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Increasing Knowledge and Self-Efficacy in Nurses Orienting to Cardiovascular Surgery Using A New Periop 202 Program

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Increasing Knowledge and Self-Efficacy in Nurses Orienting to Cardiovascular Surgery

Using A NEW Periop 202 Program

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Abstract

The operating room theater can be intimidating for new nurses, thus leading to a shortage of nurses who are comfortable working in this environment. Evidence supports that 50% of perioperative nurses in 2017 were between the age of 50 and 59. Additionally, no formal didactic courses are being offered in undergraduate programs and the challenging environment related directly to the future shortage of perioperative nurses. This negatively impacts the number of trained perioperative cardiovascular nurses. The project proposed a new didactic educational Perioperative (Periop) 202 program that aimed to increase nurses' self-efficacy to function on the cardiovascular operating room (CVOR) team and their knowledge of protocols and guidelines of new nurses entering the CVOR with the goal of generating future perioperative nurses to care for of this patient population. The eight actionable items within the Periop 202 program were designed to increase knowledge of CVOR procedures and protocol and the self-efficacy of new perioperative cardiovascular nurses, as evidence supports the use of nurses to complete these essential educational interventions. The Periop 202 program was an evidenced based program that added value and solution to the CVOR market. The program increased nurses' confidence level of what they already knew about OR nursing with their pre-course percentage scores of 63% to post-course percentage scores of 80% on the OR knowledge questionnaire. The SEIEL self-efficacy questionnaire reported an increase in communication and team collaboration. All nurse participants completed their CVOR competency validated by their preceptors. Through a partnership with the AORN, a CVOR program with online-learning modules, one on one meetings with the primary investigator, clinical experiences and exposure, and team involvement led to a successful training program. The implications of creating and

implementing an evidenced based Periop 202 program will have a positive impact on recruitment strategies across the nation.

Key words: nurse, education, environment, operating room, readiness to learn.

Increasing Knowledge and Self-efficacy in Nurses Orienting to Cardiovascular Surgery
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Chapter I

Upon college graduation and passing of the National Council Licensure Exam (NCLEX-RN[®]) national licensure exam, new graduate nurses have a variety of settings in which to commence their nursing careers, including hospitals, home health, and others, as well as a variety of patient populations in which to specialize, such as cardiac nursing or pediatric nursing (AMN Healthcare, 2019). One such setting is the operating room (OR). According to the Centers for Disease Control and Prevention (CDC), 48.3 million surgical and nonsurgical procedures were performed in the United States in 2010 (CDC, 2017), therefore creating a tremendous need for new graduate nurses to choose to practice within the OR setting. Similarly, attracting and retaining experienced nurses into the OR setting is also needed in order to adequately staff and bring clinical knowledge into the OR. Once hired in the OR, nurses will need specialized on-the-job clinical training that typically includes coursework in anesthesia, surgical draping, and patient and equipment safety (AMN Healthcare, 2019). The Association of Perioperative Registered Nurses (AORN) created a Periop 101 course that many OR nurses complete, which serves as a core curriculum for nurses new to the OR (AORN, 2019). The AORN also offers Periop 202 courses that focus on the specialty surgical procedures of total hip and total knee arthroplasties and spine procedures. The focus of the current study was to develop a new Periop 202 program related to cardiovascular procedures and to determine its effectiveness in improving knowledge and self-efficacy of new OR nurses within the cardiovascular OR unit.

Problem Statement

The global population is aging, and the demand for surgical services will increase as the proportion of elderly people continues to grow (Foran, 2015). Today's healthcare environment is complex, as it deals with increased acuity, reimbursement, quality patient outcomes and benchmarking comparisons. The operating room on average contributes to 60% to 70% of the hospital's revenue, which is a significant component of the overall business plan (Randa, Heiser, & Gill, 2009). Global shortages of specialty nurses, especially OR nurses, is increasingly becoming a challenge for recruiters (AORN, 2018). Because of this, some healthcare organizations are recruiting foreign nurses to staff their operating rooms (Rubenfire, 2015). Since there is such a demand for operating room services, operating nurses will be needed in order to efficiently and safely provide perioperative care, as OR nurses directly influence the supply and demand of business operations (Randa, Heiser, & Gill, 2009). It is common for hospital administrators to report difficulty in recruiting and/or retaining OR nurses (Sherman, Patterson, Avitable, & Dahle, 2014). Therefore, interventions aimed at increasing the recruitment and retention of OR nurses are of utmost importance, as repercussions of not doing so could be costly to organizations (Sherman, Patterson, Avitable, & Dahle, 2014).

Purpose

The purpose of this project was to measure the effectiveness of an evidence-based educational intervention targeting registered nurses who are new to the CVOR unit. This project targeted to increase knowledge of the CVOR service line through tools and a positive environment that generated confidence in the nurses who were caring for these patients. Without evidence-based programs to creatively orient specialty service-line nurses, the increasing nursing shortage will become more severe, posing a threat to the care of the perioperative cardiovascular

patients. The Association of Perioperative Registered Nurses (AORN) has an entry level Periop 101 program that introduces nurses to the OR environment. This program was described by AORN as a standardized, evidence-based on-line curriculum, supplemented with textbook readings and hands-on skills labs and clinical practice. The program allowed nurses to enter the OR environment with the basics of sterile technique, skin prep, gowning and gloving, and basic scrubbing skills. The Periop 202 program for this DNP project used the foundation of the Periop 101 course to build upon the program to allow nurses to enter the CVOR service line with increased self-efficacy in caring for open heart patients. The proposed project addressed the following specific aims and clinical questions:

Specific Aims:

1. To increase the knowledge base of new nurses entering the CVOR.
2. To determine if an education intervention improved CVOR competencies based on AORN guidelines.
3. To increase self-efficacy of new nurses entering the CVOR to function on the CVOR team.
4. To determine the OR nurses' satisfaction with the Periop 202 Program.

Clinical Questions:

Among new OR nurses:

1. What impact does a three-month Perioperative 202 orientation program have on nurses' knowledge of CVOR protocols?
2. What impact does a three-month Peri-operative 202 orientation program have on CVOR nurses' knowledge of AORN guidelines?

3. What impact does a three-month Perioperative 202 orientation program have on CVOR nurses' self-efficacy to function on the CVOR team?
4. What is the CVOR nurses' satisfaction with the Periop 202 Program?

Background Information

Three major influences that cause OR staffing shortages are an aging population of OR nurses, little to no exposure of the perioperative clinical setting in undergraduate curriculum, and a complex and intimidating surgical environment (Foran, 2015). A case-study by Ahmed (2014) evaluated the relationship between health care staff well-being and effective team working in a high-risk operating room environment. The author's findings showed that well-being was linked to happiness, job satisfaction, value and recognition of staff, a supportive and positive organizational culture, leadership involvement and effective team relationships. These factors directly influence OR nurse retention (Ahmed, Johnson, Ahmed, & Iqbal, 2014).

Aging Nurse Workforce

The aging nurse workforce is a concern for the public and private sectors. This is especially true for perioperative nurses, as 50% of perioperative nurses were between 50 and 59 years of age in 2017 (Foran, 2017). Ahmed's (2014) case-study found similar age demographics of participants, where 74% were between 31 and 50 years old. These experienced nurses influence team relationships and the education of future specialty nurses. As the perioperative nurse workforce nears retirement, members of the profession must plan for replacement solutions.

The aging population of OR nurses that will retire in less than five years will inhibit hospitals from performing surgical procedures and therefore delay care to many surgical patients. In a study by Utriainen and Kyngas (2011), the Dignity and Respect in Ageing Nurses' Work

Scale was developed and psychometrically validated to measure aging nurses' well-being at work. The study emphasized the importance of good relationships between nurses and patients for well-being at work. The relationships between nurses, patients, and other healthcare workers falls under the umbrella of social capital which refers to individual connections, social networks, reciprocity, and trustworthiness. Reciprocity in nurse-nurse interaction in regard to relationships is noteworthy (Utriainen & Kyngas, 2011). Thus, social capital should be measured during the development of programs that target OR nurses. Creating learning programs such as the Periop 202 program can integrate new specialty nurses with an already seasoned workforce.

There are many financial repercussions for not retaining permanent OR nursing staff. For example, the current project site has averaged eight CVOR traveling nurses on staff for the past two years. The average hourly wage for a traveling nurse is \$90 per hour, \$98 per over-time hour and an additional \$42 per hour for emergency cases for off shift coverage if needed. The average cost of one full time traveling CVOR nurse that takes call and is called into work for emergency cases is \$220,800 per year. Conversely, the average cost of a permanent (non-traveling) CVOR nurse that works full time, takes call, and is called into work for emergency cases is \$94,790 per year. Thus, like the current study site, many hospitals have a financial incentive to reduce and eliminate traveling nurses. The current project proposed one intervention aimed at increasing knowledge and self-efficacy of the new CVOR nurses in order to retain full-time, experienced nurses which can lead to reduced cost.

According to the Director of Quality and Infection Control at the current project site, traveling nurses on staff for extended periods of time create longer turnover times, increased safe reports being generated in regard to incorrect counts, increased cost per case in regard to opened or unused supplies and the general feeling of lack of ownership of operational issues (Davis, J.,

personal communication, June 24, 2019). Staff knowledge and competencies of OR policies and procedures is included as an area of risk of all components of the surgical continuum with The Joint Commission's (TJC) accreditation standards related to Surgical Site Infection Surveillance (SSI) and Resources (2019). Travelers on a 13-week assignment make this standard difficult to attain. Creating a specialized program to assist new CVOR nurses will help provide qualified, confident perioperative cardiac nurses to local and national markets, eventually decreasing the need for and cost of traveling nurses.

Operating Room Curricula

Curricula for the perioperative nurse in nursing programs is almost nonexistent (Foran, 2015). Researchers have investigated whether there is a relationship between the lack of nurse exposure to the operating room (OR) and the dwindling number of nurses entering this specialty field and have found that a deficit of perioperative classes and nursing curriculum may lead to a decreased interest in choosing perioperative nursing as a career (Foran, 2015). Historically, operating room nurses were internally recruited from obstetrics or medical surgical floors, as many nurses can grow tired of floor nursing and desire to transfer to the OR. Today, active recruitment of new and existing nurses must be a priority to supply operating room nurses for future surgical patients.

Variations of learning approaches can be adopted to expose postgraduates to the OR setting. With the advancement of technology in informatics, online modules, simulation labs and clinical exposure, programs such as Periop 202 can utilize multiple techniques to increase nurse self-efficacy to feel more part of the CVOR team. A study by Tai (2006) explored the effects of collaborative writing instructions on undergraduate nursing students' writing performance and self-efficacy beliefs within an online learning system. Overall, findings supported the hypothesis

that collaborative online teaching methods are helpful to increase students' competence and self-efficacy. Other research studies reviewed electronic assessment and feedback software and hybrid simulation technology. All learning techniques have demonstrated positive responses from students. However, having an educator present during online learning is key to increasing self-efficacy and knowledge retention throughout the program. Because online learning has been shown to effectively increase nurses' knowledge and self-efficacy, the current study used online modules as the primary learning tool.

The Periop 101 core curriculum course is used by more than 2,500 hospitals and ambulatory surgery centers nationwide to recruit, educate, and retain perioperative nurses. This premier program builds staff confidence, optimizes perioperative efficiencies, and currently has more than 12,000 graduates and counting (AORN, 2018). The course was developed by AORN's expert perioperative nurse authors who work in the field of OR nursing. The course content is based on the latest AORN evidence-based guidelines for perioperative practice. Upon completion of the course, the student will be able to: 1) compare roles and responsibilities of multidisciplinary surgical team members in the perioperative areas, 2) understand specific roles of the periop registered nurse through skills labs, case studies and patient care assignments, 3) apply the nursing process to identify and address the surgical patient and family needs, 4) apply principles of aseptic and sterile technique while maintaining a sterile field, 5) apply knowledge of safe patient care in the perioperative setting, discuss processes of cleaning disinfection and sterilization of instrumentation and equipment, 6) apply safe medication administration practices based on interventions and pharmacologic indication for drug administration, 7) identify ethical, moral and legal responsibilities of the surgical team, 8) demonstrate the ability to prioritize perioperative nursing activities relevant to the surgical settings and 9) identify the opportunity

and responsibilities for professional growth as a perioperative nurse (AORN, 2018). Nurses transitioning to the CVOR environment must have completed the Periop 101 course prior to beginning their new role, as the foundational content is needed in order for the nurse to be a safe practitioner in the specialized CVOR environment.

Operating Room Work Environment

A positive work culture typically creates more productive and professionally satisfied employees. The work culture helps encourage and motivate employees to bring their best and most valuable contributions (AORN, 2018). When an organization creates and supports a positive working environment, retention rates can increase into double digits. Gallup surveys capture employee satisfaction by many healthcare systems and track and trend the importance of a positive work environment. The periop 202 program supported retention strategies across all healthcare systems by increasing self-efficacy of new nurses entering difficult service lines such as CVOR. Evidence supports that self-efficacy can be altered by instruction and having consistent assessment criteria for new learners. Utilizing an evidenced based program and a structured learning environment, pre and posttest self-efficacy levels have shown increased learning progression (Tai, 2016).

TJC publishes annual National Patient Safety Goals, which are a series of actions such as miscommunication among caregivers that accredited organizations are required to take in order to prevent medical errors ("At the bedside," 2019). TJC accreditation is also required for Medicare and Medicaid reimbursement that averages 60% of a hospital system's reimbursement. One 2019 patient safety goal is to prevent mistakes in surgery. The Periop 202 course is designed to prepare new nurses to become competent in the care of the CVOR surgical patients. The Periop 202 program engages new nurses in correct side site markings, time outs, medication

safety and debriefing post procedure. In an article by Laflamme (2017), volume and acuity of patients, staffing shortages, expanding number of learner novice health professionals and the importance of efficiency and time management in the OR impose additional pressures.

This program is designed to address the shared phenomena of the lack of qualified CVOR nurses to care for cardiovascular patients, as the lack of didactic and hands on training of CVOR nurses is prevalent in many health care systems (AORN 2018). Most undergraduate nursing programs do not offer a perioperative nursing curriculum within their program (Foran, 2015) which places new graduate nurses within the OR setting without specific knowledge or self-efficacy on OR policies and procedures. The Periop 202 course with a specialty focus on CVOR has complimented all Periop 101 courses and assisted health care systems to offer an evidence-based program that teaches and supports nurses new to the CVOR environment. A national CVOR nursing shortage, increasing surgical volumes, having 30% staffing comprising traveling nurses, increased turnovers between cases, and increased safe reports being generated for incomplete counts all justify the importance of creating and implementing the Periop 202 program.

Conceptual Theory

As specified by *The Essentials of Doctoral Education for Advanced Nursing Practice* by the American Association of Colleges of Nursing (2006), there is a necessity for a doctorally prepared nurse to use evidenced-based practices to evaluate and enhance health care delivery to improve patient outcomes. The nurses' education intervention was conducted through a theoretical approach designed to emphasize the eight modules of the Periop 202 program.

The IOWA Model

This study's design and implementation of the Periop 202 program was guided by the IOWA Model of Evidence-Based Practice to Promote Quality Care (Iowa Model Collaborative, 2017). Permission was granted by the University of Iowa Hospitals and Clinics to use the model in this study. The IOWA model guides clinical decision making and EBP processes from both the clinician and systems perspective (University of Iowa Health care, 2019). The IOWA Model is a midrange theory designed to help nurses implement clinical guidelines and improve patient care, all based on best evidence (White & Spruce, 2015). It has guided clinical practice in a variety of settings, including the OR, through the encouragement of challenging the status quo and seeking solutions to current practice issues.

The IOWA Model uses seven steps to support the practice of perioperative nursing and research of creating a positive, evidence-based program. The first step was identifying triggering issues/opportunities. A lack of future CVOR nurses to care for CVOR patients is related to triggers such as clinical or patient identified issues. The CVOR nursing shortage is a national concern for the CVOR patient population, thus becoming an important topic at AORN executive roundtable meetings where members represent the 25 large healthcare organizations across the United States. The executive team at the current study site approved the program based on the lack of CVOR nurses.

The second step in the IOWA model is stating the question or purpose. The four clinical questions proposed were: 1) What impact does a three-month Perioperative 202 orientation program have on their knowledge of CVOR protocols? 2) What impact does a three-month Perioperative 202 orientation program have on nurses' self-efficacy to perform basic competencies? 3) What impact does a three-month Perioperative 202 orientation program have

on nurses' knowledge of AORN guidelines? 4) What is the OR nurses' satisfaction with the Periop 202 Program?

The third step of the IOWA model is forming a team (University of Iowa Health care, 2019). The team is responsible for evaluating the current clinical problem and then developing and implementing an evidence-based solution. The team for the current study was formulated to create the Periop 202 program and included the System Cardiovascular surgeon, Chief Nursing Officer, Chief Financial Officer, Chief Operating Officer, and Specialty Director of Perioperative Services. Additional members included the Unit Director, Shift Nurse Manager, Unit Educator and staff on the CVOR team.

The fourth step in the IOWA model is to assemble, appraise and synthesize the body of evidence (University of Iowa Health care, 2019). A systematic search was conducted in regard to topics related to variables affecting future nurses' shortage and increasing self-efficacy of new nurses entering the operating room. Keywords included: *nurse, education, environment, operating and readiness to learn*. Both qualitative and quantitative data were used in the selection of research articles that support the need for new evidenced based programs aimed at increasing knowledge and self-efficacy in the staff nurses learning process. The principal investigator collected and managed evidence retrieval needed for the Periop 202 program in collaboration with AORN staff.

The fifth step in the IOWA model is to design and pilot the practice changes (University of Iowa Health care, 2019). The Periop 202 program was designed by the multidisciplinary CVOR committee of circulating nurses, surgical technologists, nurse educators and cardiovascular surgeons at the study site. The program was reviewed and approved by the study site's AORN Chief Executive Officer. More detail regarding the curricular design will follow.

The sixth step of the IOWA model is integrating and sustaining practice changes (University of Iowa Health care, 2019). The evidence-based standard to support the Periop 202 program already exists through the AORN practice guidelines (AORN, 2018). The guideline for team communication, recommendation VIII, states that personnel should receive initial and ongoing education and complete competency verification activities related to team communication and patient safety culture. The Periop 202 program supported the existing Periop 101 course and added content to a specialized CVOR service line by improving team communication and increasing a culture of patient safety. Course content included goals and objectives, reading assignments, recommended supplemental videos, PowerPoint presentations, module post-tests, and proctored final exam. The second course setting was the clinical skills lab that demonstrated situations that they may experience in the CVOR rooms. The staff educator, circulating nurses and surgeons that were on the committee participated in these lab scenarios. Clinical objectives, competency assessments, and sample course schedules were established.

The seventh step in the IOWA model is disseminating results (University of Iowa Health care, 2019). The Periop 202 program was implemented and supported the AORN guidelines. This 202 program was established at the current study site's facilities and, once the pilot is evaluated for improvements and changes, will be offered nationally to all healthcare systems that provide cardiovascular surgery interventions.

The Periop 202 program was evaluated by knowledge gained and self-efficacy measures utilizing a knowledge questionnaire and the Self-Efficacy for Interprofessional Experiential Learning (SEIEL) Likert-type scale. This new perioperative learning program led to a reduction in the number of open CVOR positions at the current study site as well as other health care

organizations that are struggling with similar staffing issues. Deductive reasoning is used to support the conceptual framework of the program.

Chapter II

Review of Literature

Nursing Education Interventions

Nursing educational interventions come in many forms. Research related to quality and efficiency in healthcare settings are key objectives that are common within nurse training sessions. A study related to an online training course examined best practice in training public health nurses in their ability to critically appraise clinical scenarios, promoting continuous online training, and use of research in clinical practice (Reviriego et al., 2014). The online course provided introductory handbook and videos, and pre and post questionnaires were administered to assess the main interventional outcomes of knowledge acquired and self-learning readiness and satisfaction with the course, whereas, the participants significantly improved their knowledge score ($p < 0.0001$) and self-directed learning ($p < 0.0001$), and their overall satisfaction with the course giving it a rating of 7 out of 10. (Reviriego et al., 2014). The Periop 202 program followed a similar educational plan utilizing online tools to reinforce materials.

Michael Lindsay, AHIP, investigated the educational needs of nurses in a Magnet Hospital to determine topics of interest, instruction time and delivery preferences and interest in obtaining a research information skills certificate (2017). He utilized a 9-question survey of 1,500 nurses through email. The survey showed for education topics, nursing staff placed the highest priority on finding health related mobile apps for professionals and developing evidence-based research skills. The mode of delivery, the nurses preferred unit based in-service, computer-based tutorials and hands on computer training (Lindsay, Oelschlegel, & Earl, 2017).

AORN's evidence-based guidelines support nurse's needs to depend on research. The Periop 202 is based on the AORN guideline of improving communication between surgical team members.

One of the 2019 national patient safety goals is to prevent mistakes in surgery ("At the bedside," 2019). The Periop 202 course is designed to prepare new nurses to become more knowledgeable in the care of the CVOR surgical patients and more confident in their ability to function on the CVOR team. The course engaged the new nurses in correct side site markings, time outs, medication safety and debriefing post procedure. A study by Ingvarsdottir (2017) identified how patient safety in the operating room can be enhanced from the perspectives of experienced operating room nurses. Respecting the vulnerability of the patient in the OR, being attentive to the surgical patient at each moment, navigating the patient through the experience through careful preparation and using protocols and checklists are key elements of consistent safety measures (Ingvarsdottir & Halldorsdottir, 2017). The primary focus of an operating room is to ensure the patient receives the safest care possible during their most vulnerable time because they are anesthetized. Therefore, a perioperative nurse is the patient's advocate so they safely complete the procedure. The Periop 202 program reinforced the evidence-based guidelines while using checklists and open and professional communication between the surgical team members. With knowledge and confident operating room nurses utilizing proven guidelines, the environment was conducive to providing the best care possible to the patient.

Williams (2017) investigated self-efficacy perceptions of interprofessional education and practice of undergraduate healthcare students. The SEIEL scale was utilized with self-reported perceptions of self-efficacy in a cohort of public health, social work and paramedic practice students. Male and female roles were used to compare scores within the 2 subscales. No

significant gender differences were found for subscale 1, “Interprofessional interaction”; however, subscale 2, “Interprofessional evaluation and feedback” ($p = 0.01$) found the male mean being 2.65 units higher (Cohen’s $d = 0.29$). The findings demonstrated a gender difference for the overall SEIEL scale ($p = 0.029$) with male mean being 4.1 units higher (Cohen’s $d = 0.238$). The study concluded that further research into the development support of student self-efficacy for the skills required for interprofessional education and interprofessional collaboration within healthcare curricula. This study supports the importance of utilizing the SEIEL tool to measure pre and post Periop 202 educational interventions. The SEIEL tool was utilized in the current study to answer the clinical question, “What impact does a three-month Periop 202 orientation program have on their self-efficacy to function on the CVOR team?”.

One of the Periop 202 goals was to strengthen CVOR nurses’ self-efficacy to function on the CVOR team, which could ultimately lead to reduced turnover and increase job satisfaction. A correlational research study examined the relationship between nurse staffing, job satisfaction and nurse retention in an acute care hospital (Hairr, Salisbury, Johannsson, & Redfer-Vance, 2014). A survey tool was utilized to assess clinical nursing environments, the Nursing Work Index (NWI), nurse patient ratios, economic vulnerability and job dissatisfaction. Findings of this study showed job dissatisfaction related to nurse/patient ratios and nurses stay in current employment to maintain stable economic environments. Job satisfaction is a key factor in retaining experienced nurses. Nurse/patient ratios with assignments was also an important factor with retaining experienced nurses (Hairr, Salisbury, Johannsson, & Redfer-Vance, 2014). The CVOR nurse is responsible for one patient at a time according to AORN standards and overtime is always available if so desired.

Prevention of staff turnover is an economic and work force stabilization concern for health care organizations. Nursing turnover has been linked to decreased productivity, increased workloads and instability of staffing (Belton, 2018). Current cost of orienting a CVOR nurse averages \$68,000 which averages six to eight months. Orienting a new CVOR nurse is stressful for both the orientee and existing OR staff. The pressure to replace new nurses with staff members that leave the organization can lead to reduction in quality of care. The project site has observed that 45% of safe reports from the operating room are due to practice issues as it relates to incorrect sponge and needle counts potential safety issues. The Periop 202 program has a strong evidence-based curriculum that assisted nurses in practicing at the highest level of licensure. Confident nurses generate a stable practice environment that can relate to reduction of staff turnover. Overall, the goal for the Periop 202 program was to allow the nurse to orient, ask questions, and feel supported by nursing leadership in a controlled, healthy environment.

Chapter III

Methodology

The current project aimed to determine whether a newly designed and implemented Periop 202 CVOR curriculum will improve the knowledge base of new nurses entering the CVOR and their self-efficacy to function on the CVOR team. This nursing unit was selected for the study for two reasons: 1) CVOR nurse turnover rate within the project site is higher than average within the facility and costs the organization more money and also places patient safety at higher risk, and 2) the AORN wished to partner with the study site to develop and implement the new Periop 202 CVOR curriculum as a pilot site in hopes that it become nationally available. This study used a descriptive design to determine the effectiveness of a new Periop 202 CVOR curriculum on knowledge, and self-efficacy to function on the CVOR team. The curriculum was

delivered to registered nurses who are new to the CVOR unit via computerized modules, lecture and demonstration from the CVOR team members.

Protection of Human Rights

Institutional Review Board (IRB) approval by Georgia College & State University was obtained prior to IRB approval by the study site's IRB to further ensure protection of the study participants. Participation in the project was completely voluntary. Informed consent was completed prior to starting the education intervention. Assent was not required since all participants were at least 18 years of age. All participants were assigned a numeric code, and all data gathered from each participant contained the same numeric code so that responses were linked to participants. The participants' codes were known only to the participant and primary investigator. The master list of participants and numeric codes was kept with all other data which were entered in an electronic database and will be password protected. The original completed instruments were stored on a laptop file, password protected for three years and will be destroyed thereafter.

Beneficence was supported by protecting the participants from any harm due to their participation in the Periop 202 program. Participants benefited from gaining evidence-based knowledge and self-efficacy on the Periop 202 program content. The process promoted positive patient outcomes and satisfaction. There was no foreseen harm that could result from participating in the program. The primary investigator's contact information was provided in the event the participant had questions or concerns. If distress occurred with any Periop 202 participant, the primary investigator assessed and provided intervention. The program was meant to reduce distress and increase self-efficacy; therefore, support and positive reinforcement

on material was available by the primary investigator. Participants were informed that they could withdraw from the program at any time without penalty.

Recruitment

The project site's OR used an orientation process for a cohort of nurses who began their new OR position, which was standard procedure at this facility. Instead of using the traditional method of training, the current OR cohort received the educational intervention that has been developed for this project (more information regarding the curriculum will follow). Recruitment took place from this cohort prior to commencement of the training modules. Those nurses who consented and participated in the project completed voluntary questionnaires regarding demographics, knowledge, self-efficacy to function on the CVOR team, and satisfaction with the Periop 202 program in addition to completing the online training, as all nurses within the cohort received the online training modules as part of their routine orientation process. Inclusion criteria for this project included nurses who were new to the CVOR service line and had previously completed the Periop 101 course. Exclusion criteria for this project were nurses who did not previously complete the Periop 101 program and nurses not interested in the CVOR service line.

The education intervention was offered during normal working hours, and project participants were paid their hourly wage for the time they participated in the program. This was the same compensation that non-participants received. No additional incentives or compensation were offered for participating in the project.

Setting

The project took place primarily in a 400-bed, Magnet-designated hospital within a large hospital system in the southeastern United States. Two additional hospitals that are part of the

hospital system and offer CVOR services were also utilized for this project. The primary investigator floated between all three hospitals to support the Periop 202 candidates. The primary hospital's surgery department employs approximately 180 employees, 87 of which are registered nurses. The educational intervention was delivered within the OR primary investigator's office. All training and administration of instruments was completed on-site with the primary investigator present.

Instruments

Participants' demographics were collected with a researcher-developed demographic form. Demographics gathered included participant gender, age, level of college education, experience in Periop nursing, years in nursing, the project site, and history of completing the Periop 101 course. The information was transferred to an Excel spreadsheet for analysis.

Knowledge gained from the Periop 202 program was evaluated using a 20-item multiple choice CVOR Knowledge Questionnaire that was created by the PI for this study. The content assessed with the CVOR Knowledge Questionnaire came directly from the module content the nurses received during the educational intervention. Content and corresponding knowledge questionnaire items were developed in collaboration between the primary researcher, members of the CVOR team that consisted of a circulating nurse, surgical tech, nurse educator and Shift Nurse Manager, which increases content validity of the instrument. Final approval of the course content and questionnaire received final approval from AORN's Director of Education. The CVOR Knowledge Questionnaire was administered pre- and post-educational intervention. Participants received five points for each correct answer and zero points for each incorrect answer. The item scores were added together for an overall total score ranging from zero to 100, with higher scores indicating greater CVOR knowledge.

Self-efficacy to function on the CVOR team was assessed using the Self-efficacy for Interprofessional Experimental Learning Scale (SEIEL) (Mann et al., 2012). SEIEL is a 16 -item likert-type scale that was developed to assess self-efficacy for interprofessional learning in pre-licensure health professions students in medicine, dentistry, dental hygiene, pharmacology and nursing who participated in an interprofessional learning experience. Participants are asked to rate their perceived self-efficacy for each item from one (low confidence) to ten (high confidence) in performing various tasks, and higher scores indicate higher self-efficacy. Each item response ranges from one to ten, and total scores are calculated by adding together each question response. The total scale has two subscales: Subscale one (Interprofessional interaction: Items 1-5, 7, 14) focuses on working with other CVOR team members and contains eight items with a total possible subscale score of 8 to 80. Subscale two (Interprofessional team evaluation and feedback: Items 6, 8-13, 15 and 16) focuses on functioning within the CVOR team and contains eight items with a total possible subscale score of 8-80 (see table 1). The subscale scores will be utilized for variable content, but the total score will be utilized to calculate overall self-efficacy.

Although a new instrument, evidence suggests that the SEIEL is valid and reliable. Internal consistency for the total scale has been established in a previous study (Cronbach's $\alpha = .96$), (Mann et al., 2012). Content validity was established by six content experts. Construct validity determines the appropriateness of each item and subscale. Prior administration of the instrument has been with pre-licensure students only, and the instrument will be administered to post-licensure registered nurses in the current study. Therefore, the word "students" was replaced by "CVOR teammates" in the current project. This supported the PICO questions,

“Will a three-month Perioperative 202 orientation program increase knowledge of CVOR protocols and increase nurses’ self-efficacy to function on the CVOR team”?

A Stay Interview was scheduled every two weeks with each candidate meeting individually with the primary investigator to collect thoughts on their experience. Questions related to their feelings of wanting to stay and continue orienting to the CVOR, or to find another service line, or leave the institution all together were discussed. The PI kept notes from each Stay Interview so they could be analyzed in the aggregate rather than individually.

Curriculum Design

The AORN established the evidenced based Periop 101 core curriculum as a comprehensive education program for nurses to be used as a foundation for care for the surgical patient (AORN, 2020). The Periop 202 program was designed by a CVOR multidisciplinary committee with expertise in the open-heart specialty as an extension of the Periop 101 course. The primary investigator worked and collaborated with AORN’s Director of Education and Chief Executive Officer of AORN for design, oversight, and approval of content. The efforts resulted in a user-friendly, sequential, eight module program.

The eight actionable modules of the Periop 202 program were incorporated in the standard orientation of the CVOR program. The primary investigator discussed the plethora of evidential findings that supported the need for each of the eight actionable modules to be incorporated into the standard operating room orientation. The education was provided via PowerPoint format with screen shots of CVOR procedure. Specific information regarding each of the eight actionable modules was provided and are based on the information provided by the AORN website. Each session ended with question and answer sessions. The eight actionable items and details of each was included in the education intervention are as follows:

- 1) **Introduction** - Primary adult coronary artery bypass surgery (CABG) is the surgical procedure that restores sufficient blood flow to deliver oxygen to the coronary muscle. After completing this course, the candidate was able to: 1) identify the most common indication for adult Cardiovascular disease, 2) describe procedural variations, 3) discuss the positioning considerations for adult CABG, 4) identify the equipment necessary to prepare the OR for adult CABG, 5) implement best practices for care of patients undergoing coronary artery bypass surgery and 6) identify aspects of post-operative care of patients who have undergone CABG.
- 2) **History** - 1800s, heart injuries caused by trauma are treated by entering the fourth intercostal space and suturing wounds to repair damage in the late nineteenth century. 1950s, repair of intracardiac lesions became possible with the development of the heart lung machine. 1960s, contrast media is injected into the coronary artery ostia to help direct revascularization of obstructed coronary arteries. CABG surgery is first successful with the vein graft bypass technique. Internal mammary artery graft was not as popular initially as the vein graft technique. Today, with increased knowledge and technology CABG procedures are performed with and without cardiopulmonary bypass. Various autogenous conduits including saphenous vein, radial artery, and internal mammary arteries are used to revascularize myocardial tissue.
- 3) **Anatomy of the Heart** – Review of the following: Great Vessels; Aorta, Vena Cava, Pulmonary Arteries and Pulmonary Veins. Chambers: Right Atrium, Right Ventricle, Left Atrium and Left Ventricle. Valves; Tricuspid, Pulmonary, Mitral and Aortic. Coronary Vessels; Left Main Coronary Artery.

- 4) **Cardiac Circulation/Indications for Procedure** – To assist candidates with visualization of blood and oxygen circulation, details of cardiac circulation will be reviewed. Systemic blood flows through the inferior and superior vena cava into the right Atrium, through the tricuspid valve, into the right ventricle, through the pulmonary valve, through the pulmonary arteries, through pulmonary circulation, through the pulmonary veins, into the left atrium, through the mitral valve, into the left ventricle, through the aortic Valve, and through the Aorta to systemic circulation. (<https://bestharleylinks>). Indications for procedure are circulatory changes leading to: over 50% left main coronary artery stenosis, over 70% stenosis of the proximal left anterior descending (LAD) and proximal circumflex arteries, mild or stable angina (Medscape.com).
- 5) **Perioperative Care** – Nursing process steps utilized during Pre-op, Intra-op and Post-op care will be reviewed. Patient positioning, skin asepsis and practicing a sterile conscious are some examples of this module.
- 6) **Operating Room Preparation** – Operating room suite set up with equipment, supplies and personnel are described within this module. Pictures of all equipment and primary utilization are provided to candidates. Supplies needed for the CABG procedure are reviewed and pictures of the sterile field with exact placement are provided for review. This helped the candidates become familiar with the many supplies utilized for the procedure.
- 7) **Intraoperative Care/Procedure** – The workflow of the procedure from beginning to end were reviewed in detail to help candidate review sequence and understanding of the procedure. Team members' roles and communication is reviewed during this

module. Time out criteria reviewed before incision, stopping the line for questions of any team member that may not be comfortable with something happening during the procedure are some examples of the importance of communication amongst the surgical team.

- 8) Post Anesthesia Care** – Hand off communication of patient condition to the CVICU unit was detailed during this module. Rationale of steps to provide physiological assessment to post unit was vital and stressed during this module.

Procedures

The original idea to develop the CVOR Periop 202 program came from an agenda item on the AORN Executive Round table. The in-depth discussion focused on specialty training of OR nurses and the success of a previously AORN designed Orthopedic Periop 202 program that had been created and implemented with positive comments from the AORN members. After much discussion, it was a unanimous decision by the AORN group that the CVOR would be the next specialty to be developed for such a program. AORN needed a partner with a busy CVOR program to collaborate with education. The executive team of the current project site was offered by the primary investigator of this project to work with the AORN Director of Perioperative Education and Professional Development to produce a program. Once approval was obtained from the executive team of the current study site, a meeting was arranged with the CVOR Department Chief and the primary investigator to plan and discuss details of the CVOR Periop 202 program.

The primary investigator introduced and discussed the project with the CNO, CFO, and COO administration. Verbal approval by senior administration was acquired, and IRB approval was secured through the hospital and university. The primary investigator shared the CVOR

Periop Program project with the OR Specialty Directors and OR Unit Educators of each entity for their buy-in. The CVOR Periop 202 program project was then shared with the OR staff at the monthly staff meetings that included operating nurses, surgical techs, OR assistants, and perfusion. Question and answer sessions were conducted. The staff verbalized support and the program was well-received. The recruitment process for participants included an email request to the primary investigator with a time frame of two-weeks.

Just prior to starting the Periop 202 program, the primary investigator discussed and described the project with those who responded to his email request for participation. The primary investigator created an unidentified individualized folder for each participant who agreed to be in the program. Each participant was asked to complete three instruments; 1) an anonymous demographic form, 2) knowledge questionnaire, and 3) SEIEL survey (more details to follow).

The three instruments were administered via paper format before the project began and after the completion of the project. The results were tabulated by the primary investigator. Each of the content areas of the education modules included detailed information regarding the components of the eight modules, the appropriate time to address the areas of the intervention and those responsible for items to complete. Each education session was concluded with an open forum for questions and answers.

After initial procedures were complete, content from the first lesson was provided to the operating room nurses to teach them CVOR CABG procedures via PowerPoint modules created by the multidisciplinary CVOR team. The OR assignments were made appropriately by the Shift Nurse Manager, Staff Educator, Unit Director and principal investigator. The principal

investigator met with each OR nurse participant bi-weekly to discuss the stay interview questions and overall nurse satisfaction with the education and the CVOR environment.

All educational sessions were conducted by the primary investigator. Each nurse had three months to complete the eight modules. Nurses were assigned eight hours per week to review modules. Modules were completed at the candidates' own pace and on-site for support and question/answer capabilities from the primary investigator. The computer sessions were conducted in the primary investigator's office on a computer within the department in a lecture and interactive format. The primary investigator was available in real time to answer any questions and have face to face meetings with each of the participants. It was the candidate's responsibility to write down and ask any questions regarding the content and share them with the primary investigator.

During the implementation stage, each participant was given a reflective journal where they were asked to write down their thoughts on their feelings during their experience. During the biweekly one on one meetings with the primary investigator, the participants shared their journaling and the primary investigator offered support as needed. In addition, the participants were asked stay interview questions pertaining to retention.

They were also asked to complete a weekly case log of cases they observed and participated with care delivery. This allowed the primary investigator to review and evaluate their strengths, knowledge deficits, and areas of improvement. Once noted, the primary investigator would meet with the individual participant to provide education depending on what their case log revealed, provide support, and to ensure they were getting a broad case mix.

At the end of the project, the nurse preceptor and participant validated the completion of the course competency checklist. This allowed the primary investigator, preceptor, and

participant to reassess the learning objectives. Therefore, the nurse needed to revise a competency, she was able to do so at that time.

Data analysis began upon participants' completion of the six-week educational intervention. After a six-week period, the post self-efficacy survey and post CVOR competency questionnaire were conducted, and procedure case log sheets and reflective journals were reviewed. Upon receiving the paper self-efficacy survey and CVOR competency questionnaires and accumulating the stay interview questionnaires, the data were entered into an EXCEL spreadsheet and then merged into Microsoft EXCEL 2016 for data analysis using a 10 point Likert-type scale measuring the average mean score. The CVOR competency questionnaire compared pre and post test score percentages. A stay interview questionnaire was used to identify common themes. The project took approximately 10 weeks to complete.

Analysis Plan

Power Analysis

Because of the descriptive nature of this project, descriptive statistical analyses were used to answer the clinical questions. Study participation was limited to less than fifteen OR nurses due to the small size of the new cohort that completed the educational intervention and recruited for participation in the study portion. Because of the small sample size, no power analysis was necessary.

Data Analysis

Statistical analysis was performed using Microsoft Excel 2016. Post data collection, the data was cleaned to identify for missing rows and outliers, and each variable was examined for normality. Descriptive analysis was performed on the data since the number of participants did not provide enough power to conduct inferential statistics.

Chapter IV

Results of the multiple aims of this project are discussed in this chapter. Reported findings included nurses' demographics, SEIEL data, CVOR question data, competency data and stay interview results. Pre and post education reviews were used to determine the effects of the Periop 202 education intervention. A qualitative analysis evaluated the nurses' overall knowledge and comfort of satisfaction of the Periop 202 program.

Demographic Description of Participants

The diverse population represented in the participants varied in levels of education, work experience, certification status and nursing areas of expertise. The project consisted of 15 OR nurses who were selected to participate in the Periop 202 program, 100% of which were female (N=15). OR nursing experience varied widely among the participants, with a large percentage of participants having one to five years of OR nursing experience (46.1%, n=6), one nurse having six to ten years of OR experience (7.1%), two nurses having 11 to 15 years of OR experience (15%), none having 16-21 years of OR experience, and four nurses having over 22 years of OR nursing experience (30%, n=4). The majority of participants were Bachelor of Science prepared 83% (n=11), followed by Master of Science prepared 17% (n=2). In addition, 35% (n= 5) had attained their certification in perioperative nursing (CNOR).

CVOR Knowledge Questionnaire

The CVOR knowledge questionnaire is a 17- question, multiple choice and true and false tool that was developed by the multidisciplinary CVOR team and approved by the AORN to measure knowledge gained from the Periop 202 program. The CVOR knowledge test scores ranged from the pre-intervention mean score of 63 to a post-intervention mean score of 80 (see Table 2). This indicates that CVOR nurses' knowledge did increase from pre to post-

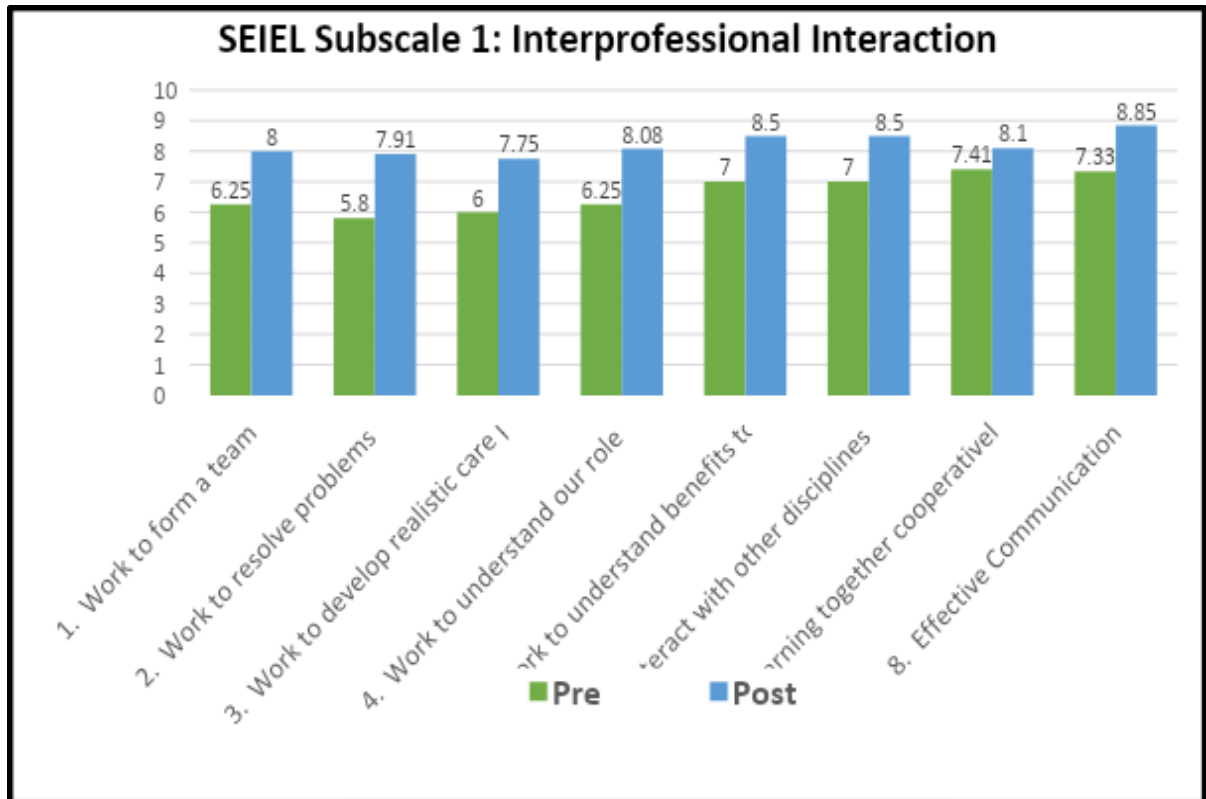
intervention and suggests that the educational intervention was successful in increasing their knowledge.

SEIEL scale

The SEIEL Scale (Mann et al., 2012) was used to measure participants' self-efficacy to function on the OR team before and after the educational intervention. Subscale 1 of the SEIEL Scale measures Interprofessional Interactions (See Figure 1). Results show that the mean score for subscale 1 (Interprofessional interactions), pre-intervention Item 1, "Working with other CVOR teammates from different professions to form a team" had a mean score of $M = 6.25$ versus post-intervention $M = 8$. This means that participants showed an increase in their self-efficacy to work with other CVOR teammates from other professions to form a team following their Periop 202 education. The mean score for pre-intervention Item 2, "Working with other CVOR teammates from different professions to resolve problems in the team" was $M = 5.8$ versus post-intervention $M = 7.91$. This means that participants showed an increase in their working with other CVOR teammates from different professions to resolve a problem following their Periop 202 education. The mean score for pre-intervention Item 3, "Working with other CVOR teammates from different professions to develop a realistic and appropriate patient care plan" was $M = 6$ versus post-intervention $M = 7.75$. This means that participants showed an increase in their working with other CVOR teammates from different professions to develop a realistic and appropriate patient care plan following their Periop 202 education. The mean score for pre-intervention Item 4, "Working with other CVOR teammates from different professions to understand our respective roles in an interdisciplinary team" was $M = 6.25$ versus post-intervention $M = 8.08$. This means that participants showed an increase in their working with other CVOR teammates from different professions to understand our respective roles in an

interdisciplinary team following their Periop 202 education. The mean score for pre-intervention Item 5, “Working with other CVOR teammates from different professions to understand the benefits to patients of care” was $M = 7$ versus post-intervention $M = 8.5$. This means that participants showed an increase in working with other CVOR teammates from different professions to understand the benefits to patients of care following their Periop 202 education. The mean score for pre-intervention Item 6, “Interacting with CVOR teammates from other professions and disciplines than my own” was $M = 7$ versus post-intervention $M = 8.5$. This means that participants showed an increase in interacting with CVOR teammates from other professions and disciplines than my own following their Periop 202 education. The mean score for pre-intervention Item 7, “Learning together cooperatively with students from other professions” was $M = 7.41$ versus post-intervention $M = 8.85$. This means that participants showed an increase in learning together cooperatively with students from other professions following their Periop 202 education. Results show that all items in subscale 1 related to interprofessional interactions increased from before the Periop 202 to after, suggesting that the new course is effective.

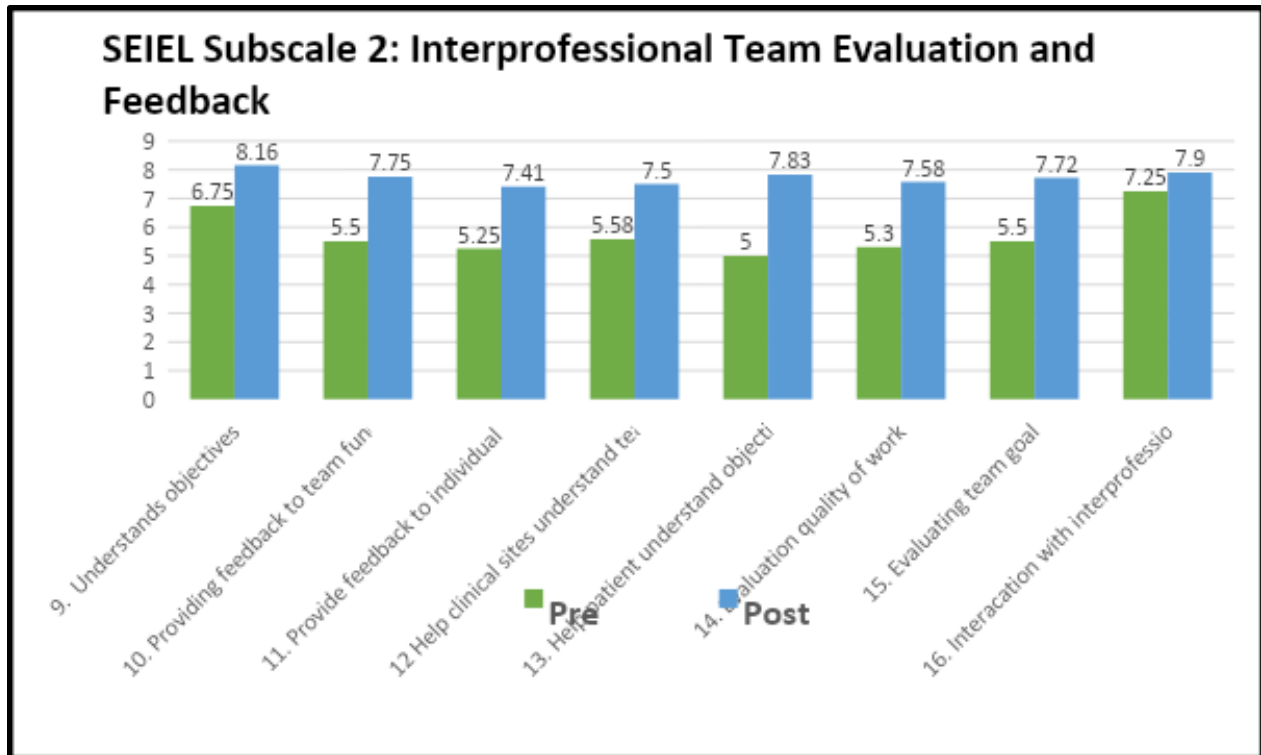
Figure 1: SEIEL Subscale 1 Results



Subscale 2 of the SEIEL Scale measures Interprofessional Team Evaluation and Feedback (See Figure 2). Results show that the mean score for subscale 2 (Interprofessional Team Evaluation and Feedback), pre-survey, Item 9, “Understanding and discussing the objectives of interprofessional learning” were $M = 6.75$ and post-survey $M = 8.16$ responses. This means that participants showed an increase in their understanding and discussing the objectives of interprofessional learning following their Periop 202 education. Item 10, “Providing feedback to an CVOR interprofessional team on our function and work as a team” were $M = 5.5$ and post-survey $M = 7.75$ responses. This means that participants showed an increase in providing feedback understanding and discussing the objectives of interprofessional learning following their Periop 202 education. Item 11, “Providing feedback to individual CVOR members of an interprofessional team on their function and work on a team” were $M = 5.25$ and post-survey M

= 7.41 responses. This means that participants showed an increase in providing feedback in individual CVOR members of an interprofessional team on their function and work on a team following their Periop 202 education. Item 12, “Helping clinical sites understand an CVOR interprofessional team’s role in a clinical setting” were $M = 5.58$ and post-survey $M = 7.5$ responses. This means that participants showed an increase in helping clinical sites understand an CVOR interprofessional team’s role in a clinical setting following their Periop 202 education. Item 13, “Helping the patient understand the objective of the CVOR interprofessional learning” were $M = 5$ and post-survey $M = 7.83$ responses. This means that participants showed an increase in helping the patient understand the objective of the CVOR interprofessional learning following their Periop 202 education. Item 14, “Evaluating the quality of work as an CVOR interprofessional team” were $M = 5.3$ and post-survey $M = 7.58$ responses. This means that participants showed an increase in evaluating the quality of work as an CVOR interprofessional team following their Periop 202 education. Item 15, “Evaluating the degree to which an CVOR interprofessional team has achieved its goals” were $M = 5.5$ and post-survey $M = 7.72$ responses. This means that participants showed an increase in evaluating the degree to which an CVOR interprofessional team has achieved its goals following their Periop 202 education. Item 16, “Interacting with teachers and preceptor from other professions and disciplines than my own” were $M = 7.25$ and post-survey $M = 7.9$ responses. This means that participants showed an increase in interacting with teachers and preceptors from other professions and disciplines than my own following their Periop 202 education. See Figure 2.

Figure 2: SEIEL Subscale 2 Results



Every item on each subscale appeared to increase. Although every item increased, however, it is unknown whether the increase was statistically significant without the ability to run inferential statistics. This is not possible in the current project due to low participation.

Qualitative Clinical Questions: Nurses level of satisfaction with the Periop 202 Program

Results from Stay Interviews were also analyzed. The candidates verbalized their desire of having the interview every four weeks versus every two weeks. They verbalized that the Periop 202 program was too new to them to make any definite decisions of leaving. They found themselves learning vast amounts of new material and the interviews were too close together to make any thought changes either way. Common themes among respondents emerged and are below:

1. What did you like most about the experience?

- *“Enjoy new exposure”*
- *“New knowledge about different procedures”*

- *Enjoying learning new roles*
- *“New experience, enjoy observing roles in the OR”*
- *“Leadership support”*
- *“Availability of supplies and resources to help me grow professionally”*

The most common response regarding what participants liked most about the experiences was enjoying the new experience, gaining new knowledge and leadership support. The candidates verbalized their enjoyment of having the opportunity to participate in the Periop 202 program.

2. What about your experience was most challenging?

- *“Not knowing what to do”*
- *“Fear of the unknown”*
- *“Being a novice”*
- *“Being exposed to medical staff”*

The most common response regarding what about your experience was most challenging was fear of the unknown and not knowing what to do. Being new on a team and having a sharp learning curve was stressful, but the CVOR team made them feel welcome.

3. Do you feel you have been recognized by other CVOR members for your accomplishments?

- *“Yes, team has been supportive”*
- *“No, team member was too busy at times to recognize me”*
- *“Yes, constantly recognizing me”*
- *“Leadership support was outstanding”*
- *“Preceptor was very supportive”*

The most common response regarding do you feel you've been recognized by the CVOR members was the candidates felt the team was busy but found the time to recognize their accomplishments. The CVOR competency checklist validated the accomplishments the candidate demonstrated in the operating room.

4. How do you like the CVOR team? Are they providing you support?

- *“Enjoy working with them, need longer orientation to get to know them”*
- *“I like the team, yes, they are available for support”*
- *“Busy team environment, enjoy the dialogue”*
- *“Yes, intense atmosphere, but fun and supportive”*

The most common response regarding did the candidate like the OR team was the candidates would like more exposure to the CVOR team for them to recognize them as part of the team. The CVOR team were sensitive to making them feel welcome even though they were busy with attending to the patient.

5. Have you ever thought of leaving the CVOR service line?

- *“No, too early, need a longer orientation”*
- *“No, too early to tell”*
- *“No, need more exposure”*
- *“Not enough time in unit to tell, not thinking of leaving”*

The most common response regarding the candidate wanting to leave the CVOR service line was there was not enough time for exposure to the service line to make any long-term decisions. The experience was exciting and challenging, but leaving the team was not in their thought processes.

6. How well are you using your basic OR nursing skills and experience?

- *“Yes, all skills being utilized, all the time, yes, foundation of practice”*
- *“Yes, everyday, I am using my past experience for this course”*

The most common response regarding how well the candidate used basic OR nursing skills was that the basic skills previously learned were utilized for every case as a foundation of practice. This allowed the candidates to expand their practice at a more advanced level of competency in a new service line.

7. What are your career goals?

- *“OR nursing, leadership track, education, attain MSN”*
- *“Obtaining my CVOR certification”*
- *“I would like to be involved in more departmental projects”*

The most common response regarding the candidate’s career goal was that the participants wanted to remain in the OR setting and build on their new skills. Leadership, education and obtaining their professional certification were in their future career goals.

8. What should we do more of?

- *“More time in Periop 202 program”*
- *“Consistency of staff preceptor assignments”*
- *“Keep ideas open, flexible orientation times”*

The most common response regarding what the 202 program should do more of was keeping the program moving and growing. Creativity and involving staff preceptors in future design was a recommendation.

9. How can I support you to keep you on the CVOR team?

- *“More 202 exposure”*

- *“Support, regular one on one meetings, include CVOR team on Periop 202 candidate progression”*

The most common response regarding what the primary investigator could do to keep them on the CVOR team was more exposure to the CVOR and continued support with one-on-one meetings.

Chapter V

Overall, the Periop 202 project was a success. Having the AORN support and guidance allowed the primary investigator to pilot learning modules, utilize nurse self-efficacy tools, validate OR nurse knowledge and competencies, and assess nurse satisfaction. The multidisciplinary team was open to sharing knowledge with the participants in the program and allowed them to learn in an environment that was conducive to adult learning. Also, the support of the senior administrative team allotted fiscal resources of time with the primary investigator and preceptors.

The project was benchmarked to a comparative education model in Ohio that was created and implemented between a university and large hospital system that was created to prepare nurses for the surgical setting (Ball, Doyle, & Oocumma, 2015). These undergrad nursing students were exposed to online activities, simulation experiences, classroom didactics and clinical experiences in a small group setting. The pilot course created an opportunity for the OR director to hire the student nurses at an accelerated time frame and move them from a new graduate status to full time employment in a shorter period of time (Ball, Doyle, & Oocumma, 2015). In comparison to this study, the CVOR Periop 202 program gave students clinical experiences, online modules and the primary investigator was able to orient them in an accelerated time.

A similar qualitative study was conducted to evaluate the efficacy of structured psychomotor educational modules on knowledge and attitude among nursing students. The students were able to work at their own pace and have time for self-reflection on what they already knew and what they needed to improve upon. The study showed the educational modules had a positive impact on the undergraduate attitude and knowledge, with a statistically significance ($p=0.05$) with the module education. (Gandhi & Vajrala, 2018). The Periop 202 utilized specific modules that pertain to the CVOR patient. The post CVOR knowledge and nurses' self-efficacy to function on the CVOR team scores increased, which supports the positive impact of a structured, module based program.

In another study describing the development of a work-based, university accredited, clinical module for nurses in a neonatal department reported that congenital abnormalities and complications from premature birth are responsible for the majority of infant deaths in the UK (Reda, 2018). Nurses in neonatal units are required to have specific competencies that necessitate a high quality education. According to Reda (2018) the module was created to educate the future nursing workforce with specific competencies to take care of a very specific, vulnerable patient population. The module described in this project is another example of creating learning modules specific to a specialty. The Periop 202 program was created to educate a very specific, surgical patient population.

Strengths and Limitations

A unique strength of the CVOR Periop 202 project was the ability to build on the existing Periop 101 program or related courses previously taken by the candidates. The foundation of knowledge and practice of the 101 program allowed the Periop 202 candidate to continue their learning experience from the basics to a more complex service line in the OR. Furthermore, the

overall clinical knowledge and experience of the CVOR team were characteristics that AORN sought to build a strong CVOR program and the senior executive team's resources allocated to this program.

One major limitation of this project was related to unexpected increased OR volume. Based on historical data, surgical volumes increase during the last quarter of the calendar year (September to December) related to year end deductibles being met by patients and family members. The year 2019 was no exception to this trend at the study site. The surgical volume in the last quarter of 2019 was 30% higher than 2018. Year-end volume demands create capacity issues related to the hospital's ability to manage excess volume along with unexpected urgent and emergent cases that are scheduled. Surgeon's offices are pressured to schedule additional cases to fulfill the demand of their surgical patients. With this year-end volume influx, elective OR schedules were extended, creative staffing schedules were developed, and additional weekend and off shift cases were approved. The Periop 202 program depended on flexibility of staffing assignments with appropriate CVOR preceptors. The stressed operating room schedule created challenges to assignments as it related to allowing the Periop 202 candidates to be with appropriate preceptors. Preceptor assignments took creative scheduling to produce appropriate mentoring for the candidates. Hence, many days, the Periop 202 candidates were not scheduled to the CVOR and assigned to other service lines due to staffing limitations. The increased volume demands along with unscheduled paid time off, FMLA, and vacation requests of employees, limited the number of days the candidates were scheduled to the CVOR. The Shift Nurse Manager of CVOR and Unit Director partnered with the primary investigator to expose as many Periop 202 candidates that the schedule allowed. Having Periop 202 candidates on three campuses was also a challenge. All three hospitals were dealing with year-end volume demands

along with other operational issues such as construction. This created additional difficulties with assignments as well. The primary investigator experienced challenges meeting with individual 202 candidates at prearranged, scheduled times. One CVOR site experienced a building water leak that was above three of the six CVOR rooms. This operational issue shut down three of the six CVOR rooms. The room closures limited the number of case selections and times for the Periop 202 candidates.

The initial barrier of the program was the fear from the hospital based staff nurse educators that the Periop 202 program would be mandated across the system without their input. The primary investigator met with each staff educator to explain the program as a pilot and no system-wide educational program would be implemented initially. The Periop 202 program was created by an interdisciplinary team at the hospital that performs the highest cardiac volumes with no input from the remaining two study sites.

The primary investigator met and reviewed the program goals and objectives with the surgical administration and front-line leaders to assure them that the program was a pilot and the material was generic to only expose the candidates to the CVOR. An association and collaborative relationship with the AORN and hospital administration was a solidified partnership to create and pilot the Periop 202 program. Once the background and future plans of the Periop 202 program were reviewed, the two other hospital sites were onboard and welcomed the project.

In retrospect, asking for volunteer CVOR educators from each entity to help with the design of the Periop 202 program would have alleviated concerns of being left out of the new program design. After reflecting upon the project, an extended time for orientation by eight to ten weeks would enhance the knowledge and experience especially with more difficult cases.

Furthermore, all cardiac surgeons at all entities could be more involved with the program, and taking a participant's recommendation to include more pictorials and animation would enhance the learning modules.

Implications for Practice

The combination of CVOR nursing shortages, increased CVOR surgical volumes, and traveling nurse usage supports the need to create and implement a Periop 202 program. The proposed Periop 202 course with a specialty focus on CVOR provides health care systems an evidenced-based tool to train new nurse candidates that are interested in the CVOR and allows nurses to professionally develop, therefore assisting with retention. The program supports increasing confidence levels and allows nurses to reflect on what they already know and what they need to learn. The program also allows the CVOR nurse and OR leadership to develop a trusting relationship.

Conclusions

In summary, the evidence-based Periop 202 educational intervention was effective in allowing nurses who were new to the CVOR to increase their knowledge through measuring pre and post self-efficacy to function on the CVOR team, clinical competency, pre and post CVOR knowledge testing, stay interviews and reflective journaling. These tools created a positive work environment that enhanced the learning experience of the new CVOR nurse. Nurses were able to gain confidence and learn new skills to deliver better quality care. This project measured the Periop 202 self-efficacy to function on the CVOR team and knowledge of CVOR protocols and guidelines with validation through clinical competencies with their preceptors. The periop 202 candidates were given the opportunity to track case types and meet with the primary investigator

bi-weekly. Journaling was encouraged for candidates to document observations and feelings on reflection of their experience back with the primary investigator.

This program is described by AORN as a standardized, evidence-based on-line curriculum, supplemented with textbook readings and hands-on skills labs and clinical practice. The program exposed nurses to the OR environment with the basics of sterile technique, skin prep, gowning and gloving, and basic scrubbing skills. The Periop 202 program for this DNP project created an evidence-based program that added value and a solution to a stressed CVOR market. This program will allow nurses to enter the CVOR service line with increased self-efficacy to function on the CVOR team and knowledge to care for open heart patients. The success of the intervention was enhanced by the multidisciplinary team's planning and creation of an evidenced based program in collaboration with the AORN. The tools, communication, and diligent follow up of the candidates also made this program a success. Nurses that were previously oriented to the CVOR verbalized they wished they had a program like the Periop 202 program when they first oriented. Several staff nurses are waiting for the next Periop 202 program to be offered. Administration and nurse leaders should embrace the momentum the Periop 202 program has created and participate in the potential strategy it will have on closing CVOR nursing gaps.

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Table 1

Self-Efficacy for Interprofessional Experimental Learning (SEIEL) scale items* (Mann et al., 2012)

Subscale 1: Interprofessional interaction

Working with other CVOR teammates from different professions to form a team.

Working with other CVOR teammates from different professions to resolve problems in the team.

Working with other CVOR teammates from different professions to develop a realistic appropriate patient care plan.

Working with other CVOR teammates from different professions to understand our respective roles in an interdisciplinary team.

Working with other CVOR teammates from different professions to understand the benefits to patients of team care.

Interacting with CVOR teammates from other professions and disciplines than my own

Learning together cooperatively with students from other professions.

Communicating effectively with other members of a CVOR interprofessional team.

Subscale 2: Interprofessional team evaluation and feedback

Understanding and discussing the objectives of interprofessional learning

Providing feedback to an CVOR interprofessional team on our function and work as a team.

Providing feedback to individual team members of an CVOR interprofessional team on their function and work on the team.

Helping clinical sites understand an CVOR interprofessional team's role in a clinical setting.

Helping the patient understand the objective of the CVOR interprofessional learning.

Evaluating the quality of work as an CVOR interprofessional team.

Evaluating the degree to which an CVOR interprofessional team has achieved its goals.

Interacting with teachers and preceptors from other professions and disciplines than my own.

*Minimum/maximum score for each item (1/10) and for each subscale (8/80).

Table: 2. Knowledge Test Questionnaire (Multiple Choice and True or False)

1.	With advances in technology, CABG procedures can be performed both with and without cardiopulmonary bypass. (True or False)
2.	The Surgical Care Improvement (SCIP) measures associated with CABG surgery are (choose all that apply) a) Beta blockers are given within 24 hours of the surgery, b) Unless it is a fluoroquinolone, an antibiotic is administered 60 minutes before the incision, c) Patient is normothermic and normotensive prior to surgery, d) Appropriate hair removal
3.	The skin prep (skin antisepsis) for a CABG procedure extends from the chin to the toes. (True or False)
4.	The internal mammary artery can be harvested either by itself or as a pedicle. (True or False)
5.	The first step in cardiopulmonary bypass is to cannulate the aorta and right atrium. When the aortic cannula is placed, the patient is given protamine. (True or False)
6.	When the distal anastomosis are complete: a) The aorta is clamped to the cannula, 2) Cardiopulmonary bypass can be commenced, c) Adequate anticoagulation is confirmed by assessing the activated clotting time, d) Rewarming of the heart is initiated.
7.	Cardioplegia is an intentional and temporary cessation of cardiac activity to provide myocardial protection while the heart is in asystole. It is given: a) After the saphenous vein has been harvested, b) After air is evacuated from the grafts and ascending aorta, c) Via the antegrade cannula after the aorta is cross clamped, d) If the patient becomes hypokalemic and has a subsequent arrhythmia.

8.	When the patient comes off by-pass and experiences bradycardia or a temporary heart block, they may need to have temporary pacing wires placed to the right atrium and right ventricle. (True or False)
9.	The perimeters for draping from the sternum to the legs are set to prevent strike-through or other breaks in the sterile field. (True or False)
10.	The first successful coronary artery bypass graft was done in the 1960s by a Russian surgeon. (True or False)
11.	The incision for a CABG may be: a) Midline sternotomy, b) Anterior thoracotomy for bypass of the left anterior descending artery, c) Lateral thoracotomy for marginal vessels, d) All the above.
12.	The sinoatrial (SA) node and the atrioventricular (AV) node regulate the heart rhythm. (True or False)
13.	The main portion of the right coronary artery provides blood to the left side of the heart, which pumps blood to the lungs. (True or False)

David Reinhart (10/2019)

Appendix A

Periop 202 Stay Interview**ID Number** _____

Purpose and rationale. The purpose of this monthly interview is to connect with the Periop 202 candidates to determine the degree to which they are engaged and planning to stay on the CVOR team. This interview, which is meant to be informal and not a part of the performance review, allows the primary investigator to ensure these Periop 202 candidates know they are a valuable part of the team. This interview gives the primary investigator the opportunity to check in on the selected candidates and to provide options and resources to enhance the Periop 202 work experience.

Questions

1. What do you like most about your CVOR experience? What parts of your experience are fun?
2. What about your experience is less positive or most challenging?
3. Do you feel you've been recognized by other CVOR employees for your accomplishments?
4. How do you like the CVOR team? Are they providing support you need?
5. Have you ever thought about leaving the CVOR service line? Why do you want to stay?
6. How well are we using your basic OR nursing skills & experience? What could we do better to help you make a difference/contribute?
7. What are your career goals? Are you meeting them?
8. What should we do more of?
9. How can I support you & keep you on the CVOR team?

Appendix B

Periop 202 Competencies

Identification Number _____

Performance Criteria	Method of Validation	Validator Initials/date	Periop 202 RN Student Initials/Date	Comments
<ul style="list-style-type: none"> Correct Avagard usage: Include one pump delivered into the palm of one hand and worked from the fingertips to elbows, then repeated with opposite hand/arm, followed by a final pump applied to hand and wrist. 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> Describe the Surgical Care Improvement Project (SCIP) measures associated with CABG surgery <ul style="list-style-type: none"> Beta Blockers given 24 hours of the surgery Unless it is a fluoroquinolone, an antibiotic is administered 60 minutes before the incision Patient is normothermic and normotensive prior to surgery Appropriate hair removal 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> Able to describe what should be done for a surgical procedure that is a moderate to high fire risk <ul style="list-style-type: none"> Observation of alcohol prep drying times of 3 minutes 	D, VF, RD, OB, CS, T			

<ul style="list-style-type: none"> • Able to implement laser safety measures • Ensure a basin of sterile fluid and bulb syringe are available for fire suppression 				
<ul style="list-style-type: none"> • Describe and perform specimen labeling and proper documentation on the requisition sheet with the “out of the body “time. AND the “in-formalin” time documentation on the label and requisition sheet. 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • IUSS implant usage: <ul style="list-style-type: none"> • Emergency usage • Unit Director notification • Placement of biological indicator that must be place and read negative before implementation of item into a patient • Safe reporting completion • Chartable occurrence documentation in Surginet 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Proper use of Pre-Klenz enzymatic cleaner <ul style="list-style-type: none"> • Able to describe how long it can remain wet on instruments for up to how many hours 	D, VF, RD, OB, CS, T			

<ul style="list-style-type: none"> • Able to describe skin prep (skin antiseptis) for a CABG procedure – Chin to Toes 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Able to describe and perform instrument cleaning during the surgical procedure in sterile water 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Able to describe blood products time frame outside the refrigerator for ___minutes 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Able to describe and perform medication usage and labeling that is used on the sterile field 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Able to describe air exchange after surgical cases that contain airborne or droplet precaution: <ul style="list-style-type: none"> • Describe minimum minutes 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Describe indication for Cardioplegia and time given 	D, VF, RD, OB, CS, T			
<ul style="list-style-type: none"> • Able to describe proper marking for operative site: <ul style="list-style-type: none"> • When it should be performed • Where is should be performed • Why is should be performed • Who is responsible for surgical site marking? 	D, VF, RD, OB, CS, T			

<ul style="list-style-type: none"> ● Able to perform complete TIME OUT procedure independently <ul style="list-style-type: none"> ● Fire Risk Assessment ● Name of Patient ● Date of Birth ● Procedure & Laterality ● Allergies 	<p>D, VF, RD, OB, CS, T</p>			
<ul style="list-style-type: none"> ● Able to describe the concept of the sterile field sterile precautions until the surgical technologist acquires the patient's status from the surgical team. 	<p>D, VF, RD, OB, CS, T</p>			
<ul style="list-style-type: none"> ● Describe the OR team clinical practice to be present inside the OR suite when the patient arrives to the OR and must assist in delegated duties of the surgical team. 	<p>D, VF, RD, OB, CS, T</p>			
<ul style="list-style-type: none"> ● Able to describe the proper use of instrument or tray blue wrapping: <ul style="list-style-type: none"> ● Layering ● Holes in blue wrap versus white wrapping ● Understands sterile instrument wrapping 	<p>D, VF, RD, OB, CS, T</p>			
<ul style="list-style-type: none"> ● Able to identify all team members in the OR suite during a CVOR case <ul style="list-style-type: none"> ● Anesthesia team ● Perfusionist ● Fellows ● Scrub Technologist ● Other RN team 	<p>D, VF, RD, OB, CS, T</p>			

<ul style="list-style-type: none">• Able to perform RN responsibilities when transfer from OR to CVICU	D, VF, RD, OB, CS, T			
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Comments:

Signatures:

RN

Validator: _____ Date: _____

Peri-op RN

Student _____ Date: _____

DR/9.9.2019

Appendix C
Periop 202 CVOR Case Log

Identification Number _____

Table with 5 columns: Date, Procedure, Surgeon, Preceptor, Comments. The table contains 20 empty rows for data entry.