

Southern California CSU DNP Consortium

California State University, Fullerton
California State University, Long Beach
California State University, Los Angeles
Kaiser Permanente School of Anesthesia

ENHANCING SIMULATION EDUCATION: A QUALITY IMPROVEMENT PROJECT TO
SUPPORT PROFESSIONAL DEVELOPMENT, GROWTH, AND EDUCATION OF NURSES
TRANSITIONING INTO THE CRITICAL CARE SETTING

A DOCTORAL PROJECT

Submitted in Partial Fulfillment of the Requirements

For the degree of

DOCTOR OF NURSING PRACTICE

By

Jennifer Ngo
Austin Peik
Lisa Wheeler-Haggart

Doctoral Project Committee Approval:

Sass Elisha, EdD, CRNA, FAAN, Team Leader
Hannah Fraley, PhD, RN, CNE, CPH, Team Member

December 2020

Author Note

Jennifer Ngo -  <https://orcid.org/0000-0002-8334-4073>

Austin Peik -  <https://orcid.org/0000-0002-3415-058X>

Lisa Wheeler-Haggart - <https://orcid.org/0000-0002-4789-107X>

DOI # doi.org/10.5281/zenodo.5021470

© 2020 Jennifer Ngo, Austin Peik, Lisa Wheeler-Haggart

ABSTRACT

The extensive knowledge base that critical care nurses have incorporated emphasizes the importance of structured training programs to facilitate a supportive educational environment before transitioning into the ICU. Adapting to a fast-paced ICU can feel very overwhelming for new graduates and experienced nurses with no ICU training. ICU training programs have been shown to promote safe clinical skills, enhance quality of care, and increase retention among nurses (McKillop et al., 2016). The purpose of this project was to improve the current nurse transition education curriculum at Kaiser Permanente, a large American Health Maintenance Organization (HMO) healthcare system; and determine the value of alternative education modalities and whether standardization and replication of this educational offering is warranted for dissemination to other institutions. The specific aims include the following: a) Identify innovative, evidence-based adult learning modalities, b) Update the current ICU training program, c) Evaluate the effectiveness of program via pre and post-tests. Several innovative learning methodologies identified include task training, role playing with actors, and the use of escape rooms. Pre and post questionnaire feedback surveys were developed to assess efficacy of developed learning modules on these three innovative teaching methods. In addition, focus groups were conducted to provide anonymous feedback on the evaluation questionnaires. Extenuating circumstances involving the global pandemic prompted changes in the project timeline and thus implementation of the project is not possible at this time. Although the team was unable to fully implement all learning modules within the curriculum, the didactic PowerPoint presentations and critical case scenarios developed by the team will create a strong foundation for future participants in this course.

Keywords: simulation, ICU nurse training, critical care nurse training, nurses transitioning to critical care programs

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	vi
BACKGROUND	1
Problem Statement.....	1
Purpose Statement	2
Supporting Framework.....	3
Application of the Iowa Model to an ICU Nurse Transition Program	3
REVIEW OF LITERATURE.....	5
Overview	5
ICU Nursing Skills	5
ICU Nurse Training Programs.....	6
Innovative Teaching Modalities	9
Task Training in a Flipped Classroom	9
Role Playing: Use of Actors in Simulation	11
Escape Room: Team-Based problem solving in simulation	12
Evaluation of Program: Metrics	13
The Iowa Model	15
METHODS.....	17
Design.....	17
Sample	17
Project Team.....	18
Setting.....	18
Interventions	18
Role Playing: Use of Actors in Simulation	18
Task-Training in a Flipped Classroom	18
Escape Room: Team-Based Problem Solving in Simulation.....	19
Measures.....	19
EVALUATION PLAN.....	21
RESULTS.....	23

DISCUSSION.....	25
Limitations.....	28
CONCLUSION	30
REFERENCES.....	31
APPENDIX A: INITIAL LITERATURE SEARCH STRATEGY	39
APPENDIX B: THE IOWA MODEL REVISED: EVIDENCE-BASED PRACTICE TO PROMOTE EXCELLENCE IN HEALTH CARE	40
APPENDIX C: PRE-TRAINING SURVEY: KNOWLEDGE PERCEPTION, RESPIRATORY.....	41
APPENDIX D: PRE-TRAINING SURVEYL: KNOWLEDGE PERCEPTION, HEMODYNAMICS	42
APPENDIX E: PRE-TRAINING SURVEY: KNOWLEDGE PERCEPTION, CARDIAC ARREST/HYPERKALEMIA	43
APPENDIX F: POST-TRAINING SURVEY: SATISFACTION.....	44
APPENDIX G: RESPIRATORY FAILURE SCENARIO/ROLE PLAYING USE OF ACTORS	45
APPENDIX H: SIMULATION: HEMODYNAMICS TASK TRAINING	49
APPENDIX I: HYPERKALEMIA/CARDIAC ARREST ESCAPE ROOM.....	52
APPENDIX J: PROJECT TIMELINE.....	55

ACKNOWLEDGEMENTS

We are incredibly thankful to our Team Leader, Dr. Sassoon Elisha, for his continued guidance and support throughout every step of this process. We appreciate not only his timely and knowledgeable advice, but his flexibility, patience, and encouragement while dealing with the rigors of our didactic and clinical portions of the program. In addition, Dr. Sarah Giron was also incredibly helpful to this project and we are very appreciative of her help and guidance throughout our IRB application.

We also would like to thank Dr. Hannah Fraley for her thorough feedback and direction. Her expertise was essential in achieving the highest quality project, especially given the hurdles and circumstances of the pandemic. We believe that with her teaching and guidance, we are equipped with the tools to continue making effective changes within the healthcare field after graduation.

We would also like to express our gratitude to our families and friends for supporting us throughout our journey.

Background

Critical care nurses provide specialized care to patients with medically complex conditions under life-threatening circumstances in an environment that requires vigilance and prompt decision-making. These advanced critical thinking skills are examples of professional competence that are vital to providing high-quality patient care (DeGrande et al., 2018). It is essential to increase confidence so that critical care nurses can make sound clinical decisions to promote safe practices in the Intensive Care Unit (ICU). The extensive knowledge base that critical care nurses embody, emphasizes the importance of structured training programs to facilitate a supportive educational environment before transitioning into the ICU.

Problem Statement

Practicing in any new nursing environment is stressful, thus, adapting to a fast-paced ICU can feel even more overwhelming for a new graduate or experienced nurse with no ICU training. It is noteworthy that there is no standardized educational program preparing nurses entering critical care. Therefore, it is the healthcare organization's responsibility to develop training programs for nurses transitioning into the ICU. Although programs vary in duration, structure, and curricular content, the literature supports the positive impact that critical care training programs have on promoting safe clinical skills, enhancing the quality of care, as well as strengthening retention (McKillop et al., 2016). The implementation of formal training programs supports the transition of nurses into critical care by increasing their competence, confidence, and critical reasoning (Innes & Calleja, 2018).

Nursing transition programs are targeted to impact the practice of both novice and experienced nurses who wish to work in the critical care setting. The scope of these programs not only applies to newly hired nurses but also nurses transitioning from other hospital units. In

addition to standardized institutional training, critical care nursing transition programs provide additional specialized training to address the needs of higher acuity patients (Short et al., 2019). These programs help shape the foundation for theoretical and clinical nursing skills, ensure competency, increase confidence, and modify the preexisting nursing practice (Short et al., 2019). One priority of a critical care education program that integrates simulation into the learning process is increasing competency. These simulation exercises provide the opportunity to learn within a high-fidelity, controlled environment without the risk of harming patients. Basic competence is assessed in a multitude of ways. Quantitative scales measuring competency holistically reflect the impact of transition programs to nursing skill sets (Lakanmaa et al., 2012). Improving patient outcomes is another consequence often interlinked with nursing transition programs. This program has the potential to produce highly skilled nurses who can provide quality care to patients. Unit outcome measures such as patient satisfaction, unit retention rate, pain management, infection rates can be cited as indirect consequences of nursing transition programs (Gullick et al., 2019).

Although widely used in some hospitals, the literature on standardization of nursing transition programs in practice is scarce. As cited by Boyle et al. (2008), minimal standardized guidelines can inadvertently lead to diversity in content and result in inconsistent outcomes. Cost, education, and the immediate need for nursing staff have been cited as barriers that can potentially hinder the spread of these programs. These factors possibly reflect the reason that transitional education programs are not commonly offered.

Purpose Statement

The purpose of this project was to improve upon the current nurse transition education curriculum at Kaiser Permanente (KP), a large American Health Maintenance Organization

(HMO) healthcare system, determine the value of alternative education modalities, and whether standardization and replication of this educational offering is warranted for dissemination to other institutions. The specific aims include the following: a) Identify innovative, evidence-based adult learning modalities, b) Update current ICU training program, c) Evaluate the effectiveness of program via pre and post-tests.

Supporting Framework

Evidence-based practice (EBP) bridges research with clinical decision making through a micro and macro perspective. From patients to large healthcare organizations, EBP promotes the fiduciary responsibility of healthcare providers to implement the highest quality of evidence into improving patient outcomes while also considering cost effectiveness. The Iowa Model is a strategic tool designed with a ten-step methodology for transforming research into practice. It is a highly regarded framework, which is supported in the literature review for the Iowa Model in the following section. The theoretical framework is organized to guide multi-disciplinary teams towards achieving successful practice changes (Appendix B). The Iowa Model will be applied to conduct a program evaluation of its effectiveness for nurses with non-ICU experience transitioning into the ICU setting.

Application of the Iowa Model to an ICU Nurse Transition Program

Step one of the Iowa Model involves identifying the problem. For this project, the issue relates to an organizational initiative for improvement through the implementation of innovative teaching methods. These teaching methods are included in step two, the purpose, which will update the current KP Nurse Transition Program curriculum to reflect evidence-based practice. This is an essential priority (step three) because the project has the potential to improve patient care, safety, nurse competency, retention rates, and staff satisfaction. For this project, a team was

formed (step four) involving key stakeholders. The stakeholders include KP School of Anesthesia (KPSA) DNP students, KPSA faculty, and California State University Fullerton faculty. A literature review facilitated the assembly, appraisal, and synthesis of evidence (step five). The team identified multiple evidenced-based, innovative teaching methods for adult learners. Given sufficient evidence on the subject (step six), it is clear that adult education methodologies apply to settings that extend beyond the realms of medicine. Our DNP project team will modify the curriculum by implementing novel teaching methods that are evidence-based to improve competency and knowledge retrieval (step seven). This will include the DNP student team members leading simulation exercises that highlight the chosen teaching methods. Subsequently, we will evaluate the implementation and determine if it is appropriate to adopt for future cohorts (step eight). Evaluation tools that will be utilized include pre and post-course feedback questionnaires that will provide a benchmark and help identify areas for improvement and learning. To integrate and sustain this practice change, the DNP team will conduct quarterly evaluations to assess participant knowledge retention. Furthermore, unit outcome measures will be routinely trended and compared to baseline data. Ultimately, the results will be presented and disseminated to the KP administration's education department.

The Iowa Model is a compelling evidence-based practice tool that can be used for practice changes, given its systematic structure that guides a project from inception to end. This model was selected for this DNP project and is also the current model utilized by KP for all program evaluation and practice improvement projects. We will also incorporate our initial literature review and plan for program evaluation to determine the program's effectiveness. Furthermore, we will apply a series of steps within the Iowa Model that will reflect an evidence-based team approach evaluating the current program.

Review of Literature

Overview

A review of the literature was conducted using PubMed, CINAHL, and Google Scholar. MeSH terms were utilized, and featured training, education, and programs related to critical care nursing. Search terms included: “nurses transitioning to critical care,” “critical care nurse training programs,” “critical care nurse residency programs.” The literature search was limited to include articles published within the last five years, written in the English language, and found in peer-reviewed scholarly journals. Exclusion criteria included non-peer reviewed articles, articles not published in the English language, and sources not addressing nurse training programs in the ICU. The final literature review included 31 articles and resulted from the evaluation of published research outlined in Appendix A. This review was divided into the following sections: a) Skill sets necessary for a successful ICU nurse, b) Current ICU nurse training programs c) Metrics evaluating program effectiveness d) Innovative teaching modalities.

ICU Nursing Skills

In the hospital, the ICU is the designated place for the most critically ill and vulnerable patient populations. Due to the patient’s acuity, many require constant one-on-one care from a nurse. Furthermore, ICUs can be categorized into different subspecialties, including trauma, burn, transplant, cardiac, neurology, medical, and surgical. To provide safe and competent care, the nurse must have specialized education focusing on a unit’s specific patient population (Alastalo et al., 2017).

The unique skillset and education of an ICU incorporates the concept of critical thinking (Shoulders et al., 2014). Critical thinking is a learned process that is comprised of analysis, logical reasoning, and applications of standards of care (Shoulders et al., 2014). In nursing,

critical thinking is a vital skill to ensure nurses can identify rapidly deteriorating patients and effectively make life-saving decisions (Shoulders et al., 2014). One study interviewed 20 experienced critical care nurses and determined that the ability to think critically is crucial to becoming a competent ICU nurse (Alastalo et al., 2017). In addition, nurses in the ICU setting also manage advanced medical devices such as mechanical ventilators, extracorporeal therapy, continuous renal replacement therapy, intra-aortic balloon pumps, and also titrate vasoactive infusions to physiologic response (Chamberlain et al., 2019). The role of the ICU nurse is complex and requires extensive knowledge, highly technical skills, and an advanced level of critical thinking (Chamberlain et al., 2018; Shoulders et al., 2014).

Currently, there is a gap between translating academic nursing education to clinical practice (Bennett et al., 2017; Joint Commission on Accreditation of Healthcare Organizations [JCAHO], 2005). Nurses reported feeling incredibly unprepared for performing patient care tasks, demonstrating psychomotor skills, and responding to emergencies (JCAHO, 2005). A proposed solution is the establishment of transitional educational programs with specific hands-on training, as well as supervision from more experienced nursing staff (JCAHO, 2005). While such programs currently exist, they lack standardization and vary in length, intensity, and structure.

ICU Nurse Training Programs

In 2010, the Institute of Medicine (IOM) recommended that hospitals implement nursing education programs for nurses transitioning into new practice settings (National Academy of Sciences, 2019). Depending on a hospital's resources, programs can vary dramatically from one healthcare organization to another, including curricular content and length ranging from 12 weeks to 12 months (Barnett et al., 2014; Letourneau & Fater, 2015). Also, the lack of a

nationally standardized core curriculum for ICU nurse competency yields the possibility of the inconsistent quality of care for critically ill patients. Despite many differences, ICU nurse transition programs such as nurse residency programs (NRPs) have been impactful and advantageous for the nurses and organizations, as a result of enhanced confidence, job satisfaction, and retention (Innes & Calleja, 2018; Kram & Wilson, 2016; Letourneau & Fater, 2015; McKillop et al., 2015).

There are two types of nurses who transition into the ICU setting and experienced nurses changing specialty and new graduate nurses. Notably, research studies have focused on the second. NRPs are based on different theoretical frameworks. Seven of the ten descriptive articles in the literature review by Letourneau & Fater (2015) used Benner's theory of novice to expert (1984), to deliver and guide education to nurses entering the new practice setting. Depending on a hospital's resources, NRPs may be affiliated with medical or nursing schools to help sponsor the education. Alternatively, there are facility-driven frameworks without academic partnerships (Barnett et al., 2014). Nursing transition models vary widely in structure and content, but the literature supports partnerships with universities increased critical thinking skills and evidence-based practices (De Silva et al., 2015; McKillop et al., 2015).

Research studies incorporated various frameworks with didactic teaching components and practical applications at the bedside; including internships, preceptorships, and mentorships (Barnett et al., 2013; Connell et al., 2016; Innes & Calleja, 2018; Kram & Wilson, 2016; McKillop et al., 2015). For instance, the American Association of Colleges of Nursing (AACN) nurse residency program (NRP) partnered with the University Health System Consortium (UHC) and is utilized in over 29 states. These programs include an orientation model that is organized into a year of curriculum and professional role development (AACN, 2013; Barnett et al., 2014;

Joint Commission, 2002; Letourneau & Fater, 2015). Other than the AACN/UHC's NRP, the literature does not distinguish any other programs that were consistently implemented among multiple hospitals throughout different states. Since there is no organization to oversee that the benchmarks of ICU training are met, the AACN/UHC structured training model has the advantage of measuring competency outcomes with increased validity since the curriculum is standardized.

It is consistently observed that ICU nurse preceptors provide specialized training to new nurses (Kram & Wilson, 2016; Letourneau & Fater, 2015; McKillop et al., 2015). There were 17 of 30 programs that utilized the structure of preceptorship in the literature review evaluating critical care transition programs (Innes & Calleja, 2018). Preceptors also became mentors to nurses as they facilitated socialization within the workplace culture, which contributed to influencing professional identity and teamwork skills. Preceptors had a positive influence because they were a resource for questions, fostered critical thinking, and encouraged self-reflection with informal debriefs (Innes & Calleja, 2018; Kram & Wilson, 2016; McKillop et al., 2015). Additionally, formal preceptor training was recommended because a lack of proper training contributed to a negative and unsupportive learning environment for new nurses (Innes & Calleja, 2018). The expenses of formal preceptor training should be considered when developing nursing transition programs.

Another common theme found in the research was high fidelity simulation training as an educational tool in NRP frameworks (Connell et al., 2016; Kram & Wilson, 2016; Letourneau & Fater, 2015). Simulation-based exercises support adult learning because the scenarios were directly related to didactic content, which was beneficial to knowledge retention (Kram & Wilson, 2016). A systematic review of 23 research studies observed that 87.5% of the studies

incorporated simulation-based exercises within their program structures (Connell et al., 2016). On average, the program durations were eight hours long. However, it was identified that minimum simulation time of 40 minutes was beneficial. Multi-scenario simulations based on real-life critical care cases were conducted alongside in-class sessions to test the knowledge of providers. These were achieved through low and high-fidelity scenarios with the use of mannequins. These simulation labs developed clinical assessment skills and promoted confidence in a safe learning environment.

Overall, different frameworks and resources, such as experienced preceptors and high-fidelity simulation scenarios, are typical trends in NRPs. Limitations to the literature included the variability of program structures and allocated resources, which emphasized the difficulty in comparing NRPs. For instance, the ratio of mentors to new nurses may contribute to different outcomes in evaluating professional development (Barnett et al., 2014). Also, time allocated to didactic versus practical learning at the bedside is crucial, but the literature did not delineate between these variables. The academic content taught within the diverse NRPs is not explicit in the research either. Nursing transition models represent a blend of theoretical frameworks that shape the structure of each program. Due to the large variability among NRPs, further research is needed to compare the rigor and content of each program through standardization for best practices.

Innovative Teaching Modalities

Task-Training in a Flipped Classroom

Traditional methods of teaching in a didactic environment are beneficial for students who learn by auditory, reading, and writing methods. However, innovative research has led to the development of enhanced educational strategies for people who optimally learn through visual

and kinesthetic approaches. The literature shows that experiential learning provides increased recall and reflection through hands-on practice (Hill, 2017; Tan, Brainard, & Larkin, 2015). An example of an experiential learning approach based on evidence that significantly improves critical thinking and performance is the flipped classroom pedagogy (Betihavas et al., 2016; Hannafin & Phillips, 2016). In comparison with the traditional methods based on a lecture format, the flipped classroom is the application of knowledge through higher-order learning activities such as case-based discussion or task training scenarios to improve independent problem solving (Tan et al., 2015). The study conducted by Tan et al. (2015) showed that 95% of the respondents preferred the flipped classroom compared to the conventional lecture style that was previously thought to be the gold standard. Results in a quasi-experimental study demonstrated improvement in student's knowledge and skills related to patient safety and quality of care competencies compared to the control groups (Kim et al., 2019).

The flipped classroom, experiential learning approach has been especially beneficial to adult learners developing new skills in the medical setting (Betihavas et al., 2016; Hill, 2017). Acquiring clinical skills is routinely taught to nurses on the unit by preceptors, although information overload can hinder learning new tasks. Research shows the importance of creating learning environments that focus on skills that can be repeated with practice and aptitude that can be validated in the flipped classroom (Hannafin & Phillips, 2017). Education in this setting encourages learning in a safe, hands-on, non-clinical environment that allows for reflection and improvement (Hill, 2017).

For example, setting up and understanding the components of a pulmonary artery catheter monitoring system or external-ventricular drain system is fundamental to an ICU nurse working on a specialty unit. The flipped classroom encourages students to connect theory with practice

and explore these skills by facilitating opportunities in class to complete hands-on tasks (Betihavas et al., 2016). This allows the participants to apply their knowledge and exercise tasks like priming arterial lines or rapid infusion devices before they need to perform them on a critically ill patient.

A competent ICU nurse is expected to quickly assemble these hemodynamic transducer systems for potentially decompensating patients. Moreover, ICU nurses must also be able to recognize potential complications with these advanced monitoring systems, identify the cause, and troubleshoot the problem accordingly with confidence and competence. The flipped classroom pedagogy emphasizes strategies such as real life clinical cases that promote advanced skills training that will ultimately translate into improving clinical practice and patient safety in the hospital (Betihavas et al., 2016; Kim et al., 2019; Tan et al., 2015).

Role Playing: Use of Actors in Simulation

Effective clinical simulations can be facilitated in several ways and incorporate the participation of actors to create a more immersive experience. The use of actors has been shown in the literature to be an effective method in conducting simulated learning and teaching critical care concepts. For instance, Nunes de Oliveira et al. (2015) outlined how the use of actors facilitated psychological fidelity and enabled students to have experiential learning. Their research delves into the importance of clinical simulation and how it divides into four phases concerning theory, briefing, simulation, and debriefing. Using actors as simulated patients was an effective strategy in enhancing the learning experience of the participants because it provided a real-life context and active engagement. A critical aspect of this type of simulation training revolves around debriefing. To facilitate an effective debriefing, participants filled out checklists that captured their reflections on whether their experience with the actors (simulated patients)

was meaningful. On a similar note, Moss et al., (2015) also featured this training modality. The participants in their study reflected that these role-play simulations were an effective alternative learning methodology. The authors identified focus groups as an efficacious way to evaluate the value of the activity and provide a qualitative assessment of the approach.

Finally, in an article by Tait et al. (2018), participants noted that the use of actors (simulated patients) fostered knowledge consolidation and learning. Also, given their increased interactivity, participants were able to practice their communication skills and gave them an opportunity for self-observation. The implementation of new methods such as the use of actors as simulated patients engages participants and increases their likelihood of retaining disseminated content.

Escape Room: Team-Based Problem Solving in Simulation

Another innovative method of adult learning is the idea of an escape room. Escape rooms are more commonly known as a leisurely social experience involving a group of friends solving puzzles to “escape” from a room. Escape rooms are highly dynamic and attempt to gamify the learning experience. Recent studies have supported the incorporation of escape rooms into the learning environments. For instance, a study by Brown et al., (2019) found that students involved in an escape room-based simulation involving urosepsis reported improvements in the ability to delegate and work as a team.

Further, they also reported that this style of experiential learning was more engaging than more traditional simulation. Another study by Friedrich et al. (2018) involved 211 students from five medical professions within the hospital who participated in an escape room scenario. The participants reported via the Likert Scale that the activity facilitated teamwork, communication skills, and inter-professionalism, all of which are essential skills in the ICU. With strong support

in the literature, the core concepts of escape rooms can be adapted to each hospital environment, resulting in productive learning for nurses transitioning to ICU practice.

Evaluation of Program: Metrics

Effective training programs can help facilitate the transition of novice nurses to clinical practice in critical care settings. Evaluation of their direct impact on training can be assessed in several ways encompassing organization, staff, and patient outcomes. Provost and Murray (2011) underscored the need for a well-developed evaluation program to determine the efficacy of an intervention and ensure program sustainability. Metric tools must be feasible to evaluate short term and long-term aspects of the program. According to Chant and Westendorf (2019), consistent monitoring of the evaluation process is vital in maintaining the value and sustainability of a program.

At the organizational level, the impact of programs can be quantified by observing the retention rate of nurses within a critical care unit. Training nurses to practice proficiently and confidently has the potential to increase satisfaction and retention during their first year of hire (Eckerson, 2018). Increases in retention rates have been shown to lead to significant financial savings for institutions (Eckerson, 2018; Kram & Wilson, 2016). According to Kram and Wilson (2016), turnover of newly graduate nurses can cost institutions approximately \$856 million with nursing turnover rates ranging from 13% to 75%. Although the focus of this study may be on new graduate nurses, the same principle of turnover cost can be considered to nursing transition programs. At the systems level, the rate of triggering and the reaction of rapid response teams can also be used to measure the effectiveness of these programs (Connell et al., 2016).

In addition to systems-level evaluations, individual self-reported nurse staffing assessment measures are also critical. These include quantitative and qualitative evaluations of

competency and satisfaction. Nursing competency can be defined in terms of patient safety, clinical leadership, and professional development (Chant & Westendorf, 2019). In the literature, professional competency and satisfaction were measured in a variety of ways including surveys and questionnaires conducted on nurses who underwent training (Chant & Westendorf, 2019; Nilsson et al., 2018; De Silva et al., 2015; Baxter & Edvardsson, 2018). The unifying theme consistent in literature is the need for sustaining these evaluation measures and conducting pre and post programs to ensure that organizational objectives are met. These evaluations come in the form of a multiple-choice questionnaire, a post-course objective structured clinical assessment, a post-course short oral exam, and a post-course feedback questionnaire (De Silva et al., 2015). According to Chant and Westendorf (2019), evaluations were integrated throughout the program and conducted at three-, six-, nine-, and twelve-month intervals. Nilsson et al. (2018) also described the value of competency scales by themselves or in addition to other outcome measures. The importance of these instrument is highlighted further when assessing program quality and their impact on self-reported nursing competency outcomes. Assessment of competency and satisfaction among nurses also comes in various modalities, including but not limited to oral exams, pre and post-course feedback questionnaires, and structured clinical evaluation (De Silva et al., 2015). Semi-structured interviews have also been used to evaluate the nurses' perception of their clinical practice (Alastalo et al., 2017). These interviews serve as a guiding tool to create a focused assessment that systematically captures the experience of nurses. This multipronged approach draws attention to aspects and fills gaps within a given program. De Silva et al. (2015) also introduces the concept of facilitated discussions between program instructors and trainees to identify learning goals. These discussions enable adjustment of content and long-term program capacity building from of feedback received. Finally,

incorporating aspects of multi-disciplinary focus groups is a useful assessment of program effectiveness (Adam et al., 2015). The inclusion of various stakeholders, namely, nursing staff, preceptors, and nurse specialists are pivotal throughout a program's evaluation process.

Furthermore, evaluation of program effectiveness would be remiss without evaluation measures of patient outcomes, such as adverse events and length of stay (Connell et al., 2016). For instance, Adams et al. (2015) emphasized the benefits of a nursing training program on unit patient outcomes, and how units with well-trained providers provided better consistent care, as evidenced by fewer central line-associated bloodstream infections and pressure ulcer rates. However, due to the complexity of extraneous variables that can impact patient outcomes, the sole evaluation of patient measures is not enough.

In conclusion, identification of essential factors that showcase a skilled critical care nurse, effective training programs, and assessment of their value provide invaluable insight into nursing transition programs. Despite limitations given in the broad scope of the literature and alternative programs spanning new graduate transition to practice and supplemental training, similar underlying themes undergird these programs. Moving forward, these assessment concepts and formulation of critical care nurse training will be applied to help achieve the overall program aim of evaluating KP's critical care nurse transition program.

The Iowa Model

The Iowa Model has been extensively used over recent years to implement evidence-based practice changes in various organizations. For instance, at a rural health care delivery system, this framework served as a guide in the implementation of a fall risk assessment tool throughout twelve emergency departments (McCarty et al., 2018). Using the Iowa Model, McCarty et al., (2018) outlined the process in which a thorough review of the evidence on fall

risk assessment led to a contextual development of their tool. In doing so, the authors were able to take into consideration organizational philosophy and prioritize the process from beginning to end.

Alternatively, another example was the implementation of a critical pain observation tool at St Joseph's Hospital (Kowal, 2010). The team was confident that any gaps found in practice were not speculations since the project was guided by the Iowa model and was driven by evidence-based practice. Organizational patterns were identified through the application of the Iowa Model, which ultimately facilitated the development of a pain observation tool. In addition, the use of the Iowa Model helped the team streamline the implementation of their pilot program. Throughout the process, this framework also helped the team identify the value proposition of their staffing in ensuring the success of their pilot program. In addition, they were also able to illustrate that the creation of an effective and precise pain-rating tool led to better patient outcomes. Finally, another example of the application of the Iowa Model was described by Robbins et al. (2017) on the implementation of the evidence-based precepting program for burn nurses. This program emerged after the issue of scarcity of transition programs for burn unit nurses was identified. The Iowa Model was integrated throughout the various phases in the program, and interventions implemented by the team, such as role-playing, simulation, and case studies, were meticulously chosen based on a thorough literature review.

Methods

The development of the nurse transition program stemmed from the identification of the need for training more competent and confident ICU nurses. The KP Regional Critical Care training program offered a ten-week intensive training program to prepare nurses prior to working in the ICU. This program has been implemented for the past three years but has not been updated since its inception. Our research group has conducted a thorough literature review to fully understand the skills necessary to become a competent ICU nurse and identify gaps in the training process. In particular, innovative teaching modalities during simulation learning supported by literature remains a priority for the KP Regional Critical Care program and is a current gap. Our project focus was to incorporate current evidence-based simulation recommendations into the existing curriculum. The Iowa Model served as a guiding tool to organize the project's steps to achieve our aims systematically.

Design

The methodology design was a performance improvement project aimed to update the current program with a focus on simulation learning for nurses transitioning to ICU practice and to evaluate its effectiveness using measurable variables.

Sample

The sample for this project would have included experienced nurses in the acute care setting who expressed interest and were selected to participate in KP Regional Critical Care training program to facilitate their transition to critical care. Exclusion criteria are nurses not selected to be a part of the KP Regional Critical Care, Spring 2020 training program. The participants are recruited into the program by the ICU nurse manager and are selected based on experience, skills, and

referral from their current nurse manager. Sample sizes in the previous three cohort training programs ranged from 8-12 participants.

Project Team

The KP Regional Critical Care program includes KP School of Anesthesia doctoral students and educators to facilitate high-fidelity simulation training sessions.

Setting

The primary setting for the KP Regional Critical Care program's didactic education takes place one day per week, for a total of 10 weeks at KP School of Anesthesia, Pasadena, California.

Interventions

Role playing: Use of Actors in Simulation

The DNP project team would have recruited actors to serve as active participants throughout several clinical scenarios. In the allotted time frame, participants will work together as a group to address a clinical scenario featuring the core concepts of the chosen module. The scenario would have consisted of four phases representing the progression of the disease process. Participants are expected to apply concepts learned during the didactic portion of the course and respond appropriately to simulation ahead. The scenario would have been moderated using goals and critical points outlined in Appendix G to ensure that all expectations are met. Feedback via debriefing would have been shared at the end of the session and will include the facilitator, participants, and actors.

Task-Training in a Flipped Classroom

The DNP project team created real-life case scenarios to simulate common tasks and responsibilities that an ICU nurse is expected to perform with competence and confidence. The participants would have engaged in activities that will only be found in the ICU setting, such as

administering numerous vasoactive IV infusions and setting up arterial line and pulmonary artery catheter pressure transducer systems for a critically ill patient. During the simulation, the participants would have been expected to use their critical thinking skills to prioritize multiple tasks, communicate with team members, and identify arterial and central line waveforms. Furthermore, there will be additional problems within the simulation that will prompt the participants to assess, troubleshoot, and identify solutions to various challenges related to equipment and lab tests.

Escape Room: Team-Based Problem Solving in Simulation

Our DNP team would have incorporated ICU concepts into an escape room to facilitate learning in one clinical scenario. Participants would have worked in groups of four or five to solve a series of problems arising in the clinical scenario. The team cannot proceed until the previous problem is solved. Open communication is encouraged, and there will be a twenty-minute time limit per scenario. A moderator will be available to provide guidance if the team requests help. Afterwards, a debriefing will be held at the end of the scenario.

Measures

Program outcomes can be measured by clinical confidence, competence, and staff satisfaction. The operational definition of clinical confidence encompasses perceived feedback from participants after the training. Positive feedback will be represented by a score of four or higher, including “strongly agree” and “agree” responses on the Likert Scale questions. Clinical confidence would have been sectionally assessed in all areas taught throughout the training. Clinical competency can be operationally defined as a quantitative assessment of a provider’s ability to act within their scope of practice as well as think critically and demonstrate sound clinical judgment. Similar to clinical confidence, aggregate survey scores of four or higher,

including “strongly agree” and “agree” on the Likert Scale, will demonstrate adequate clinical competency. These outcome measures were the driving forces that led to the current KP Regional Critical Care.

After the implementation of the revised curriculum and inclusion of additional training modalities, our DNP project would have featured an assessment of several outcome measures. These measures include conducting pre and post-course feedback questionnaires with a five-point Likert scale to determine if the project is effective. To obtain feedback in order to strengthen the face validity of our pre and post-course feedback questionnaires, two focus groups were conducted. Our sample included a total of eight registered nurses who have at least one year of critical care experience. The age range of participants was between 25 and 35 and included both male and female practitioners. The focus groups were split into groups of four and lasted 30 minutes each. To comply with ethical requirements for our focus groups, Kaiser Permanente Southern California and California State University, Fullerton Internal Review Board (IRB) reviewed and approved the study.

Evaluation Plan

The plan for evaluating the training program included pre-test and post-test training surveys. Before the start of the ten-week transition program, an outcome measure would have included participants completing a pre-test survey to assess the extent of their knowledge before the training. Specific questions and details on the pre-test survey will feature a Likert Scale, outlined in the tools found in Appendix C, D, E. Our team created a tool derived from Kirkpatrick's Hierarchy, which has been historically adopted by Best Evidence in Medical Education (BEME) for clinical program evaluations (Stephens et al., 2016). This guideline has been shown to adequately assess clinical education and training of participants. Kirkpatrick's Hierarchy outlines eight factors that facilitate careful analysis of program effectiveness and is extensively covered in the tools we created in Appendix C, D, E, F (Kirkpatrick & Kirkpatrick, 2006). The Rating Scale (RS) surveys will not only assess self-perceived clinical skills of participants but will also feature application of skills assessed using an Objective Structured Clinical Assessment (OSCA). As previously mentioned, to improve face validity of the survey tool, our team hosted two separate focus groups that consisted of four critical care nurses. The participants provided expert feedback for the survey questions to ensure the questions are interpreted with the intended meaning. To analyze data anonymously provided by focus group participants, qualitative thematic analysis was utilized. Descriptive quotations provided by participants will be grouped in themes consistent with their meaning. For instance, descriptors such as "intuitive", "straightforward", "simple" was organized under a unifying theme for analysis.

Throughout the ten-week transition program, our team would have actively participated with KP educators in the training of nurses using didactic and simulation content. Each

participant would have received a post-course feedback questionnaire outlined in Appendix F, and results would have been compared with pre-test survey scores. The pre-test survey would have established baseline data and help quantify the impact of the intervention. Analysis of the pre-course and post-course feedback questionnaires would have determined the effectiveness of the simulation program on the nurse's critical thinking skills. Furthermore, a section would have been included in the post-course feedback questionnaire to suggest improvements to the program for future cohorts.

To promote sustainability, nurses would have been surveyed quarterly for the first year to assess whether the training had an impact on their current practice. To ensure privacy and security of the nurses partaking in the program, all of the collected data would have been stored in encrypted files without identifiers at a secure KP site. The results of the project would have been organized in tables and charts to help us quantify the mean change between pre and post-course feedback questionnaires. Responses to every question would have been analyzed to help identify areas for program improvement. Aggregate data would also have been analyzed using a program called Intellectus, which would assist our team in visually representing descriptive trends within the data sets. See Appendix J for project timeline.

Results

The implementation of this project was impacted by the novel COVID-19 pandemic in 2019 and has resulted in postponement of the KP Regional Critical Care program for the foreseeable future. Originally, simulation days were scheduled to be conducted in June 2020. Since this project involved congregation of groups of people in an enclosed setting, the implementation phase will be conducted later when conditions for group activities are deemed safer. This prevented our team from implementing plans outlined in the methods section with the exception of the focus groups. No alternative methods of implementing the project was feasible and it was deemed a safer decision to perform it in the future.

The KP Regional Critical Care course would have been conducted to implement the aims of this quality improvement project. As a team, we progressed through the project timeline by finalizing all the materials necessary to conduct this course. Customized training plans outlined in Appendix G, H, I reflect critical care core training topics: respiratory distress, hemodynamics, and hyperkalemia/cardiac arrest. The project dissemination would have involved attendance of nurse participants, KP program administrators, KP Anesthesia faculty, and our DNP student team. Each DNP team member would have independently taught one course from the didactic portion as well as the simulation exercise on designated simulation days. Prior to each course, nurse participants would have been asked to fill out a pre-training survey, as well as a post-training survey upon completion of each activity. The results would have been shared with regional KP administration representatives to show effectiveness of the course.

After consulting with the KP Research Team, a retroactive IRB approval was submitted for the focus groups. Since we only performed data abstraction, the feedback from the focus groups on the questionnaire was anonymous, the KP Southern California and California State

University, Fullerton IRB determined that our focus group study presented no more than minimal risk to subjects and was given approval.

Due to social distancing measures, a total of two focus groups were conducted over Zoom, a web-based video conferencing platform. Invitations to participate in these focus groups were sent out to a total of 30 previously practicing ICU nurses and eight individuals were involved in the final discussion. Each focus group consisted of four individuals and each session was conducted over 30 minutes. Final participants received a copy of the survey prior to the Zoom conference. Participants were given five minutes each to individually share their thoughts on the survey and provide any constructive feedback. A collaborative discussion was done at the end, minimal changes were made, and consensus was reached on the final questions included in the surveys outlined in Appendices C, D, E, F. Several phrases that the participants used to describe the surveys include “intuitive,” “can improve on flow,” and “accurately reflects concepts experienced in ICU.” These feedback suggestions were taken into consideration and incorporated into updated current surveys that will be used for the critical care course.

Although we were not able to fully implement our teaching modules on task training, role playing, and escape room, our team was still able to complete materials necessary to conduct the future programs. In addition, although currently in quantitative survey results, future findings would have been analyzed by looking at the pre-training and post-training surveys completed by the participant nurses. These surveys would be tracked and mapped via the same program, Intellectus. A visual representation of the trends within the data sets would have been conducted to quantitatively show results of our intervention in educating nurses transitioning to the ICU.

Discussion

As COVID-19 cases continue to spread worldwide, the healthcare system has been stressed and overwhelmed with limited resources (Hetland et al., 2020). Among the disease affliction, frontline workers such as ICU nurses are in high demand caring for the sickest and most vulnerable patients. During these trying times, ICU nurses must depend on their strong knowledge base and technical skills. Moreover, many hospitals are in need of training experienced nurses emergently to meet the demand of the COVID-19 pandemic (Marks et al., 2020). By using evidence-based teaching methods using the pre-training and post-training questionnaires, we can further educate ICU nurses with this innovative, educational program incorporating task training activities, role playing using actors, and escape rooms. The high demand for ICU trained nurses from all specialties highlights the necessity for adopting optimal strategies to train nurses into the challenging critical care setting.

The attempt to create an immersive environment for the participants would be performed by the use of actors, each given a key designated role in a given scenario (see Appendix G). The clinical role-playing scenario attempts to capture the nuances often found in clinical practice, which encompasses charged emotions from patients, family members, and colleagues. This activity will endeavor to cultivate proper critical response from participants for the given scenario but also teach valuable concepts of interprofessional interaction. The scenario in this case, as featured in Appendix G will focus on respiratory distress and allow participants to assess, monitor, and implement an appropriate intervention for a decompensating patient requiring emergent tracheal airway intubation. By having the scenario divided into phases, participants can get a real-time gauge of how it can play out in practice and the succession of events that typically unfold when similar situations arise in the ICU. The definitive goals

outlined will guide the progression of participants and help instill valuable concepts in the module. Exposure to the didactic, immersive role-playing scenario, and debriefing will all be essential in creating the foundation for the participants and be applied to their future practice.

Role playing and the use of actors have been extensively used in numerous simulation-based learning implementation throughout healthcare. According to Allan (2019), conducting simulations and using them as teaching tools must provide interactive, experiential, and collaborative experience. The use of role playing as described in his article facilitates an authentic experience that helps with suspending disbelief among learners. Suspension of disbelief is pivotal in enhancing learning experience of medical participants but also positively impacts learning of actors themselves (Allan, 2019). This immersive experience of role playing, and the use of actors enables participants to respond, live and be one with the experience (Arrighi et al., 2018). The study performed by Arrighi et al. (2018) involving pharmacy students using role play led to results that reflect how this method of teaching helped meet the learning needs of participants in the project. To further elaborate on the benefits that role playing as a teaching modality presents, is a randomized control trial by Khamali et al. (2018). This study presented results that showed improvement on implementation of methods with the intervention group that participated in role play versus the control group.

Research studies have supported training new skills incorporated within a controlled and simulated environment, which provided superior means for mastering new clinical skills (Barsuk et al., 2015; Wayne et al., 2014). Traditional methodologies that involve sequential learning such as observation, performing a skill, and then teaching it, is not an effective strategy to acquiring new skills, thus potentially causing unnecessary patient harm (Wayne et al., 2014). The goals of task training within the stimulated exercise in Appendix H is to train the student to master tasks

that they will be expected to perform when admitting a critically ill patient to the ICU. Practicing the simulated task training exercises before performing the newly learned skills in actual patient care has demonstrated to be an effective strategy versus traditional didactic education or on the spot learning (Barsuk et al., 2015).

The students will be encouraged to utilize critical thinking skills to anticipate actions and practice completing tasks before being expected to do so for the first time in the ICU on real patients. Effective and quality communication is an essential skill for nurses to comprise in a fast-paced environment involving constant teamwork (Hartin et al., 2016). Accurate, concise, and effective communication in simulation will also enhance patient safety (Barsuk et al., 2015; Hartin et al., 2016). Post-simulation debriefing will also facilitate communication skills among those involved by prompting questions, comments, and suggestions so the students can gain insight and confidence when performing ICU tasks for real patients.

While the benefits of simulation learning are strongly supported, the elements of an escape room are designed to maximize knowledge retention through increased learner engagement. A study by Woodworth (2020) centered around evaluating feedback from nursing students who completed escape room activities related to treating a patient with an acute myocardial infarction. These activities included different puzzles and challenges in which the groups had to work collaboratively to solve. The majority of students (n = 74, 77%) identified that the escape room delivery format made them think about the material in a new way. Additionally, while simulation typically has one target learner per scenario, an escape room simulation is meant to be an exercise to improve one's ability to delegate tasks and work as a team to solve problems. In the same study by Woodworth (2020), 79% (n = 75) agreed or strongly agreed that they were able to collaborate with their teammates to successfully solve the

puzzles. These results reflect upon the student's ability to engage with peers, which is important in the clinical setting.

In our escape room, the team members will be required to independently think critically as well as communicate their ideas in order to solve problems and successfully progress through the scenario. The two operators of the scenario will be there to guide any teams needing help as well as participate as scripted, acting roles during the scenario. There will be a debriefing at the end of the scenario to reflect on the events in the escape room and analyze actions taken by the team. The two operators of the escape room will lead the debriefing using a series of questions. However, the participants will do the majority of the talking. It is important to note that adjustments to the scenarios might be warranted during the first few cycles. A study by Smith and Paul (2020) found that during an escape room of a diabetic ketoacidosis scenario, groups consistently struggled on a few of the mathematical calculations to a point where changes needed to be made. For our escape rooms, we will be assessing for aspects needing alterations if they are a continuing problem.

Limitations

Several limitations have impacted the progress of this project that included a limited time frame allotted for this project, small sample size of the focus groups, and extenuating circumstances involving the global pandemic. This project was designed to be conducted over the course of one and a half year. The proper assessment of current and future unit outcomes would have required an extended time period and would have been unrealistic to conduct within the allotted time frame. Furthermore, previous cohort participants could not be interviewed due to geographic dispersion and limited access. All of these factors impacted our sustainability plan and shifted our project to a more focused approach with teaching and conducting pre-training

and post-training evaluations. In addition, although focus groups were conducted, the sample pool was limited to current KP nurse anesthesia students who previously worked in the ICU. This limitation be a potential source of bias and could have limited the scope of our surveys.

With safety limitations put in place involving COVID-19 and modified training for health care workers, we do not foresee implementation of this project at this time. Despite not being given the opportunity to execute our project design, our team is very confident that our didactic PowerPoint presentations and critical care case scenarios for simulation will create a strong foundation for future participants in the KP Regional Critical Care course.

Conclusion

The ICU is a complex environment requiring advanced training and knowledge to safely care for its patients. For this reason, The KP Regional Critical Care course has been a vital and longstanding program that has supported experienced nurses transitioning to the ICU. Although our team was unable to disseminate our learning modules on task training, role play, and escape room; the benefits of these learning modalities are supported by the literature. Despite limitations set by COVID-19 on our planned methodology, collection of results, and evaluation; our team created substantive learning modules that can be used by future simulation educators. To fully demonstrate the programs' efficacy, a thorough evaluation using our outlined survey tools will be beneficial. In addition, the evidence-based, novel learning modalities reviewed in this paper may further enhance the program's effectiveness and serve as a template for future simulation activities. A quantitative set of results reflecting the improvement in learning among our nurse participants can be a deciding factor on full program dissemination in the future.

References

- Adams, J. M., Alexander, G. A., Chisari R. G., Banister, G., McAuley, M. E., Whitney, K.B., & Erickson, J. I. (2015). Strengthening new graduate nurse residency programs in critical care: Recommendations from nurse residents and organizational stakeholders. *Journal of Continuing Education in Nursing, 46*(1), 41-48. <https://doi.org/10.3928/00220124-20151217-01>
- Alastalo, M., Salminen, L., Lakanmaa, R., & Leino-Kilpi, H. (2017). Seeing beyond monitors- Critical care nurses' multiple skills in patient observation: Descriptive qualitative study. *Intensive Critical Care Nursing, 42*, 80-87. <http://dx.doi.org/10.1016/j.iccn.2017.03.004>
- American Association of Colleges of Nursing. (2013). Nurse residency program. <http://www.aacn.nche.edu/education-resources/nurse-residency-program>
- Barnett, J., Minnick, A., & Norman, L. (2014). A description of U.S. post-graduation nurse residency programs. *Nursing Outlook, 62*(3), 174-184. <https://doi.org/10.1016/j.outlook.2013.12.008>
- Barsuk, J. H., Cohen, E. R., Wayne, D. B., McGaghie, W. C., & Yudkowsky, R. (2018). A comparison of approaches for mastery learning standard setting. *Academic Medicine, 93*(7), 1079. <https://doi.org/10.1097/ACM.0000000000002182>
- Baxter, R., & Edvardsson, D. (2018). Impact of a critical care post graduate certificate course on nurses' self-reported competence and confidence: A quasi-experimental study. *Nurse Education Today, 65*, 156 – 161. <https://doi.org/10.1016/j.nedt.2018.03.004>
- Benner, P. (1984). From novice to expert: Excellence and power in clinical nursing practice. Addison-Wesley.

- Bennett, L. L., Grimsley, A., Grimsley, L. & Rodd, J. (2017). The gap between nursing education and clinical skills. *Association of Black Nursing Faculty Journal*, 28(4), 96-102. <https://www.questia.com/library/journal/1P4-2039834640/the-gap-between-nursing-education-and-clinical-skills>
- Betihavas, V., Bridgman, H., Kornhaber, R., & Cross, M. (2016). The evidence for ‘flipping out’: A systematic review of the flipped classroom in nursing education. *Nurse Education Today*, 38, 15-21. <http://dx.doi.org/10.1016/j.nedt.2015.12.010>
- Boyle, M., Butcher, R., Conyers, V., Kendrick, T., Macnamara, M., & Lang, S. (2008). Transition to intensive care nursing: Establishing a starting point. *Australian Critical Care*, 21(4), 190–199. <https://doi.org/10.1016/j.aucc.2008.06.001>
- Brown, N., Darby, W., & Coronel, H. (2019). An escape room as a simulation teaching strategy. *Clinical Simulation in Nursing*, 30, 1–6. <https://doi.org/10.1016/j.ecns.2019.02.002>
- Chamberlain, D., Pollock, W., & Fulbrook, P. (2018). ACCCN Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal. *Australian Critical Care*, 31(5), 292-302. <https://doi.org/10.1016/j.aucc.2017.08.007>
- Chant, K. J., & Westendorf, D. S. (2019). Nurse residency programs: Key components for sustainability. *Journal for Nurses in Professional Development*, 35(4), 185 – 192. <https://doi.org/10.1097/NND.0000000000000560>
- Connell, C. J., Endacott, R., Jackman, J. A., Kiprillis, N. R., Sparkes, L. M., & Cooper S. J. (2016). The effectiveness of education in the recognition and management of deteriorating patients: A systematic review. *Nurse Education Today*, 44, 133-145. <http://dx.doi.org/10.1016/j.nedt.2016.06.001>

- DeGrande, H., Liu, F., Greene, P., & Stankus, J. A. (2018). Developing professional competence among critical care nurses: An integrative review of literature. *Intensive and Critical Care Nursing*, 49, 65-71. <https://doi.org/10.1016/j.iccn.2018.07.008>
- De Silva, A. P., Stephens, T., Welch, J., Sigera, C., De Alwis, S., Athapattu, P., Dharmagunawardene, D., Olupeliyawa, A., de Abrew, A., Peiris, L., Siriwardana, S., Dip, P. G. Karunathilake, I., Dondorp, A., & Haniffa, R. (2015). Nursing intensive care skills training: A nurse led, short, structured, and practical training program, developed and tested in a resource-limited setting. *Journal of Critical Care*, 30(2), 438.e7-438.e11. <https://doi.org/10.1016/j.jcrc.2014.10.024>
- Eckerson, C. M. (2018). The impact of nurse residency programs in the United States on improving retention and satisfaction of new nurse hires: An evidence based literature review. *Nurse Education Today*, 71, 84-90. <https://doi.org/10.1016/j.nedt.2018.09.003>
- Friedrich, C., Teaford, H., Taubenheim, A., Boland, P., & Sick, B. (2018). Escaping the professional silo: An escape room implemented in an interprofessional education curriculum. *Journal of Interprofessional Care*, 33(5), 573–575. <https://doi.org/10.1080/13561820.2018.1538941>
- Gullick, J., Lin, F., Massey, D., Wilson, L., Greenwood, M., Skylas, K., & Gill, F. J. (2019). Structures, processes and outcomes of specialist critical care nurse education: An integrative review. *Australian Critical Care*, 32(4), 331–345. <https://doi.org/10.1016/j.aucc.2018.09.007>
- Hannafin N.M., & Phillips R. (2017) The flipped classroom applied to the clinical skills lab setting. *Journal of Healthcare Communications*. <https://doi.org/10.4172/2472-1654.100084>

- Hartin, P., Birks, M., Bodak, M., Woods, C., & Hitchins, M. (2017). A debate about the merits of debate in nurse education. *Nurse Education in Practice*, 26, 118-120. <http://dx.doi.org/10.1016/j.nepr.2017.08.005>
- Hetland, B., Lindroth, H., Guttormson, J., & Chlan, L. L. (2020). 2020-The Year that needed the nurse: Considerations for critical care nursing research and practice emerging in the midst of COVID-19. *Heart & Lung*, 49(4), 342-343. <https://doi.org/10.1016/j.hrtlng.2020.04.021>
- Hill, B. (2017). Research into experiential learning in nurse education. *British Journal of Nursing*, 26(16), 932–938. <https://doi.org/10.1016/j.mnl.2020.07.008>
- Innes, T., & Calleja, P. (2018). Transition support for new graduate and novice nurses in critical care settings: An integrative review of the literature. *Nurse Education in Practice*, 30, 62-72. <https://doi.org/10.1016/j.nepr.2018.03.001>
- Joint Commission. (2002). Health care at the crossroads: Strategies for addressing the evolving nursing crisis. https://www.jointcommission.org/assets/1/18/health_care_at_the_crossroads.pdf
- Joint Commission on Accreditation of Healthcare Organizations. (2005). *Health care at the crossroads: Strategies for addressing the evolving nursing crisis*. https://www.jointcommission.org/assets/1/18/health_care_at_the_crossroads.pdf
- Kim, Y., Yoon, Y., Hong, H., & Min, A. (2019). Effects of a patient safety course using a flipped classroom approach among undergraduate nursing students: A quasi-experimental study. *Nurse Education Today*, 79, 180-187. <https://doi.org/10.1016/j.nedt.2019.05.033>
- Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). Concepts, principles, guidelines, and techniques. In, *Evaluating training programs* (17-19). Berrett-Koehler.

- Kowal, C. (2010). Implementing the critical care pain observation tool using the Iowa model. *Journal of the New York State Nurses Association, 41*(1), 4-10.
https://na03.alma.exlibrisgroup.com/view/action/uresolver.do?operation=resolveService&package_service_id=38227976860002901&institutionId=2901&customerId=2900
- Kram S. L., & Wilson, J. (2016). Nurse residency program attracts and retains novice nurses. *Nursing, 46*(2), 15-16. <https://doi.org/10.1097/01.NURSE.0000476245.39588.ff>
- Lakanmaa, R. L., Suoinen, T., Perttila, J., Ritmala-Castren, M., Vahlberg, T., & Leino-Kilpi, H. (2012). Basic competence in intensive and critical care nursing: Development and psychometric testing of a competence scale. *Journal of Clinical Nursing, 23*, 799-810.
<https://doi.org/10.1111/jocn.12057>
- Letourneau, R. M., & Fater, K. H. (2015). Nurse residency programs: An integrative review of the literature. *Nursing Education Perspectives, 36*(2), 96-101. <https://doi.org/10.5480/13-1229>
- Macedo, A., Padilha, K., & Püschel, V. (2019). Professional practices of education/training of nurses in an intensive care unit. *Revista Brasileira de Enfermagem, 72*(2), 321-328.
<https://doi.org/10.1590/0034-7167-2017-0793>
- McCarty, C. A., Woehrle, T. A., Waring, S. C., Taran, A. M., & Kitch, L. A. (2018). Implementation of the MEDFRAT to promote quality care and decrease falls in community hospital emergency rooms. *Journal of Emergency Nursing, 44*(3), 280-286.
<https://doi.org/10.1016/j.jen.2017.10.007>
- McKillop, A., Doughty, L., Atherfold, C., & Shaw, K. (2016). Reaching their potential: Perceived impact of a collaborative academic–clinical partnership programme for early

career nurses in New Zealand. *Nurse Education Today*, 36, 145-151.

<http://dx.doi.org/10.1016/j.nedt.2015.09.005>

Moss, P., Wright, A., Watson, K., & Rue, S. (2015). Role-play simulation in Australian entry level physiotherapy clinical education: A qualitative evaluation involving students, staff, actors, and administrators. *Physiotherapy*, 101, eS833-eS1237.

<https://doi.org/10.1016/j.physio.2015.03.1925>

National Academy of Sciences. (2012). [IOM Report Recommendations] The future of nursing leading change, advancing health. <http://www.iom.edu/Reports/2010/The-Future-of-Nursing-Leading-Change-Advancing-Health/Recommendations.aspx>

Nilsson, J., Engstrom, M., Florin, J., Gardulf, A., & Carlsson, M. (2018). A short version of the nurse professional competence scale for measuring nurses' self-reported competence.

Nurse Education Today, 71, 233-239. <https://doi.org/10.1016/j.nedt.2018.09.028>

Nunes de Oliviera, S., Lenise do Prado, M., Kempfer, S. S., Martini, J. G., Caravaca-Morera, J. A., & Bernardi, M. C. (2015). Experiential learning in nursing consultation education via clinical simulation with actors: Action research. *Nurse Education Today*, 35, 50-54.

<http://dx.doi.org/10.1016/j.nedt.2014.12.016>

Provost, L. P., & Murray, S. K. (2011). Improvement methodology. In *The health care data guide: Learning from data for improvement* (pp. 3-24). Jossey-Bass.

Robbins, J. R., Valdez-Delgado, K. K., Caldwell, N. W., Yoder, L. H., Hayes, E. J., Barba, M. G., Greeley, H. L., Mitchell, C., & Mann-Salinas, E. A. (2017). Implementation and outcomes of an evidence based precepting program for burn nurses. *Burns*, 43(7), 1441-

1448. <https://doi.org/10.1016/j.burns.2017.04.017>

- Short, K., Freedman, K., Matays, J., Rosamilia, M., & Wade, K. (2019). Making the transition: A critical care skills program to support newly hired nurses. *Clinical Nurse Specialist*, 33(3), 123-127. <https://doi.org/10.1097/NUR.0000000000000444>
- Shoulders, B., Follett, C., & Eason, J. (2014). Enhancing critical thinking in clinical practice: Implications for critical and acute care nurses. *Dimensions of Critical Care Nursing*, 33(4), 207-214. <https://doi.org/10.1097/DCC.0000000000000053>
- Smith, V. R., & Paul, P. A. (2020). Escape room: Innovative teaching strategy to stimulate critical thinking/judgment in nursing students. *Nursing Education Perspectives*. <https://doi.org/10.1097/01.NEP.00000000000000700>
- Stephens, T., Pubudu De Silva, A., Beane, A., Welch, J., Sigera, C., De Alwis, S. D., Athapattu, P., Dharmagunawardene, D., Peiris, L., Siriwardana, S., Abeynayaka, A., Jayasinghe, K. S. A., Mahipala, P. G., Dondorp, A., & Haniffa, R. (2016). Capacity building for critical care training delivery: Development and evaluation of the network for improving critical care skills training (NICST) programme in Sri Lanka. *Intensive and Critical Care Nursing*, 39, 28-36. <http://dx.doi.org/10.1016/j.iccn.2016.08.008>
- Tait, L., Lee, K., Rasiah, R., Cooper, J. M., Ling, T., Geelan, B., & Bindoff, I. (2018). Simulation and feedback in health education: A mixed methods study comparing three simulation modalities. *Pharmacy*, 41(6), 1-13. <https://doi.org/10.3390/pharmacy6020041>
- Tan, C., Yue, W. G., & Fu, Y. (2017). Effectiveness of flipped classrooms in nursing education: Systematic review and meta-analysis. *Chinese Nursing Research*, 4(4), 192-200. <https://doi.org/10.1111/1742-6723.12454>
- Wayne, D., Cohen, E., Singer, B., Moazed, F., Barsuk, J., Lyons, E., Butter, J., & McGaghie, W. (2014). Progress toward improving medical school graduates' skills via a "Boot Camp"

curriculum, simulation in healthcare. *Journal of the Society for Simulation in Healthcare*.
9(1), 33-39. <https://doi.org/10.1097/SIH.0000000000000001>

Woodworth, J. A. (2020). Escape room teaching pedagogy in the didactic learning environment
for nursing. *Nurse Educator*, 46(1), 39-42.
<https://doi.org/10.1097/NNE.00000000000000847>

APPENDIX A

Initial Literature Search Strategy

Categories	Search Terms	Google Scholar	PubMed	CINAHL
Critical Care Training	Nurse Transitioning to Critical Care	47,400	743	40
	Critical Care Nurse Training Programs	16,800	4,984	8
	Critical Care Nurse Residency Program	16,900	147	17
	Flipped classroom and nurse education	23,300	45	43
	Actors and Clinical Simulation	3,864	219	14
	Simulation Escape Room	17,500	45	0

APPENDIX B

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

IOWA MODEL: TRANSITION TO ICU NURSING PRACTICE	
Issue: Organizational Initiative for Improvement Implement Innovative Teaching Methods	<u>Step 1:</u>
Purpose: Update current Nurse Transition Program curriculum to reflect evidence-based practice.	<u>Step 2:</u>
Is this a priority? Yes Project has the potential to improve patient care and improve nurse competency, retention rates, staff satisfaction.	<u>Step 3:</u>
Form a team: KPSA DNP students, KPSA Faculty, CSUF Faculty, KP Nurse Education Specialists	<u>Step 4:</u>
Assemble, Appraise, and Synthesize Evidence Conduct literature review of innovative teaching methods for adult learners.	<u>Step 5:</u>
Sufficient Evidence on innovative teaching methods? Yes.	<u>Step 6:</u>
Design and Pilot the Practice Change: KPSA DNP students will make modifications to current curriculum and update education methods supported by the literature. KPSA team members will be adequately prepared to engage participants and implement education methods. Create evaluation plan to assess effectiveness of program.	<u>Step 7:</u>
Change appropriate for adoption? Ease of implementation. Interventions will be evaluated for feasibility and adoption into practice.	<u>Step 8:</u>
Integrate and Sustain the Practice Change: To ensure sustainability, participant knowledge will be routinely evaluated quarterly intervals. In addition, outcome measures will be trended.	<u>Step 9:</u>
Dissemination of Results: Present to KP administration education department.	<u>Step 10:</u>

APPENDIX C

Pre-Training Survey: Knowledge Perception, Respiratory

Evaluation Statement	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I feel confident in my ability to properly size an oropharyngeal airway.	1	2	3	4	5
2. I feel confident in my ability to properly place an oropharyngeal airway.	1	2	3	4	5
3. I feel confident in my ability to properly size a nasopharyngeal airway.	1	2	3	4	5
4. I feel confident in my ability to properly place a nasopharyngeal airway.	1	2	3	4	5
5. I feel confident interpreting arterial blood gas results.	1	2	3	4	5
6. I feel confident identifying signs and symptoms of respiratory distress.	1	2	3	4	5
7. I feel confident interpreting and troubleshooting a ventilator alarm.	1	2	3	4	5
8. I feel confident in my ability to suction an intubated patient.	1	2	3	4	5
9. I know the differences between various oxygen delivery devices (simple mask, nasal cannula, venturi mask, non-rebreather).	1	2	3	4	5
10. I feel confident in managing patients on different ventilator modes (SIMV, VCV, PCV, pressure support)	1	2	3	4	5

APPENDIX D

Pre-Training Survey: Knowledge Perception, Hemodynamics

Evaluation Statement	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I feel confident about indications for placement of advanced hemodynamic monitors (Arterial lines, Central Venous Pressure (CVP))	1	2	3	4	5
2. I feel confident in my ability to set up Arterial Lines and CVP	1	2	3	4	5
3. I feel confident in my ability to treat hypotension.	1	2	3	4	5
4. I understand the rationale related to the square wave test.	1	2	3	4	5
5. I understand the concepts related to arterial waveforms such as underdamped, and overdamped.	1	2	3	4	5
6. I know proper anatomic placement of an arterial line and CVP transducer.	1	2	3	4	5
7. I feel comfortable zeroing an arterial line transducer.	1	2	3	4	5
8. I feel confident in interpreting the a, c, and v wave on a CVP waveform.	1	2	3	4	5
9. I feel confident troubleshooting hemodynamic monitors (Arterial lines, CVP) if not reading properly.	1	2	3	4	5
10. I feel confident assessing for site complications related to arterial lines and CVP (redness at site, hematoma).	1	2	3	4	5

APPENDIX E

Pre-Training Survey: Knowledge Perception, Cardiac Arrest/Hyperkalemia

Evaluation Statement	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I understand potassium's main role in the body.	1	2	3	4	5
2. I know how potassium affects the action potential.	1	2	3	4	5
3. I know signs and symptoms of hyperkalemia.	1	2	3	4	5
4. I understand potential causes of hyperkalemia.	1	2	3	4	5
5. I feel confident recognizing EKG changes caused by hyperkalemia (T wave, QRS, ST changes).	1	2	3	4	5
6. I know the pharmacologic treatment for patients with mild hyperkalemia.	1	2	3	4	5
7. I know the pharmacologic treatment for patients with moderate to severe hyperkalemia.	1	2	3	4	5
8. I feel confident in knowing what steps to take when a patient becomes unresponsive.	1	2	3	4	5
9. I feel confident in my ability to identify and treat shockable rhythms.	1	2	3	4	5
10. I feel confident treating hyperkalemia in a cardiac arrest.	1	2	3	4	5

APPENDIX F

Post-Training Survey: Satisfaction

Evaluation Statement	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I found the content relevant to my ICU practice	1	2	3	4	5
2. The instructors were qualified to teach the content	1	2	3	4	5
3. I feel that effective methods were used for teaching content and skills application	1	2	3	4	5
4. I had adequate opportunity for hands-on experience	1	2	3	4	5
5. The program was well-organized	1	2	3	4	5
7. The allotted simulation time was adequate for my learning.	1	2	3	4	5
8. The learning environment fostered critical thinking	1	2	3	4	5
9. What aspects of the program were most helpful to enhance your learning?					
10. What recommendations do you have to improve the program?					

APPENDIX G

Respiratory Failure Scenario/Role Playing Use of Actors

Preparation for Simulation

- Orientation to Actor
 - Use of patient monitor
 - Team Roles and placement
- A safe and supportive learning environment where mistakes are acceptable, and no one fails
- Maintain professional behavior and respect for your co-workers
- Encourage students to get into” and think out loud
- Cannot just say what you are doing--you actually have to do it
- Work as a team and talk with each other
- Maintain confidentiality. What happens in Sim, stays in Sim.
- Most valuable lessons will be learned if you can suspend disbelief and become fully immersed
- Participate in debriefing

Scenario Overview

- Target group: ICU Nursing
- Focus: Respiratory Failure
- Setting: Patient Room
- Simulation Activity: 20 min
- Debriefing Time:10 min

Room Prep

- Patient room with:
 - Basic Monitor
- Accessory/Equipment Checklist
 - Stethoscope
 - Arm band
 - Nasal Cannula, Non- rebreather, Ventilator
 - Crash cart
 - CXR board

Scenario and Flow

Patient admitted to the hospital for a recent fall with reported loss of consciousness. Family reports patient having flu like symptoms with positive productive cough a week prior and after screening, tests positive for COVID. With recent changes in mentation and mild increase in respiratory demand, patient has been put on 4LNC and recently transferred to the ICU for further monitoring. Patient arrived an hour prior your shift and night nurse has not been able to conduct a full assessment of the patient. Currently lying lateral and only responds to moderate stimulation. You have been told by your unit that all providers must wear N95 masks or PAPRs when providing patient care regardless of role.

CXR: No Orders

PMH

Asthma (w/ exertion)

Diabetes Type 2 (HgbA1C: 7% 1 month ago)

Smoker: 10 pack years. Stopped 2 months ago

PSH: Tonsillectomy (8 years ago)

Monitoring: Standard

VS: HR: 93, RR: 17 BP 125/87 Temp 98.6

Hgb: 9 HCT: 31% Platelet: 200

Na: 138 K: 4.5 Cr: 1.0 Bun: 15

Last name: Cabrera	First name: April	Diagnosis: Respiratory Distress			MRN: 123244343
Gender: Female	DOB: 12/23/53	Ht: 50 in.	Wt: 65 kg	Code Status: Unknown	Provider: Dr. DIVOC

Flow of Scenario

Progression

Total # of actors (Four): Pt, Physician, RT, Family member

Phase 1: Initial Assessment (nonresponsive → Agitation)

- Actor lying in lateral position and appears detached. Eyes closed baseline and only opens and makes eye contact when touched.
- Actor will start coughing (lasting 3 min) and now appears to have increased work of breathing as saturation drop from 98% down to 96%
- VS: HR: 110, RR: 20 BP 130/80
- Lung sounds: coarse/Wheezing

Goals:

- Conduct a full respiratory assessment
- Pt repositioning to sit up to aid with better ventilation.
- Recommend perhaps giving an albuterol treatment. With COVID this can be potentially aerosolizing. (use N95)
- Ensure proper PPE is worn

Phase 2 (Agitation → Lethargy)

- Actor coughing stops and has now closed their eyes.
- VS: HR: 80 RR: 13 SPO2: 87% BP: 100/75
- New MD taking over the shift will ask nurse, How is the patient doing? why saturations are low.
 - o MD screams “this is unacceptable”, “grab the crash cart and get RT here now we gotta tube this patient”

Goals

- Put Nonrebreather mask on patient (100% O2)
- Consider getting CXR, ABG

- Inform Team (Involve RT)
- Nurse will do SBAR to MD
- Maintain good communication with Team Members
- Grabs intubation cart and Preps intubation supplies

Phase 3: (Intubation)

- Before intubating: Doc asks RN (what's the pt's potassium?)
- MD tells RN (participant) to grab succinylcholine and propofol to intubate
- Note MD (wearing a mask but takes it off because uncomfortable (what do you do?))
- Has a hard time intubating – asks nurse for an Nasotracheal for ventilation (Should use an Oral Airway)
- Intubates and RT connects PT to ventilator
- Both MD and RT leave after hooking patient up to the vent. MD says “Make sure to check that its working and pt ventilating” - MD and RT both run outside since another pt across the hall needs to be intubated.
- VS: HR: 100 RR: 17 SpO2: 97% BP: 140/90

Goals:

- Have nurse speak out about MD not wearing N95 (team communication)
- Since pt had a fall with loss of consciousness, pt could have had potential skull fracture that we don't know about, better to do oral
- Nurse should conduct full assessment (CV, Respiratory): Auscultate to verify adequate ventilation
- Recommend CXR to confirm Tube placement

Phase 4 (Post Intubation)

- 20 min later
- CXR team appears and stimulates pt with board
- Patient wakes up and attempts to pull tube out, coughing resumes
- Currently no IV sedation on board. Vent starts alarming peak pressures
- MD orders a propofol drip for now to allow for better control of ventilation
- Family member comes crying and asking what happened?

Goals

- Application of restraints
- Realize you need sedation of patient.
- Need suctioning
- Console Family member and provide support

Debriefing:

- What are you feeling after this simulation?
- How did you feel when...?
- What were your strengths?

- What were your primary concerns in this scenario? What do you think was going on with the patient?
- What are the signs and symptoms the patient was exhibiting?
- Is there anything you would do differently next time?
- Let's identify a few take-home points that you will take away from this scenario and apply to your future practice.

APPENDIX H

Simulation: Hemodynamics Task Training

Facilitator role 1: Encourage/guide the students, control iPad simulator for VS display

Facilitator role 2: Patient

Facilitator role 3: ICU provider

Scenario: Mrs. Betty White, 72 year old female admitted from clinic to the Cardiology ICU secondary to chest palpitations, SOB, lethargy, no appetite, 10 kg weight gain over last two months, and venous stasis in bilateral legs. She wakes up in the middle of the night to catch her breath despite sleeping on three pillows. Her breathing is labored and feels dizzy.

PMH: Asthma, anxiety, depression, hyperlipidemia, HTN, MI 10 years ago in which she had a coronary artery bypass surgery. Height 5'7, weight 94 kg.

Medications: albuterol, losartan, rosuvastatin, citalopram

Part 1

Baseline VS: HR 145, BP 90/48, RR 30, SpO2 90% on RA. Pain 0/10. One IV is placed.

Part 1 desired student actions:

Place patient on O2 either NC or simple facemask

Listen to breath sounds and heart tones

- Lung sounds are diminished, and heart rate is irregular.

What labs do they anticipate being ordered? Have student gather color tubes corresponding for each test.

- ABG, CBC, BMP, Troponin, BNP

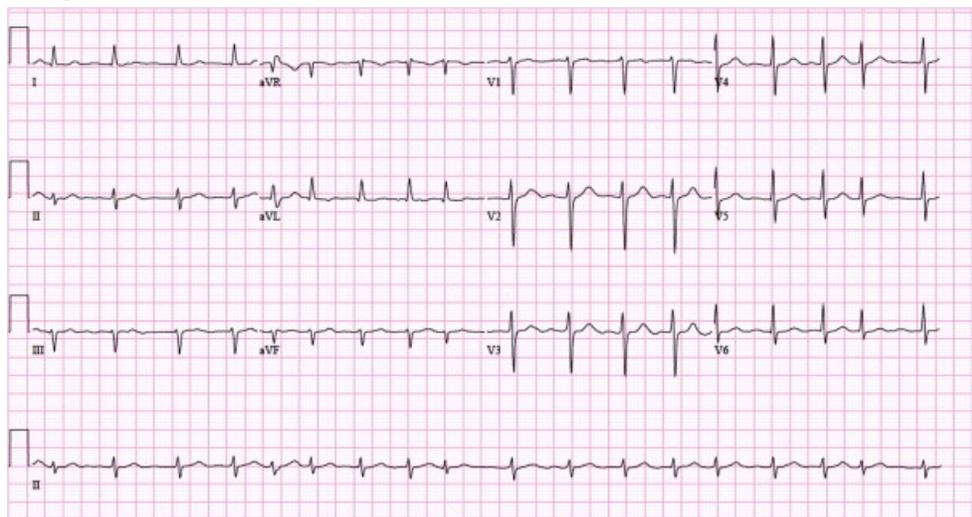
What diagnostic tests would they anticipate being ordered?

- CXR, EKG, echocardiogram

Part 2

VS: HR 138, BP 85/42, RR 24, SpO2 97% on 6L O2.

EKG:



Part 2 desired student actions:

Student will determine rhythm on EKG (*Answer: Atrial fibrillation with RVR*)

- call the provider using SBAR
- The provider states he is ordering an Amiodarone infusion 150mg IV loading dose over 10 minutes, then maintenance infusion 1 mg/min for 6hrs.

The student will set up and program Amiodarone on infusion pump, placing air filter as well on line as well. (*On Alaris pumps, there is a feature that they need to be familiar with that will auto set a bolus and then infusion rate*).

Ask student what other medication did the provider forget to order?

- (*Answer: Heparin infusion for atrial fibrillation, possible clot formation since it is unknown how long patient has been in rhythm*). Provider will order Heparin infusion 20u/kg/hr, check PTT is 6 hrs.

Part 3

VS: HR 114, BP 72/38, RR 22, SpO2 96% on 6L O2.

Ask students what is a SE of Amiodarone? Answer: Hypotension

CXR results: “bilateral pleural effusions, cardiomegaly”

Part 3 desired student actions:

Student will call provider using SBAR regarding hypotension and CXR results.

- The provider will request an arterial line to be set up, Lasix infusion at 10 mg/hr for diuresis of fluids from lungs, place a Foley, and start a Vasopressin infusion started at 0.02 units/min. Student should delegate part of these tasks.

Student will need to grab all the arterial line set up supplies:

- 500ml or 1000ml pressure bag, 500ml or 1000ml normal saline, transducer plate, transducer kit w/ or w/o vamp, cable to go from transducer to monitor.

Proper de-airing of NS, prime all ports, level at phlebostatic axis, and zero arterial line
Performs square wave test

Student programs Vasopressin and Lasix infusions on pump appropriately

Part 4

VS: HR 105, BP 88/55, RR 20, SpO2 97% on 6L O2.

Echocardiogram done at bedside. Results: EF 20%, right atrial pressure 24, PAWP 29, mitral regurgitation and a hypertrophic left atrium and ventricle.

Part 4 desired student actions:

Interprets echo results of high preload pressures, heart is not adequately ejecting volume with a low EF and increased left sided filling pressures due to regurgitant valve.

- Provider orders a Dobutamine infusion at 2 mcg/kg/min and a pulmonary artery catheter set up so the patients cardiac hemodynamics are monitored.

Student will need to grab all the central venous catheter transducer line set up supplies:

- 500ml or 1000ml pressure bag, 500ml or 1000ml normal saline, transducer kit w/ 2 ports and 2 cables for CVP and PAP. Wear mask w/ shield during any central line insertions.

Proper priming all ports, leveling at phlebostatic axis, and zeroing of pulmonary artery and CVP line

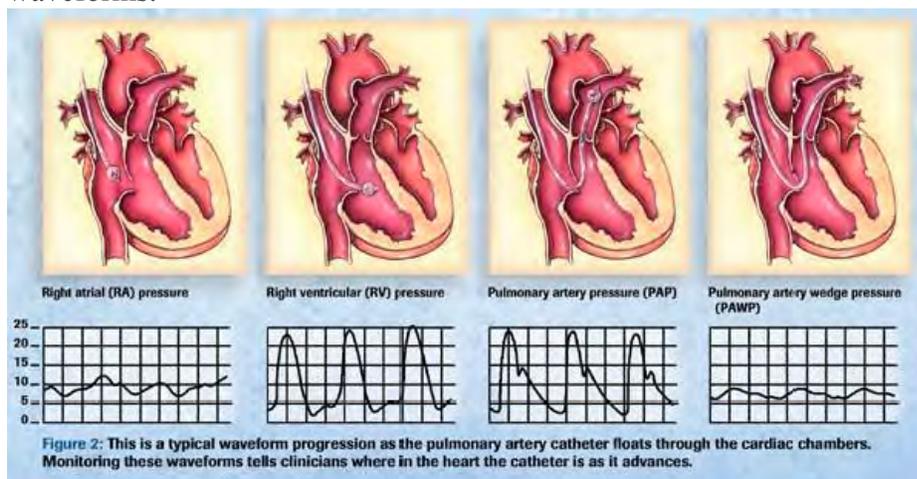
Student programs Dobutamine infusion on pump appropriately

Student will need set up an IV manifold with a NS driver for the 4 medications to infuse in the patient.

Part 5

VS: HR 98, BP 94/59, RR 18, SpO2 98% on 6L O2.

Pictures of the 4 waveforms below will be held up on patient monitor so students will correctly identify location in the heart that the PA catheter is being advanced through based on different waveforms.



Now that the pulmonary artery catheter is placed by the provider, ask student how to calibrate Edwards monitor so that they can obtain accurate CO/CI/SvO2 hemodynamic monitoring. (Answer: draw a mixed venous from the PA-yellow port)

Part 5 desired student actions:

Student correctly identifies PA catheter depth

Student correctly identifies that the balloon port is deflated

Student chooses correct syringe and correct port to draw a mixed venous sample

Student correctly identifies CVP and PAP form tracings on monitor for accuracy

Debriefing points

- Student questions
- Decision making process and prioritizing when multiple tasks are at hand
- Multiple vasoactive medication titration is impacted by variation in medication compatibilities, drivers with manifolds, IVPB lines. Important to know which ports can be utilized to prevent accidental bolus of vasoactive medications.
- Delegate tasks to others
- Task training activities completed: Amiodarone bolus/infusion, arterial line transducer set up, central venous access transducer set up, Vasopressin/Lasix/Dobutamine/programming to Alaris pump, IV manifold set up, draw mixed venous lab sample.

APPENDIX I

Hyperkalemia/Cardiac Arrest Escape Room

Preparation for Simulation

- Orientation to manikin
 - Room set up-phone is “live” if in sim lab
 - Use of patient monitor
 - What manikin can do-- head to toe
 - How to locate pulses, lung, and heart sounds
 - How to obtain a BP
 - Drug delivery, IV simulation, disposal of vials
 - Crash Cart
 - Backboard
 - How to use AED
 - Review of drawer contents
 - Documentation forms
 - Team Roles and placement
- A safe and supportive learning environment where mistakes are acceptable and no one fails
- Maintain professional behavior and respect for your co-workers
- Encourage students to get into “it” and think out loud
- Cannot just say what you are doing. you actually have to do it
- Work as a team and talk with each other
- Maintain confidentiality. What happens in Sim, stays in Sim.
- Most valuable lessons will be learned if you can suspend disbelief and become fully immersed
- Participate in debriefing

Scenario Overview

- Target Group: ICU Nursing
- Focus: Hyperkalemia leading to cardiac arrest
- Setting: Patient Room
- Simulation Activity: 20 minutes
- Debriefing time: 10 minutes

Room Prep

- Patient room with
 - Appropriate manikin for scenario in patient gown
 - Basic monitor
 - Patient on ventilator
 - Precedex gtt
- Accessory/ Equipment Check List
 - Stethoscope

- Arm band
- Two IV's in place
- IV fluids – MIVF - D5NS w/ 20mEqK+ @100ml/hr
- IV pump
- Oxygen
- Ambu bag
- Patient monitor (make sure to turn QRS beep off)
- Crash cart
- Phone to reach “resident” – use second operator
- Report sheet from

Scenario and flow

Room is locked with letter combination to escape the room. Code is “D-N-R”

Operator knowledge: June Smith 67 y/o F, hx of ESRD last dialyzed three days ago (normally dialysis 3x/week). Presents from nursing home with ischemic stroke outside of TPA window. Intubated in the field for GCS of 6. BP 135/78, HR 84, RR 14 on ventilator. SpO2 98% on FiO2 0.4.

Last name: Smith	First name: June	Diagnosis: Hyperkalemia secondary to Chronic Renal		MRN: PCS5718	
Gender: Female	DOB: 12/23/53	Ht: 64 in.	Wt: 79.8 kg	Code Status: Unknown	Provider: Dr. Sim

Incomplete report given to escape room team at 0700 from overnight nurse: “67 y/o F, just rolled up at 0645 from ED and settled. Pt had stroke and was intubated for GCS of 6. She’s outside the window for TPA. Admit stuff done. Patient is not Kaiser patient, can’t get her records. I didn’t have time to do a full assessment. We have her on a Precedex gtt at 0.4 mcg/kg/hr, also on some maintenance fluid. She’s got two IV’s. I just sent some labs. We got a foley placed, but there was no urine. Anyway, sorry, I have to get out of here. I have a flight to Barbados. 8 days off, woo! Bye!”

Flow of scenario:

- Group identifies tall, peaked T waves with wide QRS on EKG.
- Nurse left report sheet- Written on sheet - MIVF D5NS w20k at 100ml/hr. Precedex gtt. CT negative for bleed. Zero urine output.
- Lab calls - labs that were sent are clotted.
- Team member calls resident - let him/her know about t waves/QRS and clotted labs
 - 5 beat run of V-tach while on phone
- Orders 12 lead, stat labs - CMP, ABG
 - 12 lead reveals peaked T waves with QRS of 0.15ms
- Have son/daughter call to figure out she has ESRD. “Hi, this is Chris Smith. I’m calling for my mom June. The nursing home called and let me know she went to the hospital for

- a stroke. How is she doing? Did you guys get her medical records ok? I know she's not a Kaiser patient. She gets dialysis three times a week and was dialyzed three days ago."
- ABG reveals acidosis – pH 7.25, CO₂ 41, HCO₃ 18, paO₂ 83
 - Pt goes into pulseless V Tach
 - o Code blue called, resident comes into room
 - Team proceeds to run ACLS
 - o 2 rounds of CPR all the way – shock → 2 minutes CPR
 - Resident asks team about H's and T's
 - Asks if anyone has reference for hyperkalemia treatment
 - o IV calcium gluconate, IV insulin, IV dextrose → shock → epinephrine, bicarb → shock → CPR 2 minutes, pulse check - regular rhythm with thready pulse
 - o Reference ACLS card if team is struggling. Make sure they mention post-cardiac arrest care.
 - Resident – “we need to dialyze her. Do you think CRRT or dialysis for this patient?”
 - o Trivia to see if team understands that CRRT minimizes fluid shifts for sensitive patients who cannot tolerate dialysis.
 - Labs calls with critical – K 6.6
 - Family member calls back – “Hi, this is Chris Smith, one more thing. She has a medical directive, it says something like D-M-R? Oh, D-N-R!”
 - DNR is code to escape room.

Debriefing

- What are you feeling after this simulation?
- How did you feel when...?
- What were your strengths?
- What were your primary concerns in this scenario? What do you think was going on with the patient?
- What are the signs and symptoms the patient was exhibiting?
- Is there anything you would do differently next time?
- Let's identify a few take-home points that you will take away from this scenario and apply to your future practice.

APPENDIX J

Project Timeline

<i>Proposed Date:</i>	<i>Tasks:</i>
November 2019	Team meeting with key stakeholders Initial development of pre and post-course feedback questionnaires
December 2019	Complete initial project proposal
January – February 2020	Focus groups Finalize pre and post-training feedback questionnaires
March 2020	Finalize didactic and simulation scenarios for 2020 KP Regional Critical Care Program
April 2020 – July 2020	KP Regional Critical Care Program begins Implement Updated Curriculum Conduct pre and post-training questionnaires
August 2020 – October 2020	Data analysis
October 2020	First Quarter Check in with nurses-sustainability
November 2020 – December 2020	Finalize Paper and Presentation
January 2021	Second Quarter Check in with nurses-sustainability
April 2021	Third Quarter Check in with nurses-sustainability