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# Improving Surgical Patient Outcomes Through a Cross-Training Program for the Hybrid Operating Room

Ana Chozet-Griggs  
[alcgriggs@gmail.com](mailto:alcgriggs@gmail.com)

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Improving Surgical Patient Outcomes Through a Cross-Training

Program for the Hybrid Operating Room

Ana L. Chozet-Griggs

University of San Francisco

## Abstract

Innovations in the treatment of abdominal aortic aneurysms have resulted in the reduction of open surgical procedures and the increased use of minimally invasive procedures known as endovascular aortic artery repairs (EVAR) and thoracic endovascular artery repairs (EVAR). These hybrid procedures integrate the technical skills and resources used in surgical procedures with the technology used for radiological interventions. (Odle, 2011). These procedures are performed in a Hybrid Operating Room (HOR) within the Catheterization Laboratory (Cath Lab) microsystem. A HOR is a surgical operating room that is equipped with interventional radiology imaging and equipment (Taylor, 2017). These high-risk procedures demand specialized Vascular Cath Lab staff and specialized operating room (OR) Vascular staff. The integration of these specialties contributed to the development of an HOR Cross-training Program to meet the needs of surgical patients in the HOR. A Clinical Nurse Leader (CNL) led the development and evaluation of this program to ensure Cath Lab Vascular nurses and Radiology Technologists (RT) learned the principles of aseptic technique and surgical techniques. Cath Lab nurses learned the role of a circulating surgical nurse and RTs learned the role of surgical scrub in a period of three months or less. Prior to this program, the staffing ratios for a HOR included 11.9 full-time equivalents (FTE) per day. After the program, the staffing ratios were reduced to 7.3 FTE. The desired outcome for the sustainability of this program is to ensure that all aortic aneurysm surgical patients receive the same safe standard delivery of care in a HOR that is equivalent to a normal operating room.

*Keywords:* hybrid operating room, cross-training, surgical technique, staffing ratios, abdominal aortic aneurysm

## Introduction

The treatment of aortic abdominal aneurysms has traditionally been performed in two ways. One is through an open abdominal procedure in the operating room. These patients often have a minimum of a five-day postoperative stay in the intensive care unit (ICU) or step-units. Their full recovery is estimated to be six weeks.

The other method is stent placement through interventional radiology in the Cath Lab. Patient selection is restricted to very specific criteria. The selection of the patients for these procedures is not only based on patient anatomy and comorbidities, it is also based on surgeon preference (Chadi et al., 2012). However, when patients meet the criteria, their postoperative stay in the hospital is often only one day. Full recovery is estimated to be three weeks (R. Dalman, personal communication, September 8, 2017).

Surgeons and interventional radiologists agree that having imaging technology in the treatment of abdominal aortic aneurysm (AAA) patients is advantageous. A hybrid procedure integrates the technical skills and resources used in surgical procedures with the technical skills and resources needed for radiological interventions. (Odle, 2011). This leads to the development of a procedure called EndoVascular Arterial Repair (EVAR). This procedure is less invasive than open procedures, and reduces hospital stays because these patients do not have an abdominal incision. Their incisions are in the groin or in the arms. Chadi et al., (2012) found that EVAR procedures contribute to lower morbidity rates in this patient population.

Stanford Hospital opened its hybrid operating room (HOR) in the Catheterization Laboratory (Cath Lab) in December 2017. The HOR contains the appropriate resources to successfully provide this type of care. It includes radiological technology which allows three-dimensional imaging, and it also has the capacity to perform an open procedure if necessary

(Taylor, 2017). This paper will describe a practice improvement project in the HOR to improve surgical outcomes through a rigorous cross-training staff development program.

### **Description of Present Situation**

The staff nursing ratios for a Hybrid Operating Room are extensive. Presently, each HOR procedure requires an operating room team. This team consists of Cardiac, Vascular, and Thoracic (CVT) surgeons, an OR CVT nurse, and a CVT scrub person. Additionally, the Cath Lab team needs a Cardiovascular nurse circulator, a monitor, who is usually a nurse, and a Radiology Technician (RT). Each member of this interprofessional team has a specific task during the procedure.

The HOR staffing requirements strain the coverage of cardiac cases in the operating room. OR staff from other surgical specialties cannot perform in the open heart rooms. The HOR staffing ratios directly deplete the already limited CVT staffing pool from an ever-increasing CVT caseload in the operating room.

### **PICOT Question**

For the quality improvement project, a PICOT mnemonic is used to describe the five elements of an evidenced-based nursing question. These elements are: P--Patient/Problem, I— Intervention, C—Comparison, O— Outcome and T-- Timeline as defined by the Grand Valley State University (2018). First, the patient population that the project focuses on are the abdominal aortic aneurysm (AAA) patients who undergo endovascular aortic artery repair (EVAR) in a hybrid operating room (HOR). Secondly, the intervention of this project is the HOR cross-training program to train cath lab nurses and radiology technicians in perioperative nursing and surgical technique. The third aspect of a PICOT analysis is the comparison of the

standard treatment for AAA patients who have a surgical team and a cath lab team caring for them in a hybrid operating room to the proposed change. The present practice for staffing a HOR is to have both a Cath Lab and OR team to deliver care during a EVAR/TVAR procedure. The cross-training program provides an alternative. The cross-trained Cath Lab staff will negate the need for a surgical team in procedures performed in the hybrid operating room. Next, the outcome or goal is to ensure that all AAA patients in a hybrid operating room receive the same standard of care as they would receive in a standard operating room. Furthermore, the timetable for this intervention is estimated to be three months per student. The timetable can be shortened or lengthen based on the learning styles of the learner and the availability of appropriate vascular surgical procedures. The PICOT question of this project is whether aortic aneurysm patients in the hybrid operating room can have care provided by cross-trained staff from the Cath Lab that meets the standards of perioperative nursing.

### **Literature Review**

A review of literature was conducted prior to creation of the project. The articles used in the literature review describe the effectiveness of cross-training nursing staff in caring for a surgical patient in the Hybrid Operating Room. A search of CINAHL, PubMed, and Google Scholar databases was conducted using the following key words: abdominal aortic aneurysm, endovascular artery repair (EVAR), hybrid operating room, cross-training, perioperative care, TeamSTEPPS, aseptic technique, surgical technique, surgical site infections. Several relevant publications were identified with dates that ranged from 2005 to 2018.

### **Proposed Solution**

The vascular surgeons and interventional radiologists requested that Cath Lab Nurses be trained in the principles of aseptic technique and surgical technique during the development of

the HOR program. They were concerned at the increased number of nursing staff utilized for EVAR and TEVAR cases. Not all of these procedures require open cut downs for vascular access, so while the operating staff was present for the cases, they were often not needed. The operating staff was present for the cases, but not needed. The physicians felt that this was a waste of a valuable resource.

Specialized training has been developed to change the practice in the HOR. The role of a CNL was instrumental in implementing the HOR cross-training program. The CNL possesses expertise and evidence based knowledge regarding surgical technique and asepsis. By utilizing effective mentoring and communication skills, the Cath Lab staff will likely gain the confidence to successfully complete this program. The expectation is that the Cath Lab staff will adhere to the standards of surgical nursing practice, MOR policies, and procedures while caring for a surgical patient in the Cath Lab. This will ensure that all surgical patients are receiving the same standard of care in the Cath Lab. The HOR Cross-training was developed to teach Cath Lab nurses and RTs these surgical nursing practices. The successful implementation of this program will result in allowing Cath Lab nursing staff to meet the needs of a HOR surgical patient independently.

### **Supportive Literature**

The cooperation between the OR staff and HOR staff in establishing the practice of surgical technique and asepsis is fundamental. The adaptation of change can be seen when the Cath Lab team has accepted the new surgical practice, and successfully applies surgical technique and surgical asepsis (Complexity Labs, 2017). The desired outcome in this change is the independent practice of Cath Lab nursing staff in an open surgical procedure in the HOR. This would be viewed as an evolution in clinical nursing practice (Complexity Labs, 2017). A

benefit of cross-training is that it improves morale. Nurses are life-long learners. Acquiring new techniques promotes research-based knowledge and professional growth (Inman, Blumenfeld & Ko, 2005). Schaadt and Landau (2013) found that the HOR requires specific abilities from each member of the team. Each must have an understanding of the endovascular procedures, as well as open vascular procedures. Further, the integration of technology and a multidisciplinary team requires appropriately planned education in a hybrid operating room (Cowperthwaite & Fearon, 2017). Lastly, HOR training must be comprehensive. Thus all members of the team must be competent in their roles for the care of a HOR patient (Speiser & Dutra-Brice, 2014).

### **Leadership Change Theory**

The effectiveness of the learning will be strongly influenced by the role of leadership in the program. The leadership theory that the CNL would apply in this change strategy is transformational. Schwartz et al. (2011) described four components needed in transformation theory. The traits a leader must possess to apply this theory are: ideal influence, inspirational motivation, intellectual stimulation and individual consideration. Ideal influence is demonstrated through the application of a clear set of values that are used in surgical technique and asepsis. This can then be applied to the purpose of providing a high quality of care for surgical patients in the HOR. The preceptorship of Cath Lab staff would reflect the CNL's ability to motivate the learning of new skill sets. It would be demonstrated by the successful progress of the preceptee through the training program. These new skills would challenge the intellectual abilities of the Cath Lab staff, and promote a sense of accomplishment with the proper care of a HOR patient. Lastly, the program would be tailored to the learning style of the student to maximize the time spent on the training and facilitate knowledge acquisition. For example, some people learn through return demonstration while others need written instructions to retain information. The



preceptor would have to assess each student's learning preferences and incorporate them into the teaching plan.

### **Learning Change Theory**

The most feasible way to approach this educational program is to use Lewin's Change Theory to assist in the change of practice for the staff in a HOR (Shirley, 2013). Dr. Lewin's theory was developed to have an understanding of the factors that motivate behavior, and identify the factors that can contribute to change behaviors and sustain them (Shirley, 2013). Lewin's theory is based on three different steps: unfreezing, changing or transitioning, and refreezing. (Shirley, 2013; Walters & Eley, 2011).

In the first stage, the Cath Lab staff were prepared for the change in practice by persuading them to accept the principles of aseptic technique and surgical technique as a new practice in the HOR. The first sign of the unfreezing was that the participants volunteered for this program. The Cath Lab students began to review the self-study modules in aseptic technique. The emphasis was made on the need to practice these principles in the HOR. The gaps in knowledge about these principles were identified, as well as the strengths and weaknesses of the program in this stage (Shirley, 2013). An interdisciplinary team of Cath Lab and OR educators, managers, and nursing teams met to develop the timeline and cross-training education plan. Feedback from the Cath Lab staff was crucial to setting the goals of the program and having a successful buy-in (Wells, Manuel & Cuning, 2011).

The transitioning stage involved the precepting of the Cath Lab staff in a standard operating room to observe and learn the processing in the care of a surgical patient in both the scrub person and circulating nurse role. During this change, the challenge was to overcome the

fears and concerns of the Cath Lab staff in acquiring a new skill set (Shirley, 2013). The cross-training program must be structured and consistent to allow its participants to become confident and proficient in the new processes. During this stage, the Cath Lab staff was learning perioperative policies and procedures, instrumentation and positioning techniques. Each participant was paired with a designated preceptor to facilitate this stage of change.

In the freezing stage, the Cath lab staff reached a state of equilibrium in their practice. By this stage, they had learned the principles of both aseptic and surgical technique. They function independently. In addition, they had an understanding of policies and procedures that are part of the care of the perioperative patient. Cath Lab staff will continue to have access to resources and their preceptors to support the change (Walters & Eley, 2011). The cross-training allowed Cath lab staff to adapt nursing practice from clean procedures to surgical procedures. This required additional situational awareness, vigilance, and maintenance of the sterile field. The preceptees had learned safety procedures such as policies and procedures for surgical counts. Furthermore, random auditing was performed to ensure that perioperative practices are being adhered to (Walters & Eley, 2011). The new practices have become the norm, and subsequently set a high expectation for the staff in the HOR (Shirley, 2013).

### **Global Aim Statement**

The theme for improvement is to provide standardized care for aortic aneurysm surgical patients in the HOR. The aim is to improve the intraoperative care of aortic aneurysm surgical patients in the HOR. The process begins with the cross-training of the Vascular Cath Lab nurses and Radiology Technologists in the principles of surgical asepsis and surgical technique. Vascular Cath Lab nurses will learn the roles and responsibilities of a surgical circulating nurse. Radiology Technologists will learn the roles and responsibilities of a surgical scrub.

Furthermore, the process ends when Vascular Cath Lab nurses and Radiology Technologists demonstrate independent and competent practice of surgical technique and surgical asepsis in the Hybrid Operating Room. Each staff member will have a full understanding of his or her responsibilities and role in the care of a surgical patient. By working on the process, we expect to promote safe and competent care of aortic aneurysm surgical patients in a Hybrid Operating Room and decrease operating room staff utilization in the Hybrid Operating Room. Lastly, it is important to work on this now because the project provides the Vascular Cath Lab nurses and Radiology Technologists with all of the skills that are necessary to safely care for an aortic aneurysm surgical patient in the Hybrid Operating Room. This patient population will receive the same high standards of care required in the normal operating room, and costs will be reduced by decreasing the staffing ratios in the Hybrid Operating Room (Appendix A).

### **Methods in the Development of the Hybrid Cross-Training Project**

#### **Microsystem System Setting**

Stanford Healthcare Hospital is located in Stanford, California. The mission of this organization is “to heal humanity through science and compassion, one patient at a time” (Roesner, 2012). There are many microsystems that make up the perioperative services. Stanford has forty-nine operating rooms in its primary facility (Stanford Healthcare, 2015). In addition, there are seven Cath Lab procedure rooms and one hybrid operating room (OR) in the main hospital.

A Microsystem Assessment was performed using the Institute of Healthcare Improvement tools for an emergency room and an outpatient setting. The two tools had to be blended to meet the operating room and cath lab descriptions (Appendix B). Within the

perioperative services there are at least nine distinct microsystems that are based on surgical specialty. Each has their own specialized nursing staff, instrumentation, supplies and surgical technology. The cardiac, vascular and thoracic services alone have twenty-two nurses and ten surgical technicians. The cardiac surgical team consists of cardiac surgeons, cardiac anesthesiologists, a perfusionist, and two nurses per patient. Most of the nurses in this team can function as a circulation nurse or as a scrub nurse. The surgical technician can only function as the scrub. The small size of the team, and the length of some of the procedures promotes an opportunity for all team members to get to know each other well. As a result, every team member truly understands each other's roles. This encourages teamwork. Because Stanford Hospital is a Level I trauma Center, the cardiac surgery nursing team has eight people on call for three shifts on a daily basis.

### **Proposed Change Strategy in the Hybrid Operating Room**

The change strategy is designed to replace the OR nursing staff in the Hybrid Operating Room (HOR) with Cath Lab nursing staff. The HOR is located outside the Main Operating Room (MOR). It is in the Cath Lab department. This room has been designed to be an operating room that includes advanced imaging and interventional technology such as 3-D imaging (Taylor, 2017). It has surgical supplies designated and budgeted only for this room. Other Cath Lab suites can be utilized to perform EVAR cases; however, surgical supplies and instrumentation must come in from the operating room to support these procedures. In addition to these resources, a full surgical team must float to this unit to provide the expertise needed to perform an open procedure. It has been demonstrated that EVARs take less time to perform compared to an open repair (Taylor, 2017). EVAR procedures have contributed to better patient

outcomes, and therefore are increasingly utilized by physicians (Sachs et al., 2011). See Appendix C for a list of surgical procedures performed in the HOR.

### **Driving Forces of Change**

One potential incentive for creating this change, is minimizing the utilization of OR nursing staff in the Cath lab. MOR staff are specialized in CVT surgery. They are heavily scheduled in the MOR for cardiac procedures. Only twenty staff members are trained in this specialty, and there are no other staff members that can scrub and circulate cardiac cases in the OR. Presently, on call staff are being used to cover these cases. Other times, people are asked to work on their day off to care for patients in cardiac cases. The perioperative services are trying to cross-train staff to manage the acuity and staffing needs without increasing full time employee staffing (Davis, Copper & Filla, 2015). The change proposed here will ease staffing needs in the MOR and reduce the workload of the CVT team (Inman, Blumenfeld & Ko, 2005).

### **SWOT Analysis**

The SWOT (strength, weakness, opportunity and threats) analysis is central to establishing a plan for this program (Figure 1). Goals for this program can be developed based on the results of this analysis (Gregory, 2018). The analysis aids in identifying the barriers to meet these goals (Figure 2). The strengths are that: all preceptors are formally trained, the program is supported by the leadership in both the Cath Lab and the Main OR, and there is interdisciplinary support for the program. One weakness that is difficult to address is the availability of vascular surgeries on the day that the learners are available to practice. Also, CVT team scheduling requires that preceptors are utilized in the Main OR for open heart surgeries. The perceived threats in this program are related to the operating room vascular surgery

schedule. It is difficult to predict or guarantee that appropriate open vascular cases are scheduled for the preceptee to learn from. The caseload is highly dependent on the specific patient population that would elect to use Stanford Hospital for the treatment of their aortic aneurysms.

	<b>Helpful</b> to achieve objective	<b>Harmful</b> to achieve objective
<b>Internal origins</b> (attribute of the organization)	<p style="text-align: center;"><b>Strengths</b></p> <p>Volunteers participate the Cath Lab Cross Training program</p> <p>Formally trained Preceptors from the operating room</p> <p>Support from the Vascular and Interventional Radiologist</p> <p>Support from the management of the Cath Lab and OR</p> <p>Collaboration between Cath Lab educators and OR educators</p>	<p style="text-align: center;"><b>Weakness</b></p> <p>OR staffing preceptor schedule</p> <p>Cath lab staffing schedule</p>
<b>External origins</b> (attributes of the organization)	<p style="text-align: center;"><b>Opportunities</b></p> <p>Establishing a special FTE to staff the HOR</p> <p>Effective utilization of HOR staff</p>	<p style="text-align: center;"><b>Threats</b></p> <p>OR surgical cases opportunity/schedule (availability)</p> <p>Cath Lab cases opportunity/ schedule</p> <p>Cath Lab staff attrition</p>

Figure 1. SWOT Matrix

Note: SWOT analysis diagram adapted from Word MS templates. Retrieved from <http://www.wordmstemplates.com/swot-analysis-template-free.html>

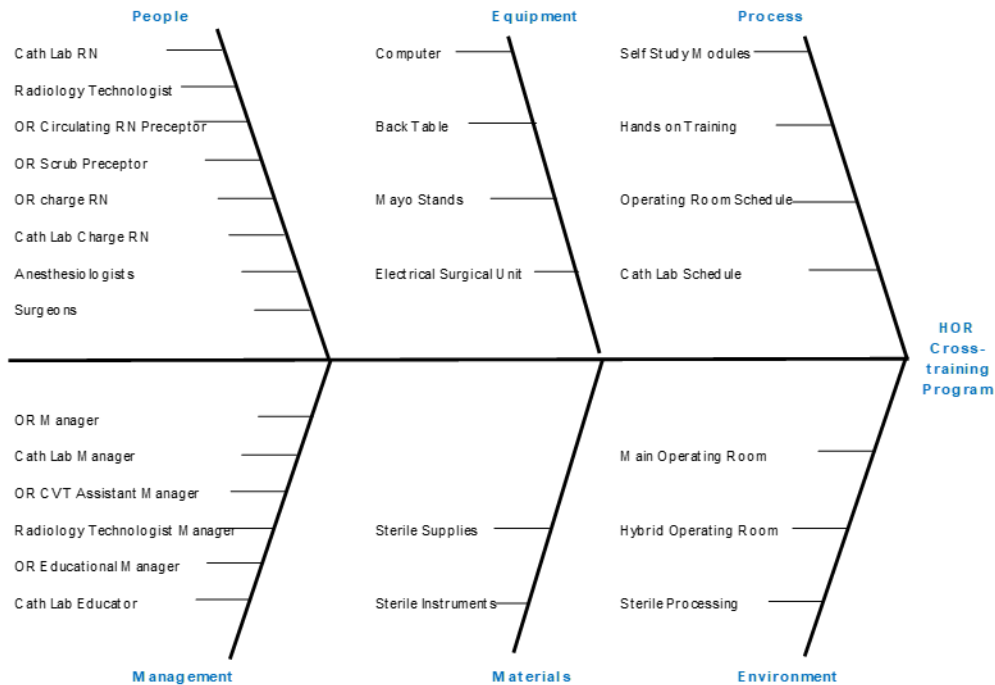


Figure 2. Fishbone Diagram for HOR Cross-Training Program

**The Stakeholders**

The key stake holders in this system are from both the MOR and the Cath Lab. They are composed of vascular and cardiac surgeons, interventional radiologists, anesthesiologists, perfusionists, surgical nurses, Cath Lab nurses, surgical technicians, and radiology technicians. The hybrid procedures require different levels of expertise to care for EVAR procedure patients. The expertise needed for appropriate care with these patients requires a background in open vascular procedures of the groin, arm, abdomen, and neck. The Cath Lab staff apply their experience in radiological interventions. Presently, a total of six nursing staff are needed to care for a hybrid patient. Two nursing staff are needed from the MOR, which can be a combination of a circulating nurse and a scrub nurse, or a circulating nurse and a surgical technician. The Cath Lab team consists of two nurses and two radiology technicians. This complex combination

of staff encompasses the hybrid team. The crossed-trained Cath Lab nurses will be able to apply this new skill set. The perioperative services would also achieve cost containment (Masson & Fain,1997).

### **Potential Barriers to Change**

The difficulties that can arise within this setting are related to differences in the culture of the operating room versus that of the Cath Lab. A multidisciplinary team met to identify the barriers to the project and conducted a PDSA cycle to begin the process of change (Figure 3 and Appendix D). In the HOR, there is always a potential that a percutaneous procedure will change to an open one. This necessitates the need for operating room expertise (Mathias, 2014). The Cath Lab staff will be required to know all of the MOR policies and procedures relating to the care of the patient. These include policies on surgical asepsis, surgical handwashing, gowning and gloving, creation and maintenance of surgical fields, surgical counts, surgical preps and medication labeling. These policies are based on the Association of Perioperative Registered Nurses (AORN) recommendations and review of literature.



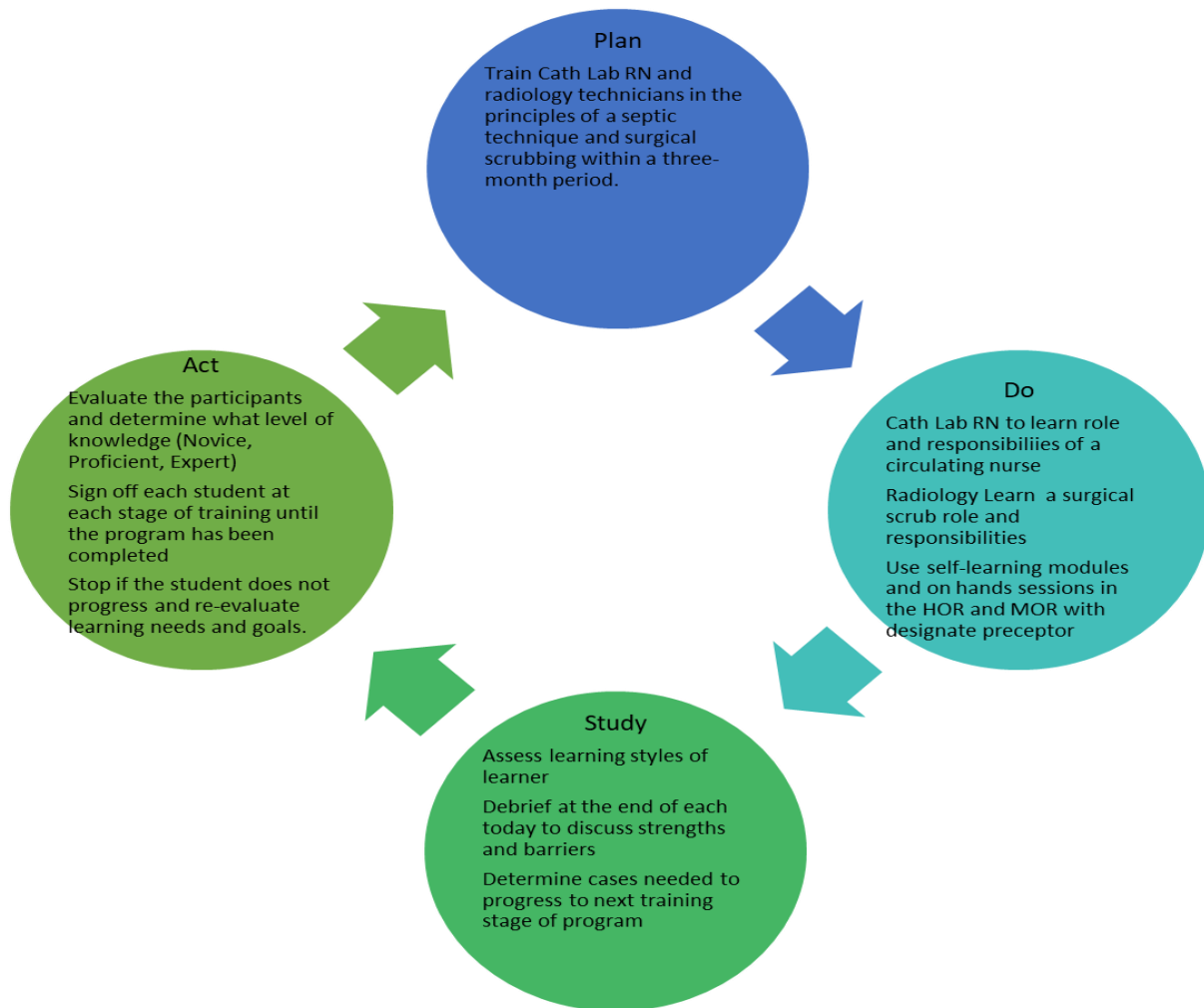


Figure 3. PDSA Cycle for the HOR Cross-Training Project

### Addressing Barriers

The curriculum was designed to meet very specific criteria as recommended by the AORN 101 Perioperative Course (Association of Perioperative Registered Nurses (AORN), 2015). The required skills are listed in Appendix E. In addition, the cross-training team performed a learning needs assessment to address barriers and create the curriculum (Appendix F). Evaluation forms were made to specifically identify the new skills needed for the Cath Lab circulating nurse and RT scrubs (Appendix G and Appendix H).

The training curriculum has included multiple reviews of the policies and procedures of the OR by Cath Lab staff, through self-paced modules on Healthstream, the education website utilized by the Stanford Hospital. Further, the application and review of these policies will be conducted during their preceptorship in the MOR. This will provide opportunity for Cath Lab staff to apply what they have learned during a surgical procedure. At the same time, MOR staff can be present to clarify any concerns or questions Cath Lab staff may have and provide guidance in the processes.

One of the fundamental skills that the Cath Lab staff needed to learn is the names of each of the instruments and uses. Within the first month, the Cath Lab staff would go to sterile processing and assemble a basic vascular instrument set. During this assembly they would have to look up the numbers on each instrument, learn the correct name, the location on the stringer and the number required in each set. This process would aid the learners in conducting preoperative instrument counts. The uses of each instrument would be learned when the RT is scrubbed into a procedure. At this time, the RT has learned how to pass the instrument to the surgeon properly, and learn the anatomy the instrument is used for. The time for learning this information can vary for each student. It is a lengthy process.

A less time consuming alternative is a simulation lab for learning these applications of instruments and surgical technique. Unfortunately, the simulation lab is predominately used by the Stanford medical school, and the schedule is full for the academic year. Currently, there is a trial for interventional instrumentation software to assess the RT and Cath Lab nurses. The software will display an instrument and ask the learner to identify it by name. The program grades the student on the correct identification of the instrument and by the amount of time it takes to respond.

**Action Plan**

Stanford Hospital is constructing a new hospital to meet the building requirements for earthquake resistance. The construction plans of the operating room include five new hybrid operating rooms. One goal of Stanford Hospital is to integrate the MOR and Cath Lab in the new hospital. These two departments will need to make changes in the cultures to adhere to surgical standards. The qualitative improvement that was used in this training plan was based on Lean methodology. Lean is used to reduce waste and improve workflows that result in a high quality healthcare performance (Cima et al., 2011). This training makes the nursing practices similar in both the MOR and HOR. OR nurses will need to learn how to function in a Cath Lab in performing the duties of a Cath Lab nurse. Cath Lab staff will need to learn how to function as circulating nurses and scrubs.

**Learning Needs Assessment**

The learning needs of the HOR staff involves developing expertise in both surgical technique and in the principles of aseptic technique. Cath Lab nursing staff will need to learn how to care for a surgical patient by utilizing components of the curriculum of the Association of Perioperative Nurses (AORN) Periop 101 course. AORN recommended practices are evidenced based and are utilized by OR nurses nation-wide (AORN, 2017). Also, OR nursing staff will need to learn some technical skills that are necessary for an interventional radiology procedure. This education would reduce the number of staff and maintain the high level of care for a surgical patient in the HOR.

The TeamSTEPPS concepts have been found to improve patient safety in healthcare settings. Communication has been standardized and provides an opportunity to use a closed

looped system (Moore, 2017). The TeamSTEPPS framework can be applied to the perioperative training program because it supports the combinations of Cath Lab nursing skills with OR nursing skills to promote collaboration in the care of a Hybrid Operating Room (HOR) patient (Reed et al., 2017). TeamSTEPPS methodology improves team performance in the areas of monitoring the surgical procedure, promoting interprofessional communication, encouraging mutual support, and displaying leadership within the HOR (Plonein & Williams, 2015). Examples of improved communication processes are the preoperative debriefs or surgical time-outs and post-operative debriefs (Weld et al., 2016). During the surgical time-out, teamwork is promoted by recognizing each team member and their role during the surgical procedure. Further, quality improvement can be made through the debriefing, especially in regard to missing instrumentation, broken equipment or interdepartmental communication breakdowns. The favorable outcomes of this program are improved teamwork, and a high quality care for a surgical patient in the HOR.

### **Learning Objectives**

The education plan will be individualized to the Cath Lab nurses and to the Radiology Technicians (RT). These are the Vascular Cath Lab nurses and the Vascular RT. The Periop 101 curriculum encompasses topics necessary for operating room staff (AORN, 2017). The SMART model was utilized to define the course objectives. SMART stands for specific, measurable, achievable, relevant, time bound (Colbert, West, Graham & Pien, 2016). The RT will be learning the role of a surgical scrub in the HOR. The Cath Lab nurse will have different educational goals. The nurse will be learning the role of a circulating operating room nurse in the HOR.

The domains of learning will be addressed in different stages of the course. The cognitive component will be self-paced modules in Stanford's Healthstream program. The psychomotor component of the education plan will be based on return demonstrations. This will be conducted in the Main Operating Room (MOR). Here, the learners will have actual practice with surgical patients under the supervision of a preceptor. Lastly, the effective component of the education plan will be demonstrated by the learner as they progress to independent or competent practice with minimal supervision.

Also, the program incorporated three aspects of learning which are in verbal, written, and tactile modalities. The verbal modality was demonstrated during the exchange of information during on hands training in the HOR. Written aspects of learning were conducted during the self-study modules. The tactile learning component was demonstrated during the handling and passing of instruments to the surgeon.

### **Timeline for HOR Cross-training Program**

The HOR Cross-training Program was designed to be over a twelve-week period. During the initial two weeks, the learners began their studies with self-paced modules. By the third week, the Cath Lab nurse trained on a one to one basis in the operating room by an operating room nurse. The RT was precepted by a OR nurse or a surgical technician. Here, they began to learn the workflows and processes that are required for an open vascular procedure (Appendix I and Appendix J). The learners applied the material in the self- modules. The mastering of each skill demonstrated that the learner is competent in applying surgical technique and aseptic technique. Presently, four Cath Lab nurses and three RT have completed the HOR program.

### **Evaluation of Evidence**

The cooperation between the OR staff and HOR staff in establishing the practice of surgical technique and asepsis is fundamental. The adaptation of change is the acceptance and application of surgical technique and surgical asepsis by the Cath Lab staff. The desired outcome in this change is the independent practice of Cath Lab nursing staff in an open surgical procedure in the HOR. This would be viewed as the evolution of clinical nursing practice (Complexity Labs, 2017). The benefit of cross-training is that it has a process to improve moral. Nurses are life-long learners. Acquiring new techniques promotes research based knowledge and professional growth (Inman, Blumenfeld & Ko, 2005). Schaadt and Landau (2013) found that the HOR requires specific abilities from each member of the team. Each must have an understanding of the endovascular procedures as well as open vascular procedures. Further, the integration of technology and a mutildisiplinary team requires appropriately planned education in a hybrid operating room (Cowperthwaite & Fearon, 2017). Lastly, HOR training must be comprehensive and all members of the team must be competent in their roles for the care of a HOR patient (Speiser & Dutra-Brice, 2014).

### **Implementation of Project**

A CNL would be expected to design educational training programs that are evidence-based, as well as implementing the programs, and evaluating the processes and the delivery of care (American Association of College of Nursing (AACN), 2013). The AACN (2013) states in Essential 4 that the CNL will be able to translate and integrate evidenced-based practices and information strategy. A CNL is expected to act as a preceptor and teach the specialized skills in the operating room, which in this case includes meeting the structured expectations defined in the Stanford Hospital preceptor course (Wesolowski et al., 2014).

The HOR Cross-training Program was designed to be over a twelve-week period (Appendix K and Appendix L). During the initial two weeks, the learners began their studies with self-paced modules. By the third week, the Cath Lab nurse trained on a one to one basis in the operating room by an operating room nurse. The RT was precepted by a OR nurse or a surgical technician. Here, they began to learn the workflows and processes that are required for an open vascular procedure. The learners applied the material in the self- modules. The mastering of each skill demonstrated that the learner is competent in applying surgical technique and aseptic technique.

### **Evaluation**

The change strategy has been effective. Four Cath Lab nurses have successfully completed the training and are independently caring for HOR patients for EVAR procedures. Three radiology technicians have completed the training. It is notable that the training for the circulating role took about three months. The complexities involved in scrubbing an open surgical procedure require a longer training period that ranges from three to six months. The success of this training program has inspired additional training of Cath Lab nurses in cardiac interventional cases as well. These cases are related to the care of transcatheter aortic valve replacement (TVAR) patients. Cross-training has added benefits including having the correct staff with the skill sets to care for HOR patients and increasing staff satisfaction with staffing assignments (Ballou et al., 2016).

In the last month of the program, the learners will be asked to complete a post-training survey to evaluate the effectiveness of the project and suggestions for improvement (Appendix M). The improvement of this program relies on the feedback of the students (Figure 4 and Figure 5). Through these program evaluations, barriers to learning can be identified and

addressed. Lastly, the program can be redesigned for improvement in learning and implementation.

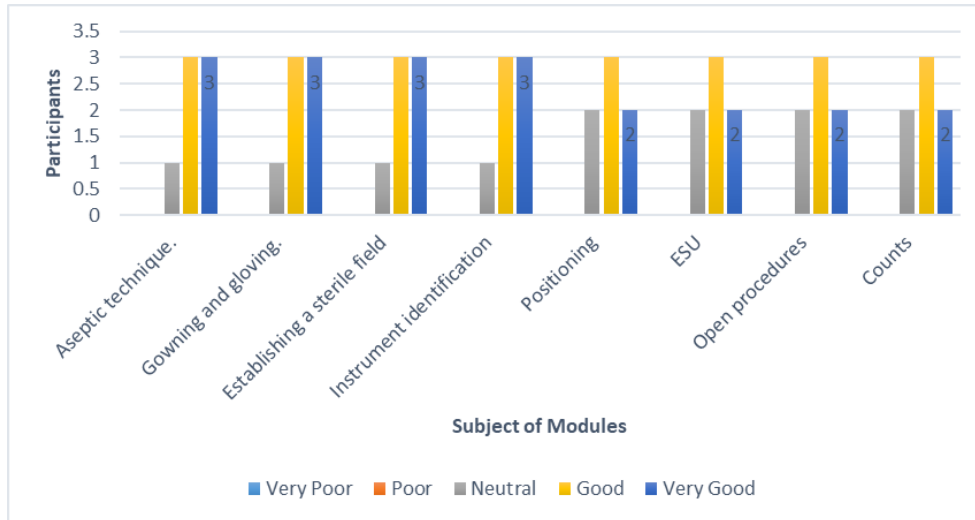


Figure 3. HOR Self-Study Modules Feedback. Note: Each category was rated by seven participants in the HOR Training Program.

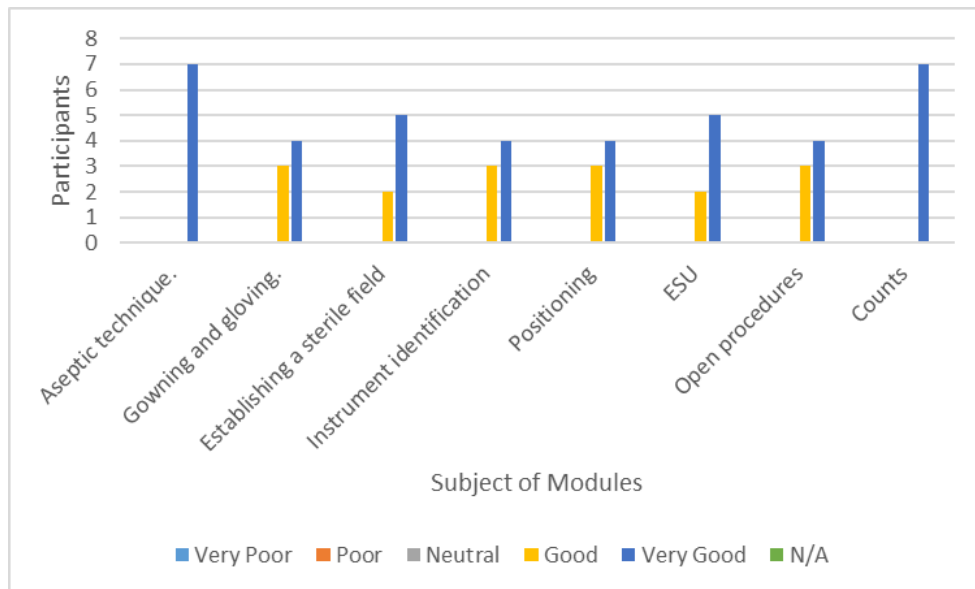


Figure 4. Post HOR Training Participant Feedback of On-Hands in the HOR for 2017-2018. Note: Each category was rated by seven participants in the HOR Training Program.

**Cost Saving for The HOR Cross-training Program**



The completion of the cross-training program will yield a savings in the cost of OR nursing staff. Once a Cath Lab nurse and an RT complete the training, the need for an additional surgical nursing team will be negated. Open procedures in the HOR can be performed with Cath lab staff that are competent in the care of a surgical patient.

Salaries are the first step in developing a budget. The nursing staff is based on the combined average salary of Clinical Nurse II, III and IV. This is approximately \$77 per hour. The RT salaries are based on the combined average salary of a RT I, II and III, which is \$55 per hour.

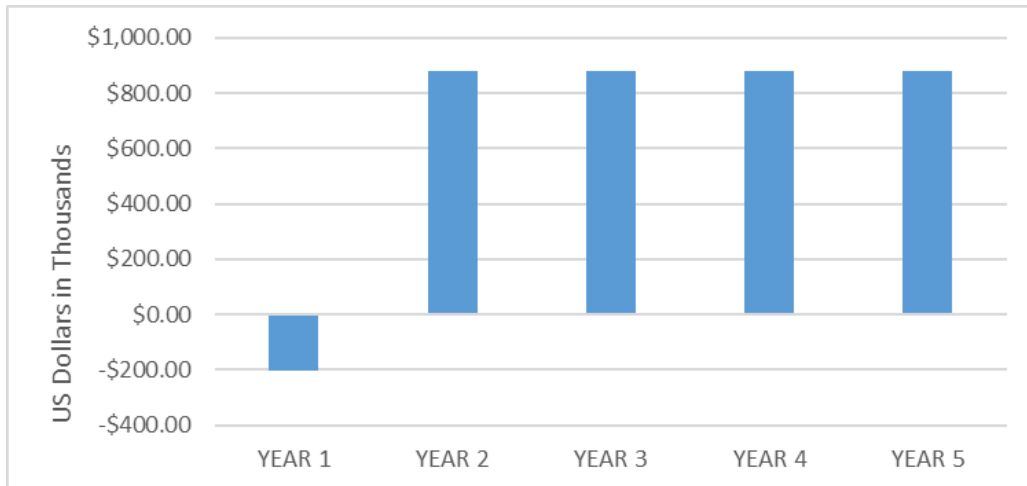
The HOR scheduled cases are performed during the first shift of the day. The shift starts at 7:30 am and ends at 7:30pm. Any cases that go past this shift are covered by a call team. The FTEs needed for the HOR day shift are currently 7.4. After the training, the FTE are predicted to be 4.6. The after-hours FTE are presently 4.5. After the completion of the program, the FTE will be 2.7. A detailed FTE staffing ratio list for the HOR can be seen in Figure 6.

7a-7p	Before HOR Program			After HOR Program			
STAFF	FTE	NEEDED	TOTAL		FTE	NEEDED	TOTAL
Cath Lab RN	0.9	2	1.8		0.9	2	1.8
OR Circulating RN	0.9	1	0.9		0	0	0
OR Scrub RN	0.9	1	0.9		0	0	0
Radiologist Technologist	0.9	2	1.8		0.9	2	1.8
Cath Lab RN relief	0.5	1	0.5		0.5	1	0.5
OR Circulating RN relief	0.5	1	0.5		0	0	0
OR Scrub RN relief	0.5	1	0.5		0	0	0
Radiologist Technologist relief	0.5	1	0.5		0.5	1	0.5
Total FTEs			7.4				4.6
7p-7a (ON-CALL)							
STAFF	FTE	NEEDED	TOTAL		FTE	NEEDED	TOTAL
Cath Lab RN	0.9	2	1.8		0.9	2	1.8
OR Circulating RN	0.9	1	0.9		0	0	0
OR Scrub RN	0.9	1	0.9		0	0	0
Radiologist Technologist	0.9	1	0.9		0.9	1	0.9
Total			4.5				2.7

Figure 6. Staffing Need for The HOR Before and After HOR Cross-Training Program. Note: The FTE for a HOR is calculated based on the work shift of 12 hours that starts at 7 am and ends at 7 pm. The relief FTE are based on the recommendations of AORN for safe staffing of on call personnel (AORN, 2014).

Another consideration that must be made in establishing a budget is the cost of non-productive hours for the training. Based on a twelve-week period, the fixed salary costs are \$133,056 for four Cath Lab nurses, \$71,280 for three RTs. The total hourly wage cost of training is \$204,336 per year.

Once the Cath Lab registered nurses (RN) and RTs are independent, the cost savings in the reduction of 5.5 FTEs is estimated to be \$736,736 per year. The first year is assumed to be a loss (-\$204,336) due to the cost of the nonproductive time for training. The five-year projection of cost saving is calculated to be \$2,742,608 (Figure 7).



*Figure 7. Five-Year Cost Saving Projection. Note:* The assumption is that in the first year the costs will be based on the non-productive hours for the training of the cath lab staff. The first year calculations were based on the sum of the salaries of the RN and RT trainees. The RN salaries the calculation was: 12 hour shifts x 3 times a week x 12-week training period x \$77 RN average hourly salary x 4 trainees = \$133,056. For the RT salary calculation was: 12 hour shifts x 3 times a week x 12-week training period x \$55 RT average hourly salary x 3 trainees = \$71,280. The total training costs for the program in the first year equal \$204,336. The second through fifth year cost saving were based on the average RN salary that are not needed for staffing the HOR. The calculation is: 4.6 FTE x \$77 x 2080 = \$736,736 per year. The total cost saving is  $(\$736,736 \times 4) - \$204,336 = \$2,742,608$ .

## Marketing Plan

If this program can be sustained over a five-year period, it can establish a new practice model for the hybrid operating room. This program serves two purposes. It saves the organization a great deal of money from OR staff utilization in HOR, and it provides a foundation for Cath lab nursing staff to maintain the high standards of care for a HOR surgical patient. Also, the program empowers the nursing staff to feel confident and competent in caring for these types of patients. It can contribute to nursing satisfaction by introducing new skills and increasing their interest in diversifying their knowledge base. This change meets with the mission of Stanford Hospitals and Clinics which is “caring with technology and compassion, one patient at a time” (Stanford Hospital, 2018). Lastly, this education provides a medium to

empower Cath Lab staff with knowledge that will contribute to positive and safe patient outcomes in the HOR.

### **Ethical Considerations**

When developing a quality improvement project, the CNL must make ethical considerations regarding professional nursing practice and legal implications. The format of the project must meet several core aspects that adhere to evidenced based practices and it must promote the wellbeing of the patients in an HOR by following federal, state, and local laws and regulations (Antai-Otong, 2014). In addition, the project must follow the guidelines for ethical practice as described in the American Nursing Association 2001 Code of Ethics for Nurses with Interpretive Statements (Gerard, 2016). In these guidelines, the ethical standards are defined for nursing professionals (Guido, 2010).

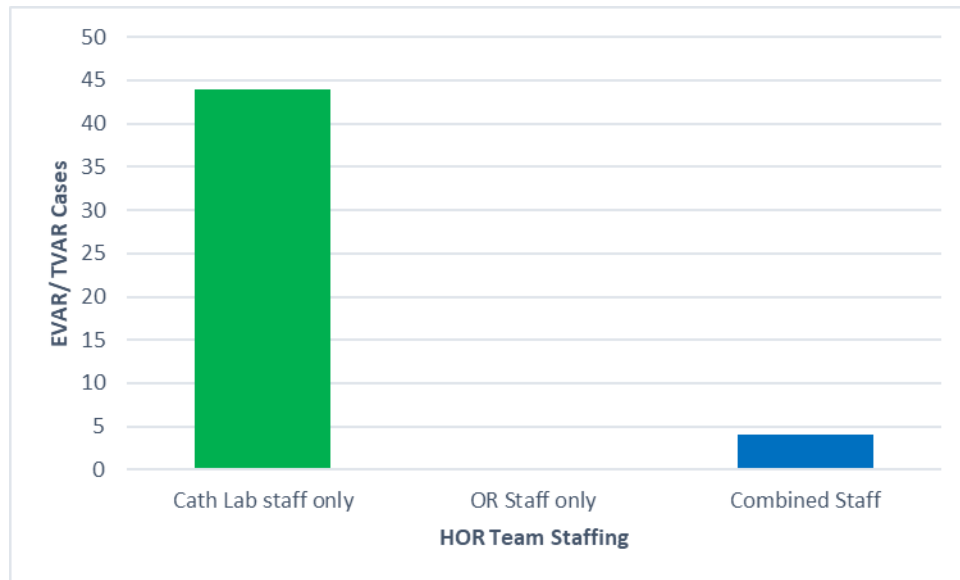
The ethical principles that are applied in this HOR Cross-training program are autonomy, beneficence, nonmaleficence, and justice. Autonomy is displayed through the advocacy for patients to have informed consent and that their wishes are respected while having a procedure in the HOR. Also, beneficence is applied by teaching the Cath Lab staff the principles in caring for a surgical patient in order to promote high quality care in the HOR. Furthermore, nonmaleficence is expressed when the cross-trained staff follow operating room protocols and procedures in the HOR to promote safety and standardized practice. Finally, justice is performed when all patients in the HOR received the same standardized care as they would have if their procedure were performed in a regular operating room.

### **Results of the Cross-Training Program**

The Stanford Perioperative leadership has given this cross-training program its full

support. As an expert in the operating room, the CNL has guided and informed the leadership in the development of the cross-training program, and has met with all of the stakeholders to support it. These include the surgeons, anesthesiologists, Cath Lab leadership and educators.

Presently, four Cath Lab nurses and three RT have completed the HOR program. Each meet the strict evaluation criteria. They were evaluated by several preceptors and their progress was reported via written evaluation forms. By the end of their training periods, which varied based on individual learning abilities, the students were able to demonstrate independent and competent perioperative patient care in the Hybrid Operating room. Lastly, a review of the OR and Cath Lab schedule revealed that fifty procedures were performed in the HOR. The chart review of these cases indicated that forty-six EVAR/ TVAR procedures were performed exclusively with cross-trained Cath Lab staff. Only four procedures required a staff person from the operating room to serve in the role of a circulating nurse or scrub person (Figure 8). The program met its goal by producing cross-trained Cath Lab staff that are able to practice independently and meet all of the surgical nursing practices and expectations. Most importantly, all surgical patients will receive the same care whether they are in the MOR or in the HOR.



*Figure 8.* HOR Staffing June 2017 to June 2018. *Note:* Forty-four AAA/TVAR procedures were performed in the HOR between June 2017 to June 2018. The patient medical information was obtained from the CUPID electronic medical records and EPIC electronic medical records. The parameters for the review consisted of the procedure nursing report and the post-operative reports. The combined cases had either an operating room circulating nurse or an operating room scrub person. There were no cases that had a surgical nurse or surgical scrub assigned to the HOR.

### Summary

This program empowers the nursing staff to feel confident and competent in caring for these types of patients. The principles of surgical technique and surgical asepsis have been added to their practice in the HOR and allow the staff to increase their value to the team and the organization. The design of the program required multidisciplinary collaboration between the operating room staff, educators and leaders. Objectives written with SMART philosophy were utilized to define the goals of the educational intervention. The change theories that were displayed in the cross-training were based on Transformational Leadership Models (Schwartz et al., 2011) and Lewin's Change Theory (Shirley, 2013). Also, the program incorporated three aspects of learning which are in verbal, written, and tactile modalities. The trainees were able to apply their new skills during open procedures in the Main OR.

The training was conducted over a three-month period. Progressive assessments were conducted at the end of each month. The preceptee and the preceptor measured the mastering of the principles in the program. At the end of the training, the participants were given an opportunity to provide valuable feedback to improve the structure and deliverance of the HOR cross-training. This education program has provided the Cath Lab nurses and RT's with recommended, evidence based practices, to care for the HOR patient independently.

The economic advantages of this program are notable. It saves the organization a great deal of money from OR staff utilization in HOR, and it provides a foundation for Cath lab nursing staff to maintain the high standards of care for a HOR surgical patient. Reducing staffing ratios for HOR cases is the ultimate goal. The Lean methodology was used to decrease staffing ratios in the HOR. Presently, the HOR has four Cath Lab nurses and three radiology technicians that have completed the training and can practice independently. The success of this program has inspired similar training for those Cath Lab staff involved in cardiac cases in the HOR. The HOR cross-training program has demonstrated that it is an effective method to improve the care of patients, and it promotes proper surgical technique as well as aseptic technique by the Cath Lab nursing staff. Further, the CVT nursing staff can be utilized properly in complex open procedures in the MOR. Finally, this education provides a medium to empower Cath Lab staff with knowledge that will contribute to positive and safe patient outcomes in the HOR.

### **Conclusion**

EVAR procedures are just the beginning for perioperative nursing in a HOR. As the practice of minimally invasive procedures increases its scope over other specialties of surgery, demand will increase for cross-trained staff in the hybrid operating room. Not only will it be

beneficial to perioperative patients, but it will also provide the means for the Cath Lab to reduce operating room staff in the HOR. In closing, if this complex and team driven program can be sustained over a five-year period, a new patient-centered practice model for the hybrid operating room will maximized efficiency and safety.



## References

- American Association of College of Nursing. (2013). CNL practice. *Competencies and curricular expectations for the clinical nurse leader education and practice* (pp. 4). Retrieved from: <http://www.aacnnursing.org/Portals/42/News/White-Papers/CNL-Competencies-October-2013.pdf?ver=2017-08-07-093318-867>
- Antai-Otong, D. (2014). Effective communications and team collaboration. In Harris, J. L., Roussel, L. & Thomas, P. L. (Eds.). *Initiating and sustaining the clinical nurse leader role: A practical guide* (2<sup>nd</sup> ed., p.113). Burlington, ME: Jones & Bartlett Learning.
- Association of Perioperative Nurses (2017). Periop 101: A core curriculum OR. Retrieved from <https://www.aorn.org/education/facility-solutions/periop-101/or>
- Ballou, M., Sortman, S., Meddings, K., Locker, J.& Kreighauser (2016). Double agents: Cross-training PACU nurses to inpatient operating room nurses [Abstract]. *Association of Perianesthesia Nurses National Conference Abstract*, 36. doi: 10.1016/j.jopan.2015.05.096
- Bastable, S. B. (2013). *Nurse as educator- Principles of teaching and learning for nursing practice*. (3rd. ed). Burlington, MA: Jones and Bartlett Publisher
- Benner, P., Tanner, C. & Chesla, C. (1996). *Expertise in nursing practice: Caring, clinical judgment, and ethics* (2nd ed., p. 2). New York, NY: Springer Publishing Company
- Chadi, S. A., Rowe, B. W., Vogt, K. N., Novick, T.V., Harris, J. R., De Rose, G. & Forbes, T. L. (2012). Trends in management of abdominal aortic aneurysms. *Journal of Vascular Surgery* 55 (4), 925. doi: 10.1016/j.jvs.2011.10.094

Cima, R. R., Brown, M. J., Hebl, J. R., Moore, R., Roger, J. C., Kollengode, et al. (2011). Use of lean and six sigma methodology to improve operating room efficiency in a high-volume tertiary-care academic medical center. *Journal of American College of Surgeons* 213, 84. doi: 10.1016/j.jamcollsurg.2011.02.009

Colbert, C. Y., West, A.C., Graham, L.& Pien, L. (2016). Getting SMART about teaching objective writing. *Medical Education* 50 (11),1171-1172. doi: 10.1111/medu.13166

Complexity Labs (2017, May 17). Complexity Theory Overview [Video File]. Retrieved from <https://www.youtube.com/watch?v=i-ladOjo1QA>

Cowperthwaite, L. & Fearon, M. (2017). Guideline implementation: Minimally invasive surgery, part 2-hybrid OR. *Association of Perioperative Registered Nurses Journal* 106, 149-150. doi: 10.1016/j.aorn.2017.06.006

Darthmouth College, Godfrey, Nelson, Batalden & Institute for Healthcare Improvement (2005). Clinical microsystems, “The place where patients, families and clinical teams meet”, Assessing, diagnosing and treating your outpatient specialty care practice. Retrieved from: <http://clinicalmicrosystem.org/uploads/documents/outpatient-primary-care-workbook.doc>

Geisinger Health System, Godfrey, Nelson, Batalden & Institute for Healthcare Improvement (2005). Clinical microsystems, “the place where patients, families and clinical teams meet”. Assessing, diagnosing and treating your emergency department. Retrieved from: <http://clinicalmicrosystem.org/uploads/documents/emergency-department-workbook.doc>

- Gerard, S. O. (2016). Ethical considerations for clinical nurse leaders. In King, C. R. & Gerard, S. O. (Eds.). *Clinical nurse leader: Certification Review* (2<sup>nd</sup> ed., p.243-244). New York, NY: Springer Publishing Company, LLC
- Grand Valley State University. (2018, July 27). Nursing - graduate: PICOT & evidence based practice. Retrieved from: <https://libguides.gvsu.edu/c.php?g=108494&p=702791>
- Gregory, A. (2018, February 16). How to conduct your SWOT analysis for your small business. *The Balance*. Retrieved from <https://www.thebalance.com/swot-analysis-for-small-business-2951706>
- Guido, G. (2010). *Legal and ethical issues in nursing* (5<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Inman, R. R., Blumenfeld, D. E. & Ko, A. (2005). Cross training hospital nurses to reduce staffing costs. *Health Care Management Review* 30 (2), 117.
- Moore, Q. (2017). TeamSTEPPS: Addressing imaging procedure appropriateness. *Radiology Technology* 88 (5). 551. Retrieved from <http://0-web.a.ebscohost.com.ignacio.usfca.edu/ehost/pdfviewer/pdfviewer?vid=5&sid=a3719107-a52e-4922-ad22-0624db8bb2b4%40sessionmgr4009>
- Odle, T. (2011). Managing the transition to a hybrid operating room. *Radiologic Technology* 83 (2), 168CL
- Plonien, C.& Williams, M. (2015). Stepping up teamwork in TeamSTEPS. *Association of Perioperative Registered Nurses Journal* 101 (4), 466. doi: 10.1016/j.aorn.2015.01.006

Reed, T. Horsley, T. L., Muccino, K., Quinones, D., Siddall, V. J., McCarthy, J. & Adams, W.

(2017). Simulation using TeamSTEPPS to promote interprofessional education and collaborative practice. *Nurse Educator* 42, (3), E2. doi:

10.1097/NNE.0000000000000350

Roesner, P. (2012). Stanford Hospital and Clinics who we are: Mission and vision. Retrieved

from <http://www.paulroesner.com/clients/stanford/site/stanford-who-we-are-mission-vision.php>

Stanford Healthcare (2015). About us: Quick facts. Retrieved from

<https://stanfordhealthcare.org/about-us/quick-facts.html>

Stanford Hospital and Clinics (2018, April 20) Mission and Vision. Retrieved from

<http://www.paulroesner.com/clients/stanford/site/stanford-who-we-are-mission-vision.php>

Stanford Medicine. (2017). 500398 Certified surgical technician I job description, pp. 1-2.

Retrieved from:

<https://stanfordmedicine.app.box.com/s/90ggt0f304t7tl7w78f2rkp2arhihus/file/201772073811>

Stanford Medicine. (2017).500397 Certified surgical technician II job description, pp. 1-2.

Retrieved from:

<https://stanfordmedicine.app.box.com/s/90ggt0f304t7tl7w78f2rkp2arhihus/file/201771935320>

Stanford Medicine. (2017).500396 Certified surgical technician III job description, pp. 1-2.

Retrieved from:

<https://stanfordmedicine.app.box.com/s/90gtt0f304t7tl7w78f2rkkp2arhihus/file/201772078484>

Stanford Medicine (2017, July24). Clinical Nurse II Job Description, p. 1-2. Retrieved from

<https://stanfordmedicine.app.box.com/s/90gtt0f304t7tl7w78f2rkkp2arhihus/file/95689703998>

Stanford Medicine (2017, July 24). Clinical nurse III job description, p.1-2. Retrieved from

<https://stanfordmedicine.app.box.com/s/90gtt0f304t7tl7w78f2rkkp2arhihus/file/95692836697>

Stanford Medicine (2017, July 24). Clinical nurse IV job description, p. 1-2. Retrieved from

<https://stanfordmedicine.app.box.com/s/90gtt0f304t7tl7w78f2rkkp2arhihus/file/95748484509>

Schaadt, J & Landau, B. (2013). Hybrid OR 101: The primer for the OR nurse. *Association of Perioperative Nurses Journal* 97 (1), 94. doi: 10.1016/j.aorn.2012.10.009

Schwartz, D. B., Spencer, T., Wilson, B. & Wood, D. (2011). Transformational leadership: Implications for nursing leaders in facilities seeking Magnet designation. *Association of Perioperative Registered Nurses* 93 (6), 739. doi: 10.1016/j.aorn.2010.09.032

Shirley, M. R. (2013). Lewin's Theory of planned change as a strategic resource. *Journal of Nursing Administration* 43 (2), 69. doi: 10.1097/NNA.0b013e31827f20a9

Speiser, B. & Dutra-Brice, C. (2015). Transcatheter aortic valve replacement: Establishing a comprehensive program model for hybrid cardiac catheterization laboratories in the

department of Veterans Affairs. *Dimensions of Critical Care Nursing*. 33(5), 262. doi: 10.1097/DCC.0000000000000069

Spruce, L. (2017), Back to basics: Surgical technique. *Association of Perioperative Nurses Journal* 105, 479-483. dio: 10.1016/j.aorn.2017.02.014

Taylor, B. (2017). Endovascular surgery and the operating room. *The Dissector* 40 (1), 3. doi: 10.4103/0971-9784.159794

Walters, L. & Eley, S. (2011). Robotic-assisted surgery and the need for standardized pathways and clinical guidelines. *Association of Perioperative Nurses Journal* 93 (4), 461. dio: 10.1016/j.aorn.2010.05.032

Weld, L. R., Stringer, M. T., Ebertowski, J. S. Baumgartner, T. S., Kasprenski, M. C., Kelley et al. (2016). TeamSTEPPS improves operating room efficiency and patient safety. *American Journal of Medical Quality* 31 (5), 411. dio: 10.1177/1062860615583671

Wells, J., Manuel, M. & Cunning, G. (2011). Changing the model of care delivery: nurses' perceptions of job satisfaction and care effectiveness. *Journal of Nursing Management* 17, 778-779. dio: 10.1111/j.1365-2834.2011.01292x

Word MS templates. (n.d) SWOT analysis diagram. Retrieved from

<http://www.wordmstemplates.com/swot-analysis-template-free.html>

Appendix A

**EVIDENCE-BASED NON-RESEARCH DETERMINATION FORM**

**STUDENT NAME:** Ana Chozet-Griggs\_\_\_\_\_

**DATE:** 2/16/18\_\_\_\_\_.

**SUPERVISING FACULTY:** Stanford Hospital\_\_\_\_\_.

**Instructions: Answer YES or NO to each of the following statements:**

<b>Project Title:</b> Improving Surgical Patient Outcomes Through a Cross-Training Program for the Hybrid Operating Room	<b>YES</b>	<b>NO</b>
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	X	
The specific aim is to improve performance on a specific service or program and <b>is a part of usual care</b> . ALL participants will receive standard of care.	X	
The project is <b>NOT</b> designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does <b>NOT</b> follow a protocol that overrides clinical decision-making.	X	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does <b>NOT</b> develop paradigms or untested methods or new untested standards.	X	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does <b>NOT</b> seek to test an intervention that is beyond current science and experience.	X	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	X	
The project has <b>NO</b> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	X	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., <b>not</b> a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	X	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “ <i>This project was undertaken as an Evidence-based change of practice project at Stanford Hospital and as such was not formally supervised by the Institutional Review Board.</i> ”	X	

\*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

Appendix B

Microsystem Assessment Tool

CVT SURVIVE SERVICE OF THE MOR PROFILE							
<b>A. Purpose:</b>							
The CVT surgical service exists because there is a need in our patient population to have their cardiac, vascular or thoracic medical conditions addressed through a surgical intervention and promote a better quality of life.							
Site Name: Main Operating Room			Site Contact: Sarah Hirx			Date: 10-01-17	
Practice Manager: Mark Roesner			Surgical Medical Director: Dr. R. Wade			Assist Patient Care Manager: Tina Billingsley	
<b>B. Know Your Patients:</b>							
The patient population that is cared for in the CVT Service had cardiac, vascular or thoracic medical conditions that require a surgical intervention.							
<b>Estimated Age Distribution Percentage</b>		<b>List top Diagnosis</b>		<b>List top 10 Procedures</b>		<b>Patient Satisfaction Score in Percentage</b>	
Birth-10 years		Aortic Aneurysms		EVAR/ TVAR, open aortic aneurysm repair with cardiopulmonary bypass		Length of wait time preoperatively	
11-18 years		Coronary Artery Disease		Coronary Artery Bypass Graft Surgery with cardiopulmonary bypass		Privacy/ comfort	
19-45 years		Peripheral Artery Disease		Femoral- popliteal arterial bypass, femoral-tibial artery bypass, femoral-femoral arterial bypass		Courtesy, respect, sensitivity, friendliness	
46-64 years		Cardiomyopathy		Mitral Valve repair/replacement		Overall Experience	
65-79 years		Aortic valve insufficiency		Aortic valve repair/replacement		Pt Population Census for CVT surgery service and Cath Lab EVAR procedures	
80 + years		Cardiac Failure		Heart lung transplant, ECMO procedure		By Day	3
% female		Lung Cancer		VATS wedge resections/ lobe resection, lung resection		By Week	11
		Cystic Fibrosis		Lung transplant with cardiopulmonary bypass		By Month	47
						By Year	564
<b>C. Know Your Professionals:</b>							
<b>Current Staff</b>		<b>Days FTEs</b>	<b>Evening FTEs</b>	<b>Weekend FTEs</b>	<b>Overtime/ On Call</b>	<b>Staff Satisfaction Scores (NDNQI)</b>	
Attending surgeons		8			1	Measure	Unit Mean
Attending Interventional Radiologist		2			1	Autonomy	4.71 3.99
Fellows		2			1	RN-RN Interaction	4.97 4.71
Residents		4			2	Nursing Administration	3.82 3.54
Registered Nurse MOR		7	2		2	Professional Development opportunity	4.89 4.11
Registered Nurse MOR Scrub		11	2		1	Professional Development Access	5.08 4.27
Registered Nurse Cath Lab		22			2	<b>Nursing Staffing needs per procedure</b>	
Surgical Technicians		6	2	1	1	Main operating room	1 RN circulator 1 Scrub person (Can be RN or ST)
Radiology Technicians		16			2	Cath lab	1 surgical RN 2 Cath Lab RN (circulator and Monitor/nursing documentation) 1 Scrub person 2 Radiology Technicians (scrub and circulator)
<b>D. Know Your Process:</b>							
Create flowcharts of routine processes		Number of MOR suites/ day			Cath Lab procedure rooms/ day		
a.	Scheduling of surgical procedure	Open cardiac procedures		2	EVAR/TVAR	HOR3, RM 8	
b.	Case cart preparation						
c.	OR preparation			1	TAVAR	HOR3, RM 2	



<ul style="list-style-type: none"> <li>d. Creation of surgical field and counts</li> <li>e. Admission into the MOR/Hybrid OR</li> <li>f. Transfer to the MOR suite/ Hybrid OR</li> <li>g. Anesthesia Time outs</li> <li>h. Patient positioning</li> <li>i. Patient preparation</li> <li>j. Surgical Time out</li> <li>k. Surgical Procedure</li> <li>l. Closing counts</li> <li>m. Transfer of patient to postoperative care unit.</li> <li>n. OR suite turn over</li> </ul>	<p>Open vascular procedures</p> <p>Thoracic procedures</p>	<p>1</p> <p>Utilization of OR suites based on surgical block time and can change based on emergency cases delaying scheduled cases</p>		<p>HOR 3 is shared by the vascular and cardiac surgeons and is based on block time</p>
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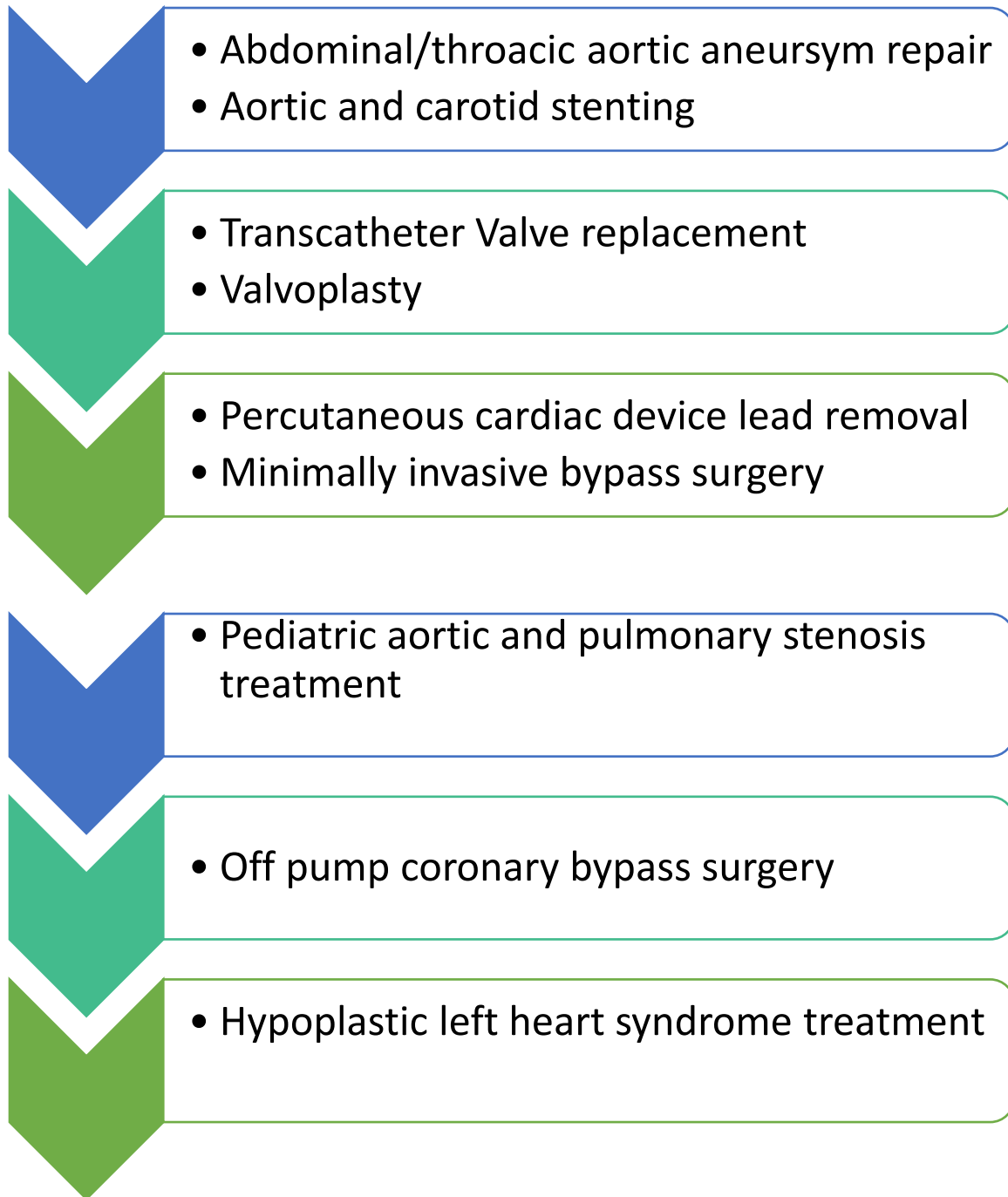
References:

Dartmouth College, Godfrey, Nelson, Batalden & Institute for Healthcare Improvement (2005). Clinical microsystems, “The place where patients, families and clinical teams meet”, Assessing, diagnosing and treating your outpatient specialty care practice. Retrieved from: <http://clinicalmicrosystem.org/uploads/documents/outpatient-primary-care-workbook.doc>

Geisinger Health System, Godfrey, Nelson, Batalden & Institute for Healthcare Improvement (2005). Clinical microsystems, “the place where patients, families and clinical teams meet”. Assessing, diagnosing and treating your emergency department. Retrieved from: <http://clinicalmicrosystem.org/uploads/documents/emergency-department-workbook.doc>

## Appendix C

## Examples of Procedures Performed in Hybrid Operating Room



*Note:* Adapted from: Odle, T. (2011). Managing the transition to a hybrid operating room. Radiologic Technology 83 (2), 168

## Appendix D

## Plan-Do-Study-Act (PDSA) for CVT Surgical Service

2016- to present

AIM: The goal of the Stanford Hybrid Operating Room Taskforce is to identify and address the components that are needed to operate the Hybrid Room in a patient centered way and fiscally efficient.

Taskforce members: Cath lab Manager: C. Brien-Hibma

OR Manager: M. Roesner, MSN, RN, CNOR

OR CVT Services APCM: T. Billingsley, BSN, RN, CNOR

Perioperative Education Director: S. Hirx, MSN, RN, CNOR

Cath Lab Educator: C. Bunales, MSN, RN

Cath Lab Radiology Technologist Manager: M. Idio RT

Clinical workflow manager: M. Riddick

APCM Cath Lab: A. Cruz RN

APCM Cath Lab: J. Funke RN

APCM Cath Lab: R. Elliott RN

OR CN VI: A. Chozet-Griggs BSN, RN, CNOR

Cath Lab CN VI: J. Montemayor BSN, RN

Cath Lab CNII: S. Atkinson, RN

Cath CIT III: I. Yardley RT

Cath CIT II: A. Monik RT

PLAN: One task identified by the task force was to train Cath Lab nursing staff and radiology technicians in the principles of a septic technique and surgical scrubbing within a three-month period.

Persons Responsible for providing training: T. Billingsley RN, BSN, CNOR

A. Chozet-Griggs RN, BSN, CNOR

S. Hirx, RN, MSN CNOR

Participants in OR training:

I. Yardley, RT, S. Atkinson, RN,  
J. Montemayor, RN, T. Brenner, RN and  
B. Ton, RT

It is predicted that the Cath lab staff will be able to provide the same standards of care of a surgical patient in the Hybrid operating room by the end of a three-month training period. This will remove the need to have an additional nursing team from the operating room to perform required open procedures for vascular surgery patients that are undergoing Hybrid procedures in the Cath Lab. The success of the prediction will be evidenced by the trainees meeting the requirements listed under the preceptor program of the Main Operating Room that are tailored to the vascular surgical service. The requirements are based on surgical outcomes.

**DO:** The principles of aseptic technique and the management of an operative patient were conducted in the MOR. Here the nurses were exposed to various procedures and practiced positioning patients, performing surgical preps, performing counts and management of a surgical field. The radiologist technician was taught the principles of aseptic technique, instrumentation and surgical supplies needed for a vascular procedure and how to scrub a surgical case as a first scrub.

**STUDY:** The three participants required different teaching approaches to obtain the new skill set. Two benefited from written information. All trainees learned will through repetition of the required tasks. The training took more than three months for scrub training to complete due to the MOR schedule cases. Vascular procedures were needed to train the participants in cut-downs and use of specific vascular surgery instrumentation and supplies.

**ACT:** The evaluation of all participants was subjective. As a result, there was variability on the degree of competency when the participants were precepted by a different surgical staff nurse or technician. A plan needs to be developed to bring together all surgical staff involved with the training of the next trainees and establish consistency and consensus on the evaluation of the Cath Lab Staff.

The Vascular orientation packet will be distributed to all learner to familiarized them with the operating room set-up and instrumentation for vascular procedures. Also, all preceptors must complete the daily circulator or scrub evaluation sheets to monitor progress of the learners and set measurable goals. MOR competency forms will be completed for the end of the training program.

An evaluation tool needs to be developed to test three stages of learning: beginner, competent and expert using the Brenner Model. A new tool evaluation tool has been developed and is currently under review by both the MOR and Cath Lab educators for approval.

## Appendix E

## Topics in the Hybrid Operating Room Cross-Training Program

Core Curriculum for HOR Cross-training Program	
Topic	Learner
Gowning and Gloving	RT
Establishing a Sterile Field	RT and Cath Lab RN
Plastic Adhesive Incise Draping	RT
Preparing Sterile Field	RT and Cath Lab RN
Opening Sterile Items	RT and Cath Lab RN
Medications and Solutions	RT and Cath Lab RN
Covering Sterile Fields, Draping	RT and Cath Lab RN
Breaks in Surgical Technique	RT and Cath Lab RN
Moving within and around a sterile field	RT and Cath Lab RN
Electrical Safety	RT and Cath Lab RN
Surgical Counts and using sponge scanner device	RT and Cath Lab RN
Surgical Stie preparation	Cath Lab RN
Vascular instrumentation	RT and Cath Lab RN
Patient Positioning	Cath Lab RN
Anticipation of Surgeon needs during an open surgical procedure.	RT
Specimens labeling and management	RT and Cath RN

Note: HOR subject matter adapted from: Back to Basics: Surgical Technique by L. Spruce (2017), 479-483 in *Association of Perioperative Nurses Journal* 105.

## Appendix F

## Learning Needs Assessment Template

**Name(s) of Educator(s):** A. Chozet-Griggs BSN, RN, CNOR; L. Walsh BSN, RN; A. Singh BSN, RN; D. Jung BSN, RN; M. McDade BSN, RN; B. Grant, ST; T. Ford, CST; C. Macias, CST and R. Cerna, CST.

**Overall Purpose/aim of proposed learning activity:** The Purpose is to Cross-train Cath Lab nurses and Radiology technologist on the Principles of Aseptic Technique and Surgical Technical in order to care for a Hybrid Operating Room (HOR) patient.

1. **Learner:** The Cath Lab nurses are highly specialized vascular intervention nurses that are motivated to learn a new skill in perioperative nursing. All of the nurses have a minimum of a bachelor degree in nursing. There are currently four male nurses and one female nurse in this education program. The other learners in this program are Radiology Technologists (RT) who are specialized in vascular interventional procedures and are motivated to learn how to scrub an open surgical procedure in the HOR. Both, the Cath Lab nurses and RTs are licensed in their perspective fields.
2. **Setting:** The initial training is based on self-paced modules in perioperative practices. The second and third stage of their HOR training is experienced in the operating room and in the HOR during actual procedures with the Vascular surgical team. This training is on a one to one basis with the learner and the operating room preceptor(s). The obstacles that these nurses have faced are related to the surgical cases that are available and applicable to the hands on training and the daily staffing needs of the Cath Lab and Main Operating Room.
3. **Learning Content:** The Cath Lab nurses and RTs will be taught the principles of aseptic technique, surgical technique, and surgical patient safety.
4. **Learner Input:** The obstacles in learning will be persuading the participants to successfully acquire new skill sets for the care of a Hybrid Operating Room patient. Many of the Cath lab staff had voiced concerns that OR nursing skills were not part of the scope of practice.
5. **Team Input:** The Cath Lab staff have the opportunity to develop the standard of practice in the HOR that combine both cath lab and OR nursing skill sets. The policies and procedures can be tailored to the practice in the HOR based on the input of the participants of the program.
6. **Prioritize Needs:** The participants of the HOR Cross-training Program were all volunteers from the Cath Lab. Also, these volunteers are specialized in Cath lab vascular and cardiac procedures.
7. **Resource Availability:** The resources available are five operating room nurses that have been through the Stanford Precepting Program and are experts in the operating room. The nurses will be specifically training Cath nurses to be surgical circulating nurses. The scrub

roles training for the radiology technicians will be taught by both OR nurses who scrub and surgical technicians. The OR nurse will train the Cath Lab nurses on a one to one ratio in both the OR and in the HOR.

8. **Organizational Demands:** This program is a pioneering the design of staffing requirements for nursing staff in the HOR. The ultimate goal is to reduce the number of nursing staff needed and maximized the technical abilities of the staff assigned to the HOR. The effectiveness of the training will be based on the benchmarks that are used for the OR and through increase surgeon satisfaction feedback.
9. **Potential Obstacles:** The potential obstacles are the interruptions of the training due to the availability of vascular procedures in the main operating room. The Cath lab and the operating room also may need to delay training if the needs of each department require the talents of all the participates and trainers in regular scheduled cases. The time table for each of the individual learner may need to be adjusted. This will be measured on progression of knowledge acquirement to a competent level.

Adapted from: Bastable, S.B. (2013). *Nurse as educator- Principles of teaching and learning for nursing practice*. 3rd. ed. Jones and Bartlett Publishers

Appendix G

Proposed Clinical Competency for Hybrid Operating Room Circulating Nurse

<b>CLINICAL COMPETENCIES FOR HYBRID OR CIRCULATING NURSE</b>				
Document created 1/2/18 by Ana Chozet-Griggs CNVI				
<b>LEVEL OF COMPETENCY</b>			<b>EVALUATION</b> B- beginner C- competent E- expert	
<b>BEGINNER</b>	<b>COMPETENT</b>	<b>EXPERT</b>	<b>SELF</b>	<b>PRECEPTOR</b>
Needs guidance to establishing workflow	Functions independently in majority of services with minimal assistance. Capable of performing common emergency cases proficiently	Acts as a preceptor and leader to team in establishing workflow		
Knowledge and theoretical understanding of normal/abnormal anatomy/physiology	Builds on knowledge and theoretical understanding of normal/abnormal anatomy/physiology	Acts as a preceptor and shares information based on evidence base sources		
Knowledge and understanding of surgical procedures to anticipate needs/request from the surgical team with assistance. Reviews preference cards.	Anticipates availability of equipment, supplies and instrumentation and prioritizes usage. Conserves supplies and unnecessarily opens supplies.	Initiates changes to preference cards in collaboration with Surgeon and scrub person		
Needs assistance to prepare the surgical field by opening correct supplies and preparing instruments and equipment needed for the schedule case with assistance. Works with team member to supplies and equipment are available. May need instruction on use of equipment, instrumentation or supplies	Aids the scrub person in the preparation of the surgical field by opening correct supplies and preparing instruments and equipment needed for the scheduled case. Assures all materials are available and in working order and verifies own skill in using equipment correctly	Problem solves rapidly with changes in clinical situation and displays expert technique during conversions in multiple surgical procedures and/or surgical set-up		
Requires guidance to perform the necessary surgical counts on sharps, small items, instruments and sponges with the circulating nurse prior to opening, during, and after	Performs the necessary surgical counts on sharps, small items, instruments and sponges with the scrub person prior to opening, during, and after closing the incision according to	Actively monitors count board during the case to ensure that counts are correct and clarify any discrepancies to scrub person. In addition, performs the necessary		



<p>closing the incision, according to Main Operating Room policies and procedures. Is instructed on the use of using the Sponge Scanner device per policy</p>	<p>Main Operating room policies and procedures. Use Sponge scanning device properly without assistance</p>	<p>surgical counts on sharps, small items, instruments and sponges with the circulating nurse prior to opening, during, and after closing the incision. Instructs new staff on use of Sponge Scanner Device.</p>		
<p>Anticipates the needs of the surgical team by monitoring the surgical field and following progress of the procedure. Obtains any needed instruments, supplies and equipment in a timely manner and may require practice to reduce delay time.</p>	<p>Demonstrates advanced knowledge and proficient practice in the circulating nurse role in the majority of surgical procedures as defined by SHC</p>	<p>Demonstrates critical thinking capabilities, determine course of action and makes recommendations</p>		
<p>Requires additional instruction on aseptic technique. Acquiring skill to actively monitor situations that could lead to a breach in aseptic technique. May need assistance to define breaks in technique. Communicates and immediately corrects breaks in aseptic technique</p>	<p>Maintains aseptic technique: actively monitors situations that could lead to a breach in aseptic technique. Communicates and immediately corrects breaks in aseptic technique</p>	<p>Is hypervigilant of any breaks in technique and addresses them without hesitation. Effectively, communicates breaks with the surgical or anesthesia team. Is constantly monitoring the field for potential breaks and addresses them with team.</p>		
<p>Is obtaining experience with all policies and practices for safe identification and handling of specimens and medications. Has knowledge of medications and its intended use on the field. Is aware of patients' weight and maximum doses of medication when appropriate; Is aware and knows patient allergies</p>	<p>Adheres to all policies and practices for safe identification and handling of specimens and medications. Has knowledge of medications and its intended use on the field. Is aware of patients' weight and maximum doses of medication when appropriate; Is aware and knows patient allergies</p>	<p>Adhere and keeps informed with the current policies and procedures regarding specimens and medications on the field.</p>		
<p>Ability to apply judgment and make informed decisions</p>	<p>Solves problems rapidly with changes in the clinical situation</p>	<p>Leads in addressing problems due to changes in the clinical situation a quick and effective manner. Uses team approaches to make decisions.</p>		
<p>Knowledge of general safety procedures</p>	<p>Applies knowledge related to emergency situation and</p>	<p>Reinforces safety procedures with new team members and address any</p>		

	surgical procedures in the hybrid operating room	hazards in emergency situations or surgical procedures in the hybrid operating room		
Performs surgical site shave and surgical prep with assistance	Performs surgical site shave and surgical prep with no assistance	Leads new staff in the instruction and rationale for a surgical site preparation		
Positions patient based on AORN standards and surgeon preference with instruction and supervision	Demonstrated critical thinking with complex patient anatomy for proper patient position and uses AORN standards and SHC policies with no assistance	Leads new staff in the application of proper positioning techniques using standard practice procedures		
Assist Surgical Team leader in performing the “Surgical Time-Out” per policy with direction of preceptor	Reinforces the need for attention by the surgical team to perform the “Surgical Time-Out”	Demonstrates expert communication skills to assist new staff members with the proper process of the “Surgical Time Out”		
In collaboration with ANM/Education sets realistic and measurable goals for performance plan and improvement: Circulating nurse goals: Will _____ by _____ evidenced by _____.  Circulating Nurse Name: _____ Signature: _____ Date: _____  Preceptor Name: _____ Signature: _____ Date: _____				
Cases observed or participated in:				

References:

Spruce, L. (2017). Back to Basics AORN guidelines. Retrieved from: <http://dx.doi.org/10.1016/j.aorn.2017.02.014>

Stanford Medicine (2017, July24). Clinical Nurse II Job Description, p. 1-2. Retrieved from <https://stanfordmedicine.app.box.com/s/90gtt0f304t7t17w78f2rkkp2arhihus/file/95689703998>

Stanford Medicine (2017, July 24). Clinical nurse III job description, p.1-2. Retrieved from <https://stanfordmedicine.app.box.com/s/90gtt0f304t7t17w78f2rkkp2arhihus/file/95692836697>

Stanford Medicine (2017, July 24). Clinical nurse IV job description, p. 1-2. Retrieved from <https://stanfordmedicine.app.box.com/s/90gtt0f304t7t17w78f2rkkp2arhihus/file/95748484509>

Appendix H

Proposed Clinical Competency Evaluation Form for Scrub Role

<b>CLINICAL COMPETENCIES FOR RADIOLOGY TECHNICIAN IN A SCRUB ROLE</b>					
Documented created 11/1/17 by Ana Chozet-Griggs CNVI					
<b>LEVEL OF COMPETENCY</b>				<b>EVALUATION</b> B- beginner C- competent E- expert	
<b>TASK</b>	<b>BEGINNER</b>	<b>COMPETENT</b>	<b>EXPERT</b>	<b>SELF</b>	<b>PRECEPTOR</b>
Review Surgeon Preference card  Check that all necessary equipment is in the room and functioning properly.  Arrange furniture with those pieces that will be draped to become sterile field with at least 18" away from walls or cabinets	Needs guidance to establishing workflow	Functions independently in majority of services with minimal assistance. Capable of performing common emergency cases proficiently	Acts as a preceptor and leader to team in establishing workflow		
	Knowledge and theoretical understanding of normal/abnormal anatomy/physiology	Builds on knowledge and theoretical understanding of normal/abnormal anatomy/physiology	Acts as a preceptor and shares information based on evidence base sources		
Check that all supplies and instrumentation is correct and accounted for surgical procedure.	Knowledge and understanding of surgical procedures to anticipate needs/request from surgeons with assistance.	Anticipates availability of equipment, supplies and instrumentation and prioritizes usage. Conserves supplies and unnecessarily opens supplies.	Initiates changes to preference cards in collaboration with Surgeon, Service lead, and Circulating Nurse		
Performs surgical hand Scrub  Gowns and gloves using aseptic technique  Establish and maintains surgical field  Follows the principles of surgical technique. Monitor other scrub team member to adhere to principle of surgical technique  Adheres to standardized Vascular back table and mayo stand set up	Needs assistance to prepare the surgical field by opening correct supplies and preparing instruments and equipment needed for the schedule case with assistance. Works with team member to supplies and equipment are available. May need instruction on use of equipment, instrumentation or supplies	Prepares the surgical field by opening correct supplies and preparing instruments and equipment needed for the scheduled case. Assures all materials are available and in working order and verifies own skill in using equipment correctly	Problem solves rapidly with changes in clinical situation and displays expert technique during conversions in multiple surgical procedures and/or surgical set-up		
Follows Stanford MOR count procedure  Can identify instruments by their proper names and use.	Requires guidance to perform the necessary surgical counts on sharps, small items, instruments and sponges with the circulating nurse prior to opening, during, and after closing the incision,	Performs the necessary surgical counts on sharps, small items, instruments and sponges with the circulating nurse prior to opening, during, and after closing the incision according to Main Operating room policies and procedures	Actively monitors count board during the case to ensure that counts are correct and clarify any discrepancies to circulating nurse. In addition, performs the necessary surgical counts on sharps, small		

	according to Main Operating Room policies and procedures.		items, instruments and sponges with the circulating nurse prior to opening, during, and after closing the incision		
<p>Maintains attention to surgical field</p> <p>Instruments are passed to surgeon in order of use and are placed in the surgeon's hand appropriately for use</p> <p>Establishes sharp zone and passes and handles sharps safely and appropriately</p> <p>Uses proper body technique to maintain surgical field (scrub must not have back to back table)</p>	Anticipates the needs of the surgeon by passing instruments, supplies and equipment in a timely manner and may require practice to reduce delay time.	Demonstrates advanced knowledge and proficient practice in the first scrub role in the majority of surgical procedures as defined by SHC	Demonstrates critical thinking capabilities, determine course of action and makes recommendations		
<p>Follows the principles of surgical technique. Monitor other scrub team member to adhere to principle of surgical technique</p>	Requires additional instruction on aseptic technique. Acquiring skill to actively monitor situations that could lead to a breach in aseptic technique. May need assistance to define breaks in technique. Communicates and immediately corrects breaks in aseptic technique	Maintains aseptic technique: actively monitors situations that could lead to a breach in aseptic technique. Communicates and immediately corrects breaks in aseptic technique	Is hypervigilant of any breaks in technique and addresses them without hesitation. Effectively, communicates breaks with the surgical or anesthesia team. Is constantly monitoring the field for potential breaks and addresses them with team.		
<p>Follows policies and procedures for specimen handling</p> <p>Use two-person identification of medications that are introduced to surgical field and labels immediately.</p>	Is obtaining experience with all policies and practices for safe identification and handling of specimens and medications. Has knowledge of medications and its intended use on the field. Is aware of patients' weight and maximum doses of medication when appropriate; Is aware and knows patient allergies	Adheres to all policies and practices for safe identification and handling of specimens and medications. Has knowledge of medications and its intended use on the field. Is aware of patients' weight and maximum doses of medication when appropriate; Is aware and knows patient allergies	Adhere and keeps informed with the current policies and procedures regarding specimens and medications on the field.		
<p>Monitors progress of procedure and communicates with circulator regarding the need of additional instrumentation and supplies or a change in the process of the surgery</p>	Ability to apply judgment and make informed decisions	Solves problems rapidly with changes in the clinical situation	Leads in addressing problems due to changes in the clinical situation a quick and effective manner. Uses team approaches to make decisions.		
<p>Handles and disposes of sharps appropriately.</p> <p>Discards contaminated drapes and supplies appropriately</p> <p>Uses proper body mechanics</p>	Knowledge of general safety procedures	Applies knowledge related to emergency situation and surgical procedures in the hybrid operating room	Reinforces safety procedures with new team members and address any hazards in emergency situations or surgical procedures in the hybrid operating room		
	In collaboration with ANM/Education sets realistic and measurable goals for performance plan and improvement:				

	Scrub goals: Will complete by _____ evidenced by _____.  Radiology Technician Name: _____ Signature: _____ _____ Date: _____ Preceptor Name: _____ Signature: _____ _____ Date: _____
	Cases observed or participated in:

References:

Benner, P., Tanner, C. & Chesla, C. (1996). *Expertise in Nursing Practice, Second Edition: Caring, Clinical Judgment, and Ethics* (pp. 2). New York, New York: Springer Publishing Company

Stanford Medicine (2017). 500398 Certified surgical technician I job description, pp. 1-2. Retrieved from: <https://stanfordmedicine.app.box.com/s/90ggt0f304t7tl7w78f2rkkp2arhihus/file/201772073811>

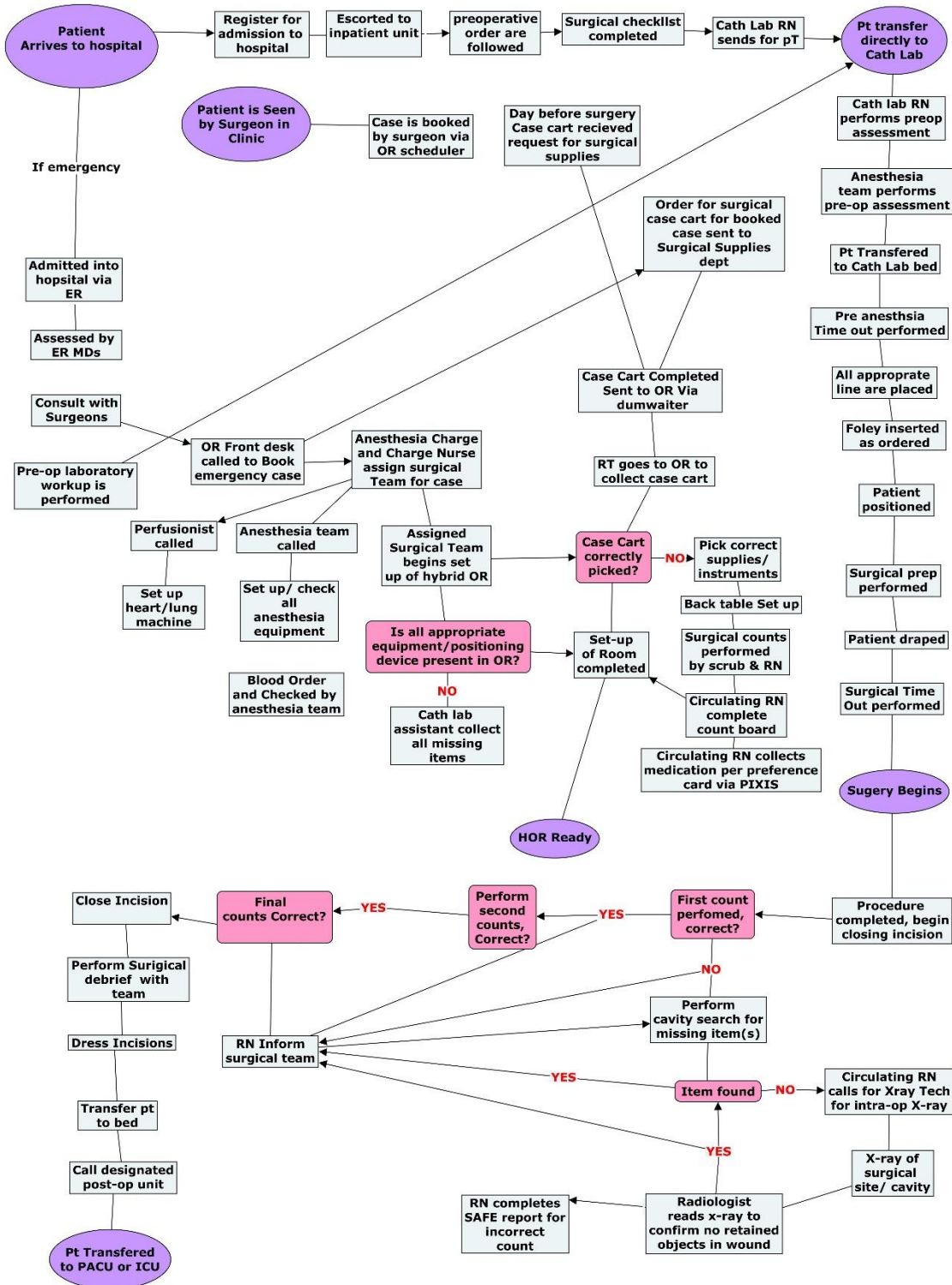
Stanford Medicine (2017).500397 Certified surgical technician II job description, pp. 1-2. Retrieved from: <https://stanfordmedicine.app.box.com/s/90ggt0f304t7tl7w78f2rkkp2arhihus/file/201771935320>

Stanford Medicine (2017).500396 Certified surgical technician III job description, pp, 1-2. Retrieved from: <https://stanfordmedicine.app.box.com/s/90ggt0f304t7tl7w78f2rkkp2arhihus/file/201772078484>



Appendix J

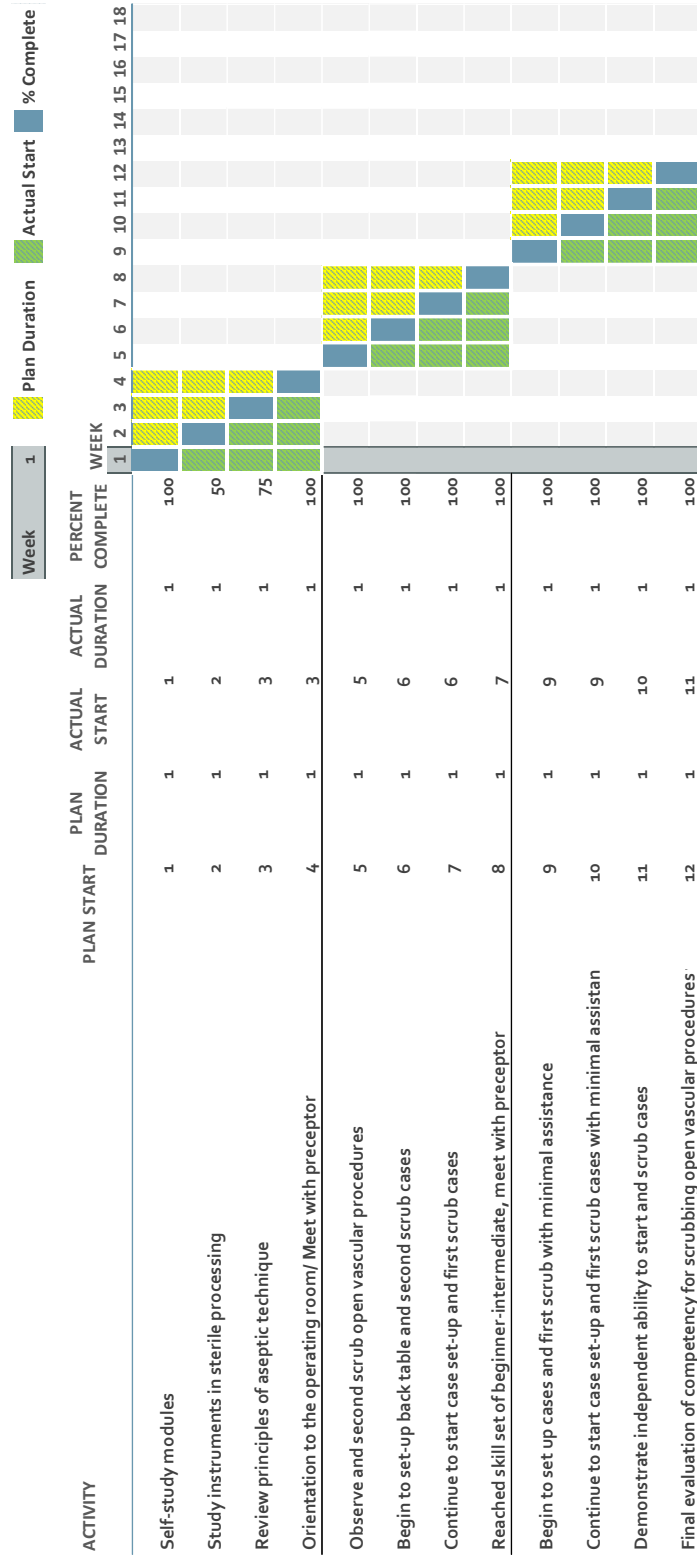
HOR Workflow





Appendix K  
Scrub Gantt Chart

# Hybrid OR Cross-Training for Scrub



*Note:* The training timeline is three months. This can be reduced or extended based on appropriate vascular case availability in the operating room for active training of Cath Lab staff.





Appendix M

*Stanford Hospitals and Clinics*

Hybrid Operating Room Surgical Asepsis and Technique Training						
Learner Course Evaluation						
Please rate your learning experience	Very Poor 0	Poor 1	Neutral 2	Good 3	Very Good 4	N/A
The self-modules were useful in increasing knowledge about:						
Aseptic technique.						
Gowning and gloving.						
Establishing a sterile field.						
Following standardized back table and mayo stand setup.						
Instrument names and uses						
Surgical site preparation.						
Increasing knowledge about patient positioning.						
Electrical Surgical Unit use (ESU)and safety.						
Type of open surgical procedures for the Vascular Surgery						
Surgical counts						
The hands-on training in the operating room increased knowledge about:						
Aseptic technique.						
Gowning and gloving.						
Establishing a sterile field.						
Following standardized back table and mayo stand setup.						
Instrument names and uses						

Surgical site preparation.						
Increasing knowledge about patient positioning.						
Surgical electric unit use and safety.						
Type of open surgical procedures for the Vascular Surgery						
Surgical counts						
Initial orientation to the operating room by your preceptor.						
Preceptor						
How would you rate your preceptor's daily teaching plan discussion?						
How would you rate your preceptor's communication skills?						
How would you rate your preceptor' debriefing?						
Did you have enough surgical caseload to meet the goals of the timeline of the training?						
How would you rate the quality of the training program?						
What were the barriers in your learning?						
What are your recommendations for improvement?						