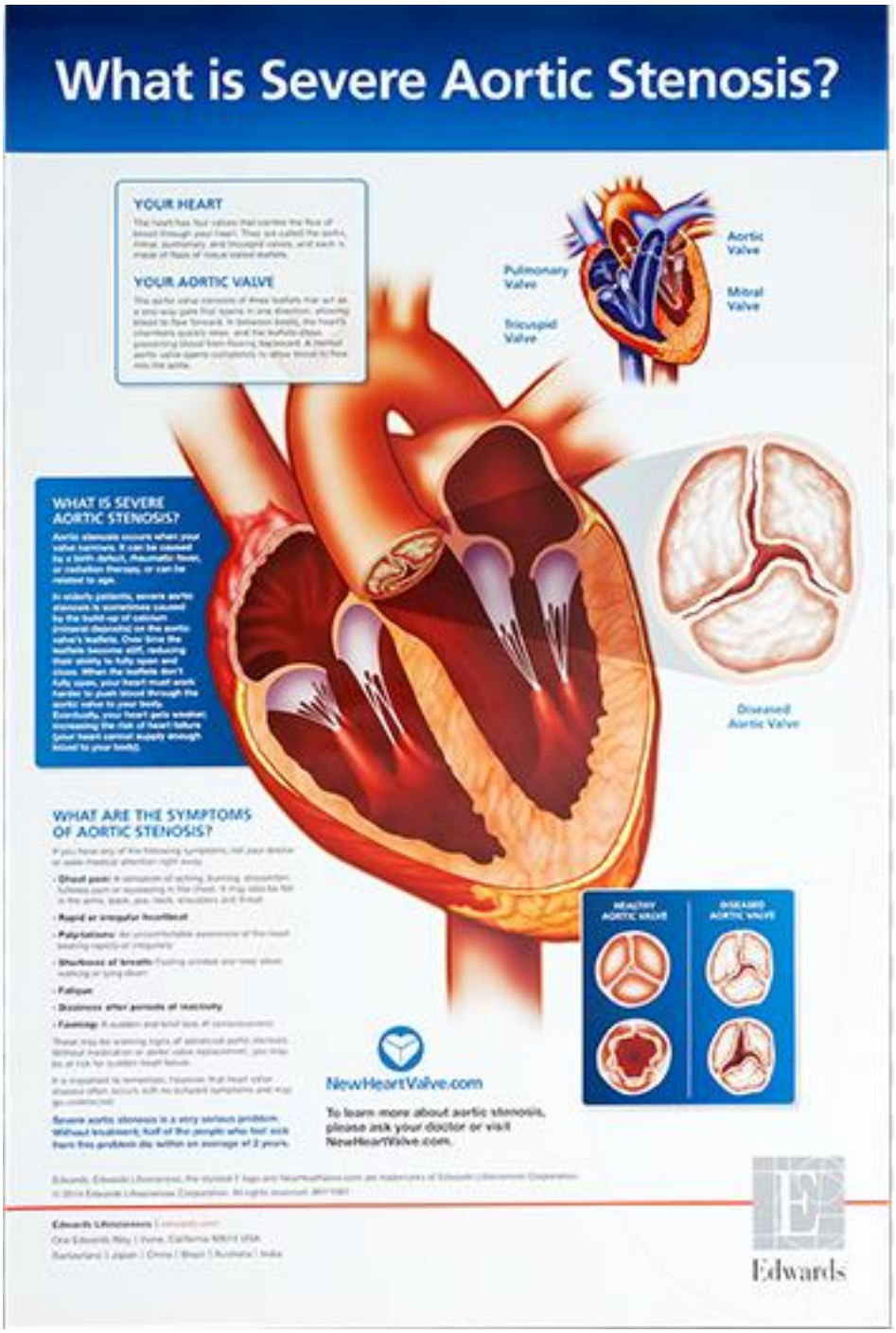
TAVR Patient Guide



Courtesy of Edwards LifeSciences

Appendix Q

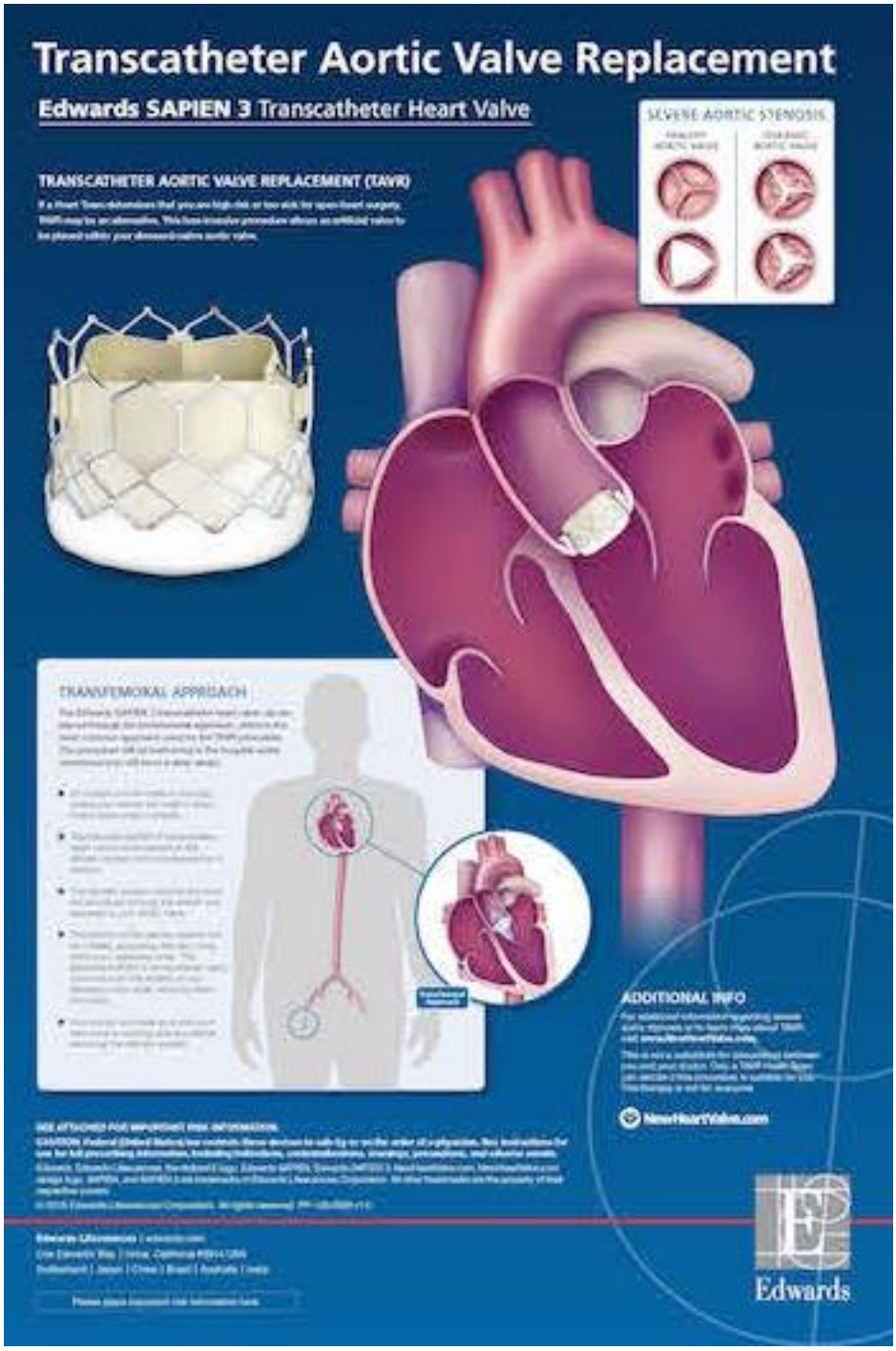
What is Severe Aortic Stenosis? Poster



Courtesy of Edwards LifeSciences

Appendix R

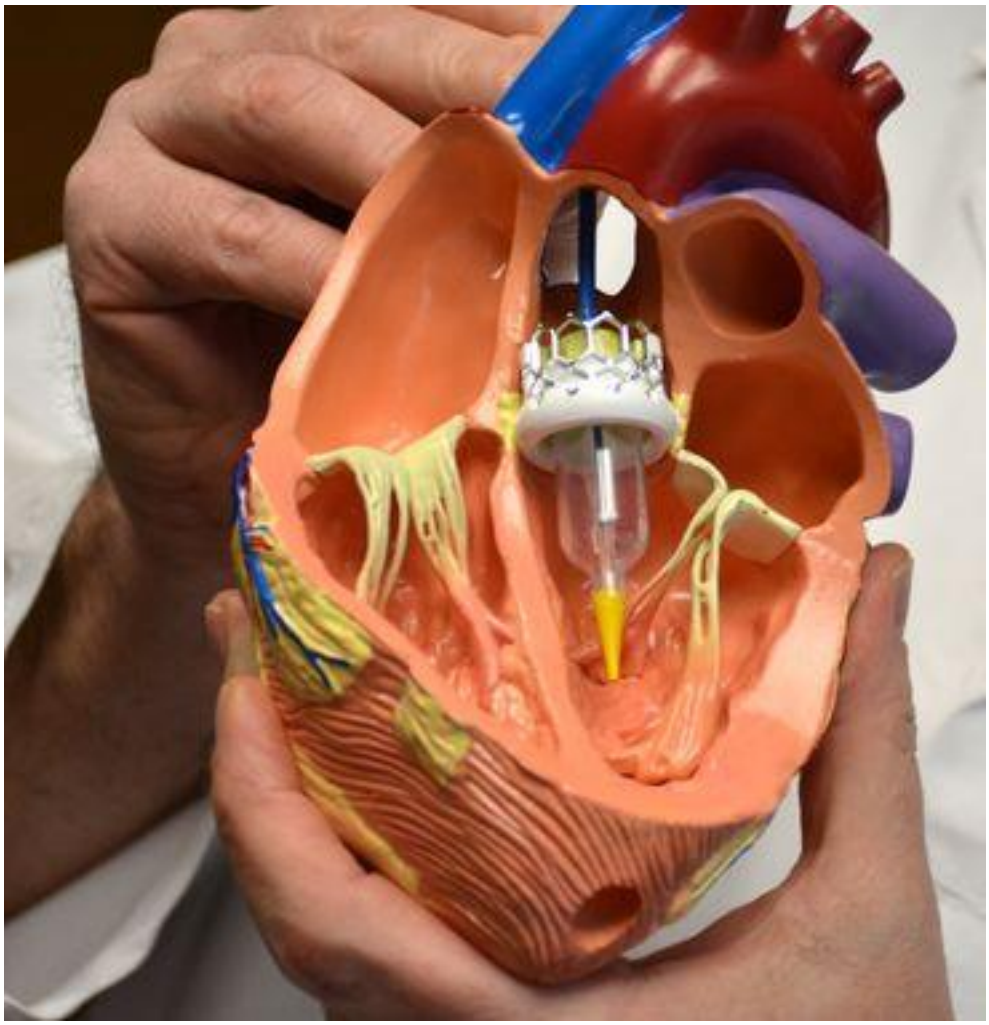
Transcatheter Aortic Valve Replacement Poster



Courtesy of Edwards LifeSciences

Appendix S

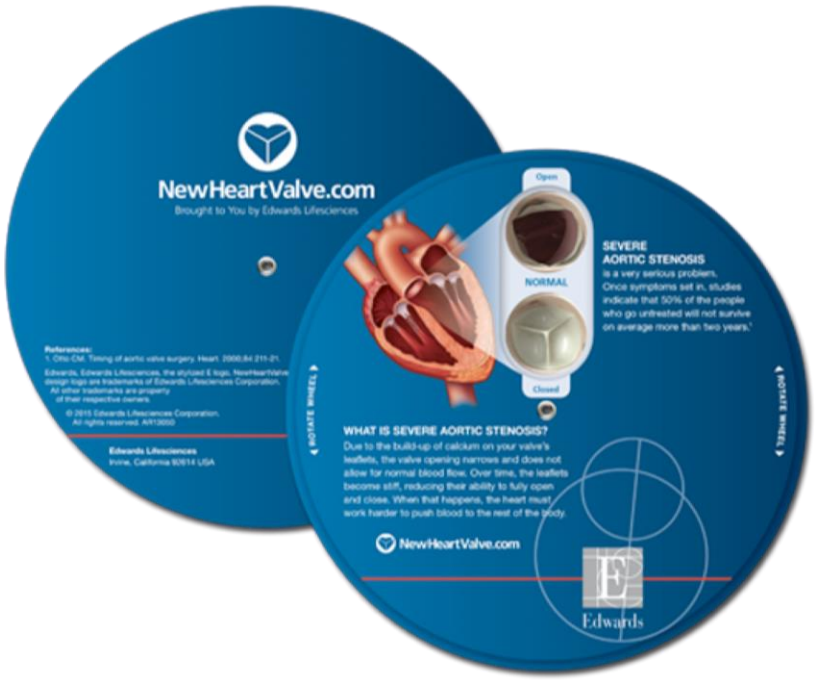
TAVR Heart Model



Courtesy of Edwards LifeSciences

Appendix T

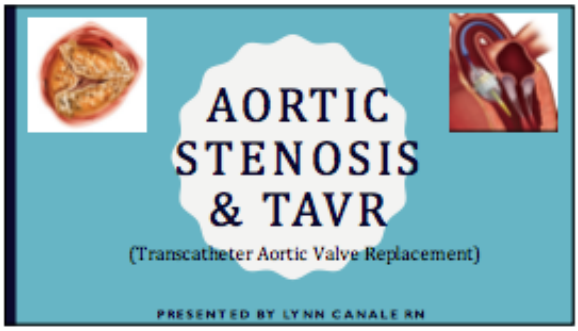
Aortic Valve Models and Wheel

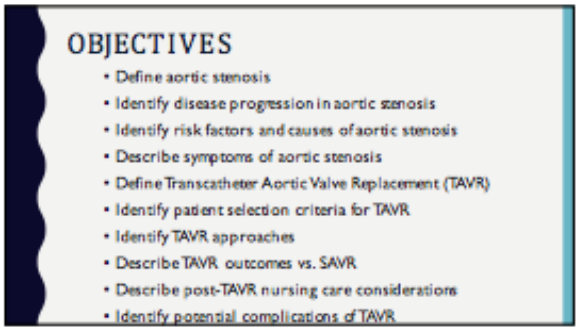


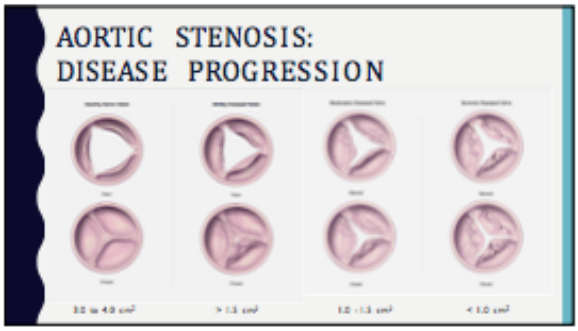
Courtesy of Edwards LifeSciences

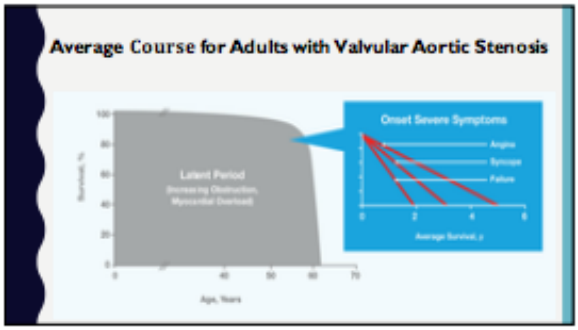
Appendix U

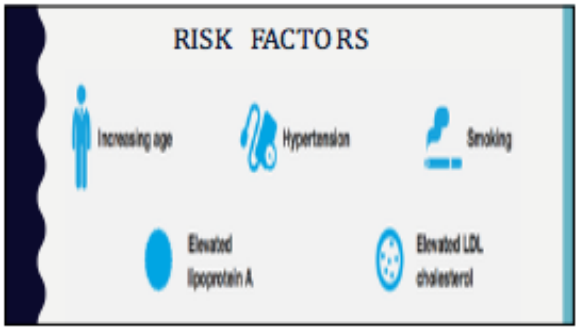
TAVR Education Slide Presentation





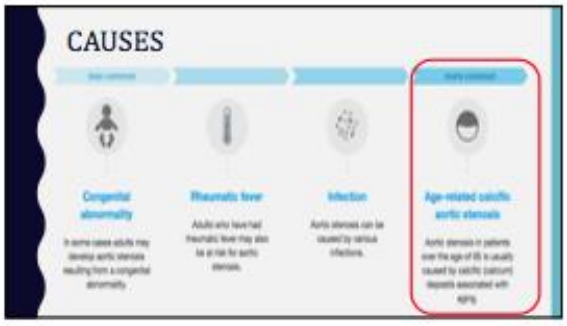


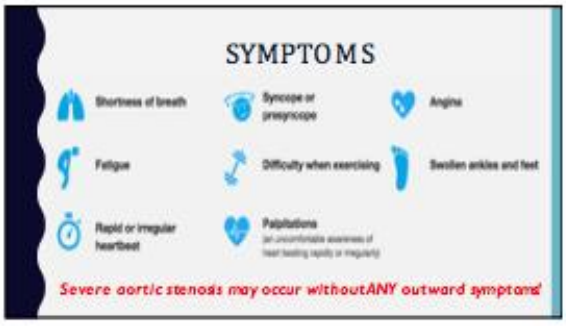


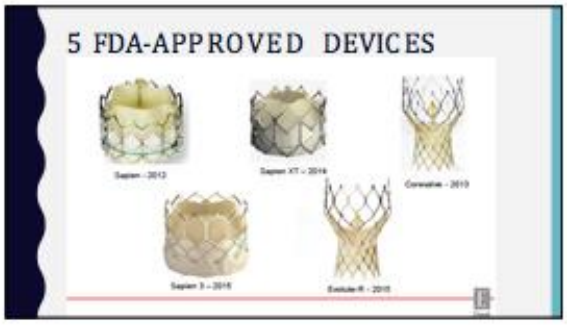


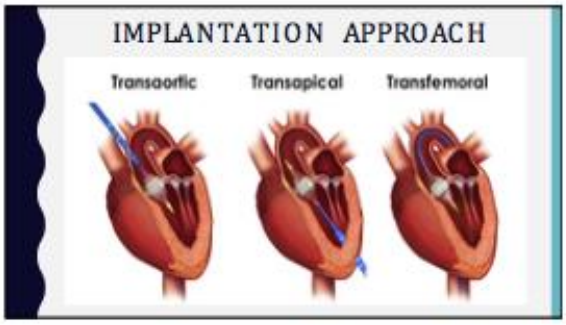
Appendix U (continued)

TAVR Education Slide Presentation



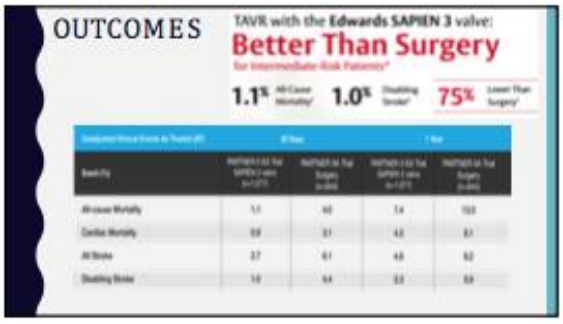


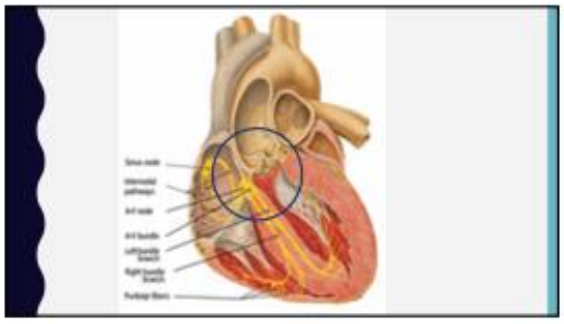


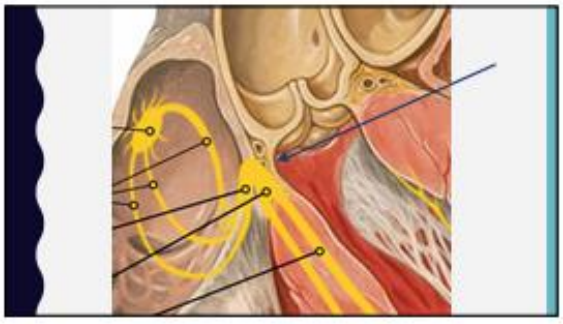


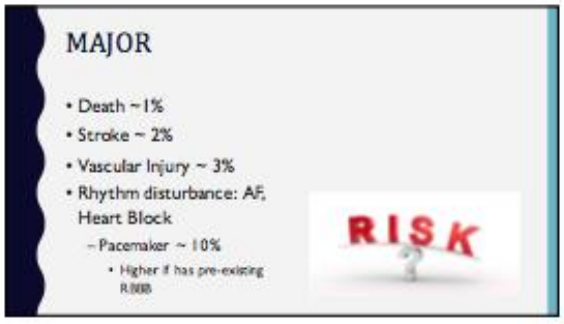
Appendix U (continued)

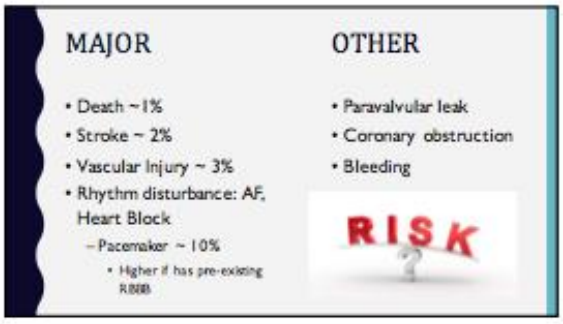
TAVR Education Slide Presentation

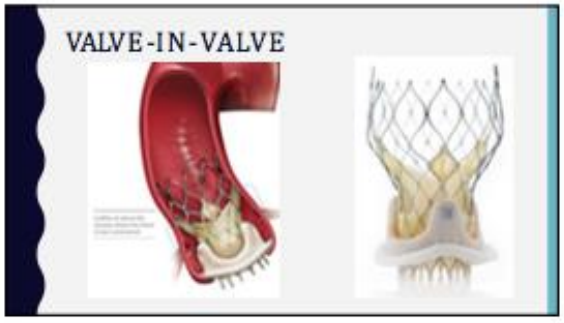






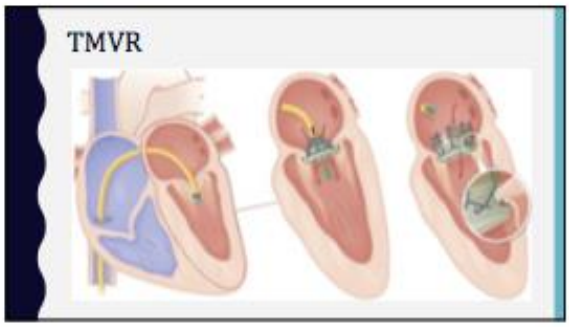


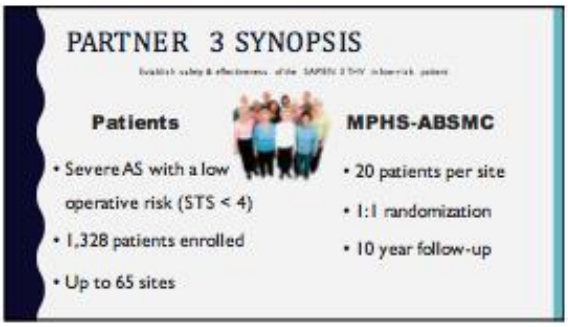


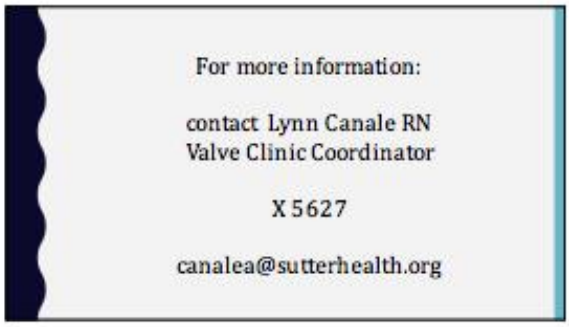


Appendix U (continued)

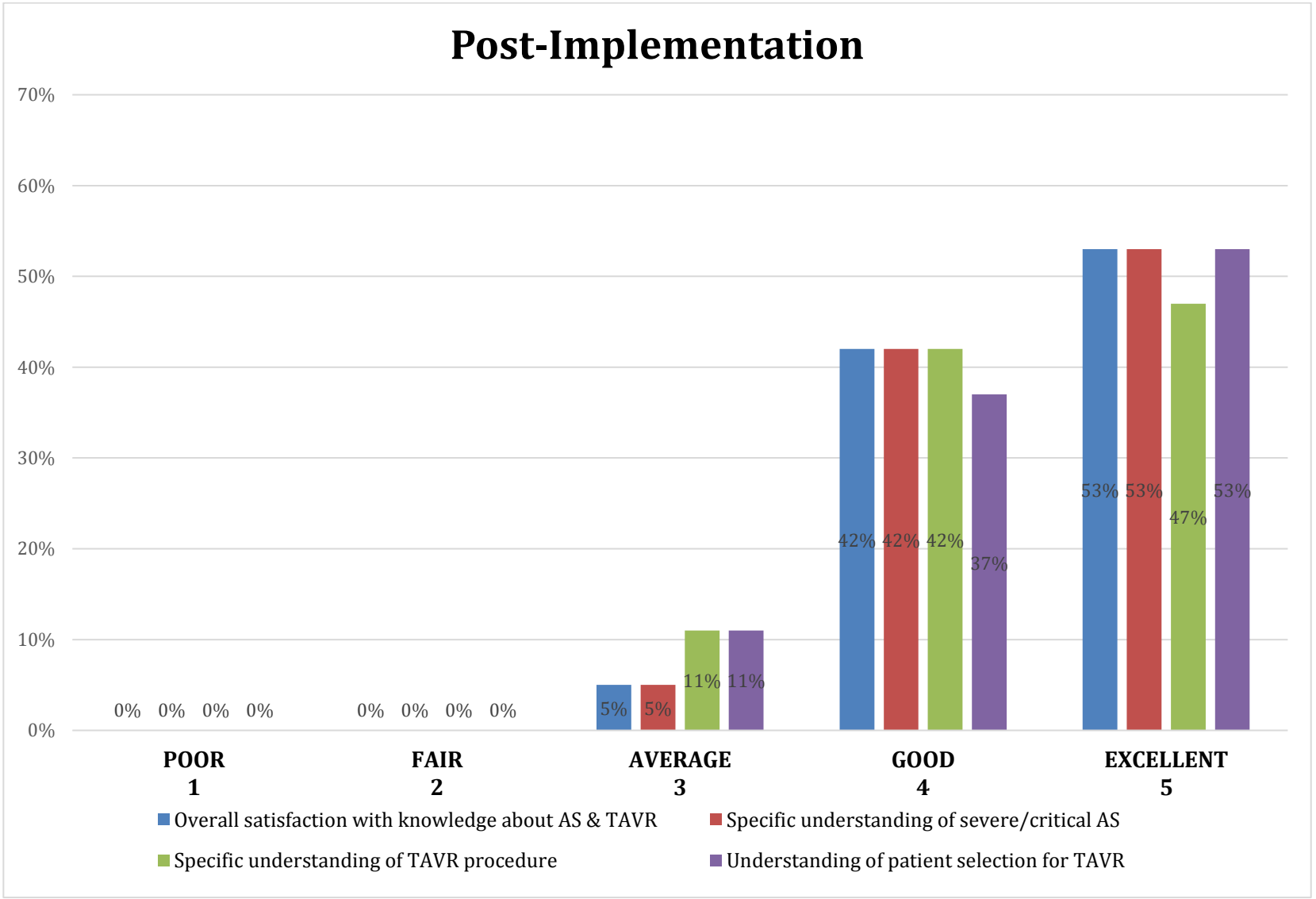
TAVR Education Slide Presentation







Appendix V


Post-Implementation
70%
60%
50%
40%
30%
20%
10%
0%
0% 0% 0% 0%
0% 0% 0% 0%
5% 5% 11% 11%
42% 42% 42% 37%
53% 53% 47% 53%
POOR 1
FAIR 2
AVERAGE 3
GOOD 4
EXCELLENT 5
Overall satisfaction with knowledge about AS & TAVR
Specific understanding of severe/critical AS
Specific understanding of TAVR procedure
Understanding of patient selection for TAVR

Appendix W

Post-Implementation Survey Results