Spring 5-21-2021

Implementing In-Situ Mini Mock Code Trainings for Medical-Surgical Nurses to Improve Nurse Readiness and Self-Confidence during a Code Blue

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Abstract

Immediate, high-quality cardiopulmonary resuscitation (CPR) and early defibrillation are important in increasing survival rates during a cardiac arrest. At the Medical Center, which is part of integrated healthcare system in a metropolitan area of the San Francisco Bay Area, a quality improvement project was implemented to increase readiness and self-confidence of medical-surgical nurses during a code blue situation. Nurse participants completed a pre- and post-intervention survey containing questions about their self-confidence in performing different skills relevant to a code blue, scored on a 5-point Likert scale from Strongly Disagree (1) to Strongly Agree (5). The intervention included an in-service mini mock code training for nursing staff, where they were presented with a code blue scenario and received hands-on practice with their unit's crash cart equipment. 81.8% of nurses who participated in the intervention and took the post-intervention survey believed they felt confident and prepared for a code blue scenario, increasing 20.7% from the pre-intervention survey. The average response relating to general preparedness for a code blue also improved from 3.6 to 4.1, displaying a 10% increase in overall average confidence of skills if a code blue were to occur on the unit. Additional in-hospital mock code trainings, compared to lack of additional training to the out-of-hospital Basic Life Support certification that occurs every 2 years, is necessary for individuals to maintain knowledge of their CPR skills and feel confident in performing these skills during a code blue.

Keywords: nurse, mock code, CPR, medical-surgical

Introduction

The American Heart Association (AHA) emphasizes the importance of immediate, high-quality cardiopulmonary resuscitation (CPR) and early defibrillation in order to increase survival rates after a cardiac arrest. High quality CPR includes minimized interruptions in chest compressions, compressions of adequate rate and depth, proper hand placement, and avoidance of excessive ventilation (American Heart Association, 2021). For every minute that the initiation of CPR is delayed, the survival rate decreases by 7-10% (Herbers & Heaser, 2016).

Healthcare workers, including all nursing staff, are required to complete Basic Life Support (BLS) for Healthcare Providers certification by the American Heart Association. BLS certification renewal is completed every two years. However, skills from BLS certification trainings can deteriorate as quickly as two weeks, with significant reduction in BLS skills by six months of the initial training (Herbers & Heaser, 2016). This issue is more even prevalent among acute care, medical-surgical nurses because they experience a code blue situation less frequently than nurses working on critical care units. Additionally, lack of self-confidence in code blue skills can act as a barrier to performing high-quality CPR and safe use of the automated external defibrillator (AED) (Morton, Powers, Jordan, & Hatley, 2019).

In a not-for-profit, integrated healthcare system with over 200 licensed beds located in a metropolitan area of the San Francisco Bay Area, which will be referred to as the Medical Center for the purposes of this paper, a group of 6 Clinical Nurse Leader (CNL) students conducted a quality improvement project among four medical-surgical units at this hospital. The goal of this project was to increase nurse readiness and self-confidence relating to code blue scenarios, thereby improving patient outcomes and survival rates. A pre- and post-intervention survey was distributed to the nursing staff on the medical-surgical units of the Medical Center to assess the

learning needs and the effectiveness of the intervention. The intervention consisted of a unit-based in-service educational training, providing BLS skill refresher and an interactive mini mock-code scenario that included hands-on practice with crash cart equipment.

Problem Description

At the Medical Center, the emergency cardiac arrest response team (eCART) was implemented in July 2018, which initially significantly decreased the number of cardio-pulmonary arrests (CPA) on acute care, medical-surgical units (Quality Improvement Coordinator, 2020). While an interdisciplinary team mock code is performed across the Medical Center campus-wide on a quarterly basis, only medical-surgical nursing staff working on that day and on the chosen unit for the mock code have the opportunity to participate in this training (Nurse Educator, 2021).

During the calendar year of 2020 at the Medical Center, there were a total of 117 true code blue activations, where a true code blue is defined as a CPA. Of these true code blue activations, 19% of them occurred on acute care, medical-surgical units. This is a significant increase from the previous year of 2019, where only 14% of the true code blues took place on medical-surgical units. Additionally, the survival rate to discharge for CPA patients is 3.45% lower at the Medical Center compared to their custom peer review group containing 99 other hospital systems in the country (Quality Improvement Coordinator, 2020). Other metrics tracked for all true code blue activations at the Medical Center is displayed in Appendix A.

According to the Quality Improvement Coordinator at the Medical Center, “code blue data is analyzed daily and any deviation in care or concerns are escalated up to nursing leaders or risk manager to follow up for any needed actions, such as re-education, investigation, or root cause analysis” (2021). The increase of true code blue activation during the past calendar year

prompted for stakeholders, including nurse educators, nurse managers, charge nurses, and nursing staff, at the Medical Center to assess the need for continuing education plans relating to code blue scenarios. In more recent code blue debriefing and feedback from the code team and medical-surgical units, there were a few different events where the medical-surgical nurse "froze" during the recognition of a code blue, defibrillation pads were not placed correctly, and the nurses on the unit did not remember how to or feel comfortable to operate the Zoll defibrillator before the code team arrived (Nurse Educator, 2021).

With the recent increase in true code blue activations, it is important that medical-surgical nurses are familiar and comfortable with the equipment on their unit if a code blue occurs. Code blues are generally an unpredictable event and can commonly increase panic and stress, especially if the staff member has not performed CPR or renewed their BLS certification recently. With the rate at which BLS skills can deteriorate if not frequently used, continuing education is vital for quick recognition to call a code, perform high-quality CPR, and initiate early defibrillation before the code team arrives to improve patient survival rates.

Review of Literature

A comprehensive literature review was conducted to determine the best practices for continuing education to increase nurses' knowledge and preparedness for code blue situations and improve patient outcomes. The PICOT question used for reviewing current literature and synthesizing evidence on code blue education was as follows: For medical-surgical nurses at a not-for-profit hospital (P), how does mock code trainings on medical-surgical units (I) compared to lack of additional code blue training (C) affect nurse readiness and confidence for a code blue (O)? A search of the CIHNAL and PubMed databases was performed using key words including "nurs*", "code blue", "mock code", "simulation", "education", and "patient outcomes".

In a quasi-experimental pilot study conducted by Morton et al. (2019), a high-fidelity simulation training was conducted to determine its effectiveness on medical-surgical nurses' mock code performance and self-confidence. Nurses played an active role in two high-fidelity mock codes and were evaluated on their skills and self-confidence after each mock code. Self-confidence scores, which was measured using the National League for Nursing Student Satisfaction and Confidence in Learning instrument, significantly improved between the pre- and post-test. The mean time to defibrillation also significantly improved (Morton et al., 2019). This experiment conveys how additional training can improve both performance and skill confidence during codes.

A published study by Crowe, Ewart, and Derman (2018) focused on using the adult learning theory to develop a simulation-based education to improve nursing confidence, knowledge, and patient outcomes during a code. Nurses attended a simulation training in a high-fidelity simulation center, receiving an hour-long didactic lecture before actively role playing in a scenario with progressive patient deterioration. Hicks' "Clinical Decision-Making Self-Confidence Scale" was used before and after the intervention to measure nurses' confidence when caring for a deteriorating patient. Confidence and knowledge levels improved immediately after then training and were sustained at three-month follow up after the training (Crowe et al., 2018). This study exemplifies that simulation training can have both immediate and lasting effects on code blue knowledge and confidence of nurses.

In another study by Herbers and Heaser (2016), an in situ mock code simulation was developed for two years on two different progressive care units to increase nurses' confidence and improve patient outcomes during code blues. The implementation of the mock codes was successful in significantly improving nurses' confidence during codes, when evaluated by survey

within two weeks after mock code participation. Response time to assess and call a code in addition to the timing of the initial defibrillation significantly improved. This study emphasized how in situ simulation training is beneficial because the training takes place in a realistic environment where the nurses can practice with the resources on their unit (Herbers & Heaser, 2016). This implementation design allows nurses to be familiar and comfortable with the availability, location, and functionality of the specific equipment used for a code in their hospital setting.

Rationale

The conceptual framework used to implement this change project within Medical Center was Lewin's force-field model of change. This change theory includes three stages that focuses on dynamic balance and driving forces of behaviors when implementing a change (Finkelman, 2016). The three stages include 1) unfreezing, 2) moving, and 3) refreezing. The purpose of the unfreezing stage is to develop problem awareness and decrease forces that maintain the status quo. During the moving stage, the problem is clearly identified, goals and objectives are developed, and new values and behaviors are promoted to achieve desired outcomes of the change. The refreezing phase consists of fully integrating the change into the work environment and its processes (Lewin, 1951).

The unfreezing stage of this project occurred when the code team and nurse managers at the Medical Center provided feedback to the nurse educator that the medical-surgical nurses need additional continuing education on their role during a code blue. An initial survey was sent out to medical-surgical nurses to assess their current knowledge and self-confidence of skills during a code blue. When conducting the initial survey, the CNL students discussed to nursing staff the importance in implementing this additional mock code training. An additional survey

was sent to the critical care nursing staff to provide feedback on how to improve code blue readiness based on their previous experience in responding to codes on medical-surgical units. In the moving stage, the goal was to improve the self-confidence and readiness of medical-surgical nurses during a code blue through mini mock code trainings on each unit. This form of education was utilized to provide hands-on training and review of unit-specific equipment used during a code. During the refreezing stage, the group of 6 Clinical Nurse Leader students recommended to the organization to conduct the mini mock code trainings on a quarterly basis to maintain code blue readiness skills.

Specific Aim

The specific aim for this code blue readiness project was to increase the amount of overall confidence of skills for medical-surgical nurses at Medical Center during a code blue from an average baseline of 3.6 to 4.1 (10%) by April 2021.

Methodology

To begin planning how to increase nurse knowledge and confidence for recognizing and responding to a code blue, the group of CNL students created a Gantt chart, shown in Appendix B, to guide the timeline for implementation of this quality improvement project.

A root cause analysis (RCA) was initially conducted using a fishbone diagram to determine any causative factors for the recent events to improve care (Finkelman, 2016), which can be found in Appendix C. From the RCA, it was determined that potential causes can be related to the unrealistic out-of-hospital training environment for BLS certification renewal, the nurses' lack of familiarity and comfortability using crash cart equipment, the functionality of the equipment and processes for a code blue, and no current standardized educational training through the hospital. The causes found in the RCA could lead to the lack of nurse self-

confidence in a code blue, the delay in initiation of CPR and first defibrillation, and poor communication among the floor nurses and interdisciplinary code team, ultimately resulting in the request for more hands-on practice of CPR skills through mock codes.

Microsystem Assessment

While this change project was implemented on multiple medical-surgical units at the Medical Center, the group members were tasked with performing a microsystem assessment on different units. The unit chosen for this paper's microsystem assessment was the Oncology and Pulmonary Acute Care Inpatient unit. The 5 P's framework was utilized for the microsystem assessment because it often helps clarify the needed improvements and enhances planning activities (Nelson, Batalden, & Godfrey, 2007). The 5 P's include an analytical focus on purpose, patients, professionals, processes, and patterns.

The purpose of this oncology and pulmonary acute care unit is to treat patients presenting with a variety of conditions, including oncology, pulmonary, diabetic, and wound care diagnoses. The mission of Medical Center focuses on improving the health of communities served with quality and compassion, which also guides the compassionate and high-quality care on this unit.

This unit has a total of 20 patient rooms with 8 private and 24 semi-private beds. The acuity level of patients on this unit is typically a 1:4 nurse to patient ratio. This unit typically serves patients with oncology and pulmonary related diagnoses, in addition to patients with diabetes, cellulitis, sepsis, influenza, pneumonia, and other conditions.

Core professionals on the unit include a charge nurse, registered nurses, certified nursing assistants (CNAs), a unit secretary, and physicians. Support staff includes physical therapists,

occupational therapists, speech therapists, respiratory therapists, case managers, social workers, phlebotomists, the lines team, the lift team, dieticians, and spiritual services.

The unit processes specific to code blues on the unit begin with nursing training through BLS certification and renewal every 2 years. BLS training educates staff on recognizing and calling a code, performing high quality compressions and respirations, and using an AED. If a code blue is recognized on the unit, the nurses are instructed to call for help and dial "66" on their work phones to alert the operator of the code. The operator will announce the code on the hospital's overheard speakers and notify the code team on where to respond to the code. A crash cart and personal protective equipment (PPE) cart are located on the unit for codes. Staff members will bring these two carts to the room and assist with performing CPR, operating the Zoll defibrillator, and scribing events of the code until the code team arrives. The primary nurse is expected to stay in the room for the duration of the code in order to provide the physician with pertinent information about the patient history and events leading up to the code.

Other patterns and nurse-sensitive metrics tracked on the unit include patient safety measures like falls, medication errors, hospital-acquired infections, pressure ulcers, and the average length of stay per admitting diagnosis.

Cost Benefit Analysis

The CNL students conducted the mini mock code trainings on the units as a part of their internship. The Medical Center had an existing mannequin torso, battery-operated training defibrillation pads, and Zoll defibrillator machine to use for this project. Since the mock code trainings occurred on each unit during the nursing staff's scheduled shift, there was no additional costs for the nurses to attend the training. These factors resulted in minimal to no costs throughout the implementation of the quality improvement project. However, future costs if this

training continues to be implemented include the hourly wages for the nurse educators to conduct this mini mock code training on a quarterly basis in addition to the costs from the capital budget to replace of any training equipment as needed.

Intervention and Implementation

Utilizing the information obtained from the RCA, microsystem assessment, and meetings with stakeholders, the group of CNL students developed a plan to assess current nurse self-confidence relating to code blue response. First, an initial survey was developed with feedback from the nurse educators to determine the baseline knowledge and self-confidence of medical-surgical nurses if a code blue scenario were to occur. The survey was sent out to nursing staff on the medical-surgical units, and 164 responses were recorded, reaching the benchmark goal of at least 50% of nursing staff on the units. The survey consisted of 10 questions with a 5-point scale from Strongly Disagree (1) to Strongly Agree (5) about their self-confidence in performing different skills relevant to a code blue, displayed in Appendix D. The lowest recorded responses from the survey included neutral confidence for scribing with an average of 3.3, operating the Zoll defibrillator with an average of 3.5, and overall confidence with an average of 3.6. Additionally, only 61.1% of nurses agreed—responded a 4 or 5—that they felt confident and prepared for a code blue situation to happen. An additional survey, displayed in Appendix E, was sent out to nursing staff of critical care units who respond to code blues on other units to receive feedback on which skills they believe require additional teaching for medical-surgical nurses. The two areas that had the lowest averages on the Likert Scale for this survey included that SBAR handoff was communicated efficiently (3.1) and the Zoll Defibrillator was turned on and being used efficiently (3.2). Both surveys contained a free response question on how the nurses would like to see code blue readiness be improved.

Using previous Medical Center Code Blue Competency Checklist Standards, feedback from the survey responses, and input from the nurse educators, a teaching plan was created, which can be reviewed in Appendix F. The proposed intervention included an in-service mini mock code training for nursing staff during their shift. The educational lesson was planned to take roughly 5-10 minutes. Nurses would come participate when they were available during their shift, with approximately 1-4 nurses participating in each mini mock code. The primary nurse was presented with a scenario of what they would do if they found their patient unresponsive and would complete the steps of recognition and calling a code and begin CPR. The secondary nurse(s) participating would bring the "crash cart" (a cart with training materials with the same equipment was used in place of the actual crash cart on the unit), place the defibrillation pads and backboard, operate the Zoll defibrillator, and provide ventilation for the patient with a bag-valve-mask. The nurses were given the opportunity to run through each of the roles so that they received hands-on practice with the equipment for each role.

Flyers regarding the dates and times of the in-service teaching were passed out to the charge nurses and displayed near the nurses' stations and break rooms. Charge nurses provided feedback for what timeframe would work best for their unit. Initially, the teaching plan was for an in-situ mock code training, but due to high census at the Medical Center, empty waiting or conference rooms on the unit were utilized. A post-educational handout with main points from the teaching plan was given to participants for a review of the steps from the training.

Study of Intervention

Once at least 50% of nursing staff on the units received the training, a post-intervention survey was sent to the participants. This post-survey utilized the same 10 questions as the initial pre-survey in Appendix D to evaluate the effectiveness of the in-survey code blue readiness

training. It was sent out and conducted approximately one week after the last training to determine if the intervention provided sustained, lasting improvement in knowledge and self-confidence of code blue skills. The CNL students went into the Medical Center to help promote the completion of surveys by participants during various nursing shift times. The aim was to compare the survey results from the pre-survey and post-survey for an improvement in average confidence for each question on the Likert scale.

Measures

Measures for this code blue readiness project are focused at capturing medical-surgical nursing staff participation and quantitative survey responses before and after the intervention. The outcome measures are the percentage of nurses who respond 4 or 5 (agree and strongly agree) on the survey questions and the mean of each of the 10 Likert scale questions from the post-intervention survey, which will be compared to the pre-intervention survey results. The process measures include a target goal of at least 50% of medical-surgical nursing staff to complete the pre-intervention survey and participate in the mini mock code training and at least 50% of those who participated to complete the post-intervention survey. The balancing measure is aimed at evaluating nurse satisfaction and availability to complete the training while working on the floor.

A plan-do-study-act (PDSA) cycle is a structured, continuous quality improvement model designed to rapidly conduct tests of change, learn from the testing, and move forward with better initiatives to make improvements (Nelson et al., 2007). The PSDA cycle for this project focused on the initial implementation cycle of a new mini mock code training for the Medical Center. During the planning phase, current confidence level of code blue skill performance was assessed, and a need to improve BLS skills set was determined. During the second phase of the PDSA

cycle, engaging hands-on instruction was implemented. The CNL students studied nursing staff participation to identify potential problems and strengths of the intervention and modified the training each session to meet the needs of the units each day. The level of BLS skills and confidence was reassessed after the mini mock code implementation. As part of the fourth phase of the PDSA cycle, the intervention was determined if it was effective, and feedback for areas of improvement was considered before planning to implement the training on other units.

Ethical Considerations

In situ simulation allows participants to work with equipment in a familiar environment around their team members, which can have positive effects on clinical performance and process improvement (Adcock, Kuszajewski, Dangerfield, & Muckler, 2020). When attending continuing education, nursing staff are upholding the nursing ethical principle of beneficence and Provision 5 of the American Nurses Association Code of Ethics, which states that "the nurse owes the same duties to self as to others, including the responsibility to promote health and safety… maintain competence, and continue personal and professional growth" (American Nurses Association, 2015). By participating in the mini mock code intervention, nursing staff are actively interested in maintaining their code blue competency skills to promote better patient outcomes if a crisis occurs. This quality improvement project has been approved by faculty at the University of San Francisco using quality improvement review guidelines. Due to the evidence-based, change in practice nature of the project, it does not require IRB approval.

Results

Among the four medical-surgical units, the CNL group was able to provide mini mock code trainings to 111 registered nurses and 14 CNAs. Of these individuals, 33 nurses completed the post-intervention survey. Results showed an overall increase in confidence of BLS skills if a

code blue were to occur. A comprehensive table of the post-intervention survey question responses can be found in Appendix G. 81.8% of nurses who took the post-intervention survey believed they felt confident and prepared for a code blue scenario. This is a 20.7% increase from the proportion of nurses who agreed they felt prepared for a code blue in the pre-intervention survey. The average response also increased from 3.6 to 4.1, displaying a 10% increase in overall average confidence of skills if a code blue were to occur on the unit. Pie charts comparing the data from this question on the survey are displayed in Appendix H. Most averages of the Likert scale between the pre- and post-intervention survey increased, except for bring the crash cart and monitoring vital signs, which remained the same average. None of the survey question responses decreased in knowledge between the pre- and post-intervention survey. A bar chart comparing the pre- and post-intervention average responses to each question are displayed in Appendix H. Overall, this group of CNL students successfully met their specific aim to increase the average confidence of skills pertaining to a code blue for medical-surgical nurses by 10%.

Discussion

Due to the unpredictability of a code blue situation, one can never be fully prepared for a code blue to occur. However, continuing education for performing BLS skills through hands-on training can prepare individuals to become more confident in their skills when responding to a code, leading to higher quality CPR and potentially better patient outcomes (Morton et al., 2019). The mini mock code training was overall well received by nursing staff and key stakeholders at the Medical Center. Many nurses were excited at the idea of receiving this additional code blue training and expressed interested in having more hands-on practice with operating the Zoll defibrillator. Originally, the training was designed to take place in-situ, anticipating that the units would have at least one open bed for the mini mock code training to be conducted from. Due to

high census throughout the hospital from the COVID-19 pandemic, the training was only able to take place in an empty patient room on one unit during one of the eight training sessions. The training was able to be implemented in the family waiting rooms, conference rooms, and additional break rooms on the units. While these rooms did not have the wall connection for administering oxygen through a bag-valve mask and a gurney to practice the bed's CPR release, the nursing staff were still able to place the defibrillator pads, operate the Zoll defibrillator, and perform CPR on the mannequin on a table. This adjusted setting for the training still received positive feedback, as the nurses were able to participate in the training on their unit during their regular work shift and utilize equipment specific to the hospital.

Resistance was also met when trying to recruit nurses to participate in the training. Nurse participation was limited due to the busy schedule of nurses each day on the unit during the times the trainings were offered. Even though the CNL students modified the times on later dates of the schedule based on feedback from the charge nurses, it did not significantly increase participation those days. It was also noted that when the charge nurse fully supported the quality improvement initiative on the unit that day, more nurses were encouraged and willing to participate in the mini mock code training.

Additionally, while the benchmark of at least 50% was met for pre-intervention survey responses and intervention participation by nursing staff, this benchmark was not met for the post-intervention survey responses. When promoting the completion of the post-intervention surveys, the CNL students encountered many nurses who did not participate in the training or new traveling and contingent workers who were not working on the unit when the training was implemented. Due to the decrease number of post-intervention survey responses, a challenge is presented when evaluating if the true effectiveness of the intervention and its external validity.

However, there was still an overall increase in confidence in addition to a significant decrease in those who responded 1 or 2 on the post-intervention survey questions. Despite these limitations, the specific aim of this project was still achieved, and it can be determined that the mini mock code training was effectiveness in increasing the medical-surgical nurses' confidence in their BLS skills.

Conclusion

Early recognition, initiation of high-quality CPR, and rapid defibrillation is crucial to increase a patient's chance of survival during a CPA (American Heart Association, 2021). Without continuing education and simulation training, BLS skills can begin to deteriorate as early as two weeks (Herbers & Heaser, 2016). In-hospital mock code trainings, compared to lack of additional training to the out-of-hospital BLS certification that occurs every 2 years, is necessary for individuals to maintain knowledge of their BLS skills and feel confident in performing these skills during a code blue. By providing mini mock code trainings and increasing the self-confidence of medical-surgical nurses, improvements can be seen among both individual and team readiness when responding to a code blue. This quality improvement initiative at the Medical Center was effective in increasing overall confidence of medical-surgical nurses' code blue skills by the target goal of 10%. If the project were to be conducted again, the CNL students discussed the importance to include a non-applicable option on the survey for CNAs, to offer a wider variety of training times, and to focus on identifying a key unit champion to help promote nurse buy-in. It is recommended that the Medical Center continues to offer a mini mock code training with review of equipment and actions to take before the code team arrives on the medical-surgical units on a quarterly basis, with the possibility of expanding additional mock code training for progressive and critical care units.

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Appendix A

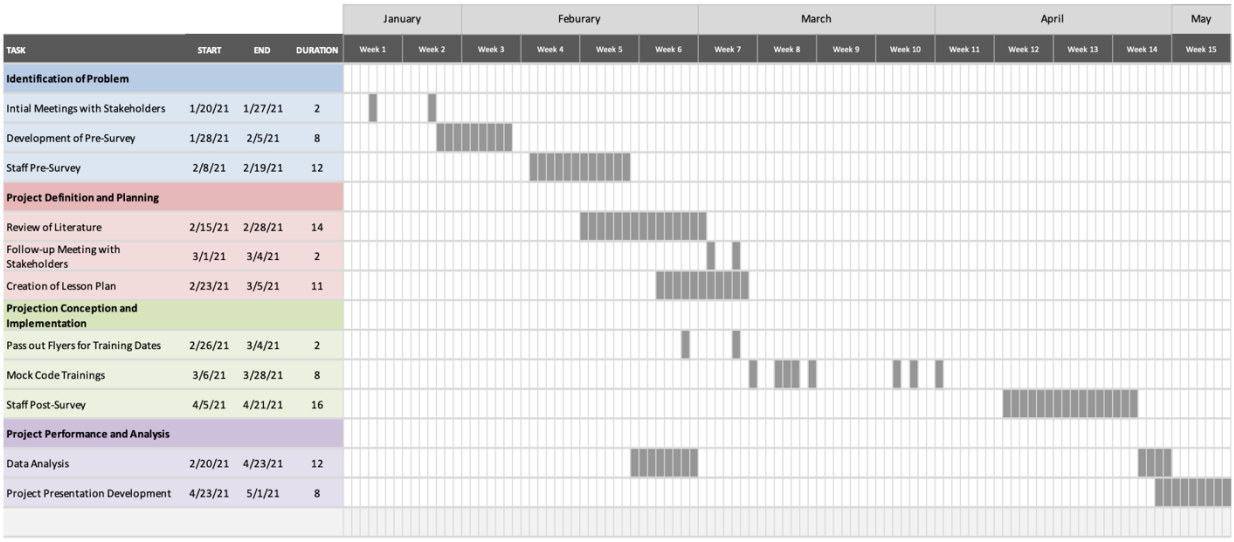
Data Points Tracked for Code Blue Events at the Medical Center

Biomed Equipment Involved/Malfunctioned
Code type (cardiac arrest, respiratory arrest, malignant hyperthermia, seizure, syncope, false/mistaken activation,
Immediate outcome
Did code occur 30 min before or after shift change; care hand off?
Was location of code clearly paged?
Did physician arrive within 5 minutes?
Did Pharmacist attend code?
Were all necessary equipment functioning?
Potential deviation from generally accepted practices?
Time patient found down
Time pulses were first lost
Time chest compressions started
Time of intubation
Time of first shockable rhythm
Time first defibrillation shocks given
Time first rescue medication given
End of Code Time
Was RRT called within 4hr of code?
Highest eCART score in 24hours prior
Highest eCART score in the 4hours prior to code start
Was code potentially preventable? (No active comfort care discussions; goal of care not hospice)
Was code potentially predictable? (physiologic instability or eCART id'd risk > 1hr prior)
Trended issues (Care issues during code, Care issues prior to code start, code initiation/paging, code team
Were ECG strips scanned into the chart?
Patient mortality at discharge

Note: from (Quality Improvement Coordinator, 2020)

Appendix B

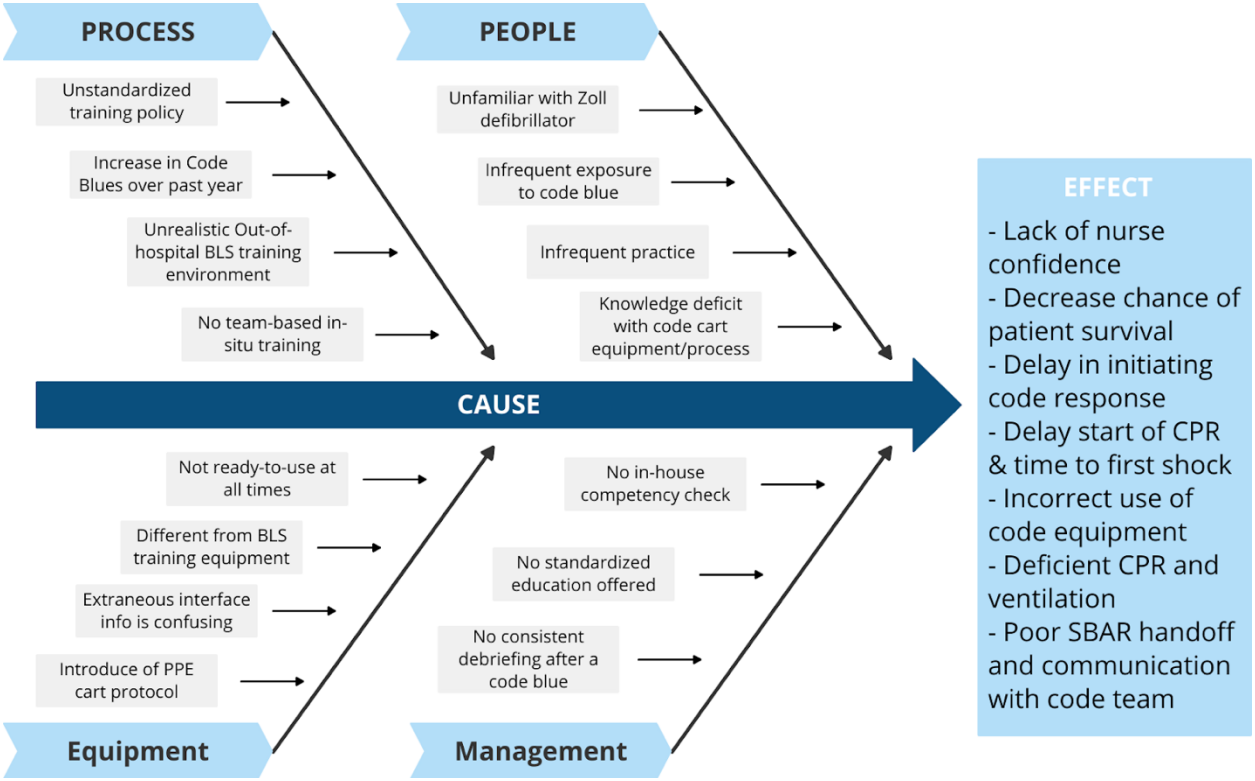
Gantt Chart



				January		Feburary				March				April				May
TASK	START	END	DURATION	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
Identification of Problem																		
Intial Meetings with Stakeholders	1/20/21	1/27/21	2															
Development of Pre-Survey	1/28/21	2/5/21	8															
Staff Pre-Survey	2/8/21	2/19/21	12															
Project Definition and Planning																		
Review of Literature	2/15/21	2/28/21	14															
Follow-up Meeting with Stakeholders	3/1/21	3/4/21	2															
Creation of Lesson Plan	2/23/21	3/5/21	11															
Projection Conception and Implementation																		
Pass out Flyers for Training Dates	2/26/21	3/4/21	2															
Mock Code Trainings	3/6/21	3/28/21	8															
Staff Post-Survey	4/5/21	4/21/21	16															
Project Performance and Analysis																		
Data Analysis	2/20/21	4/23/21	12															
Project Presentation Development	4/23/21	5/1/21	8															

Appendix C

Root Cause Analysis – Fishbone Diagram



Appendix D

Initial Pre-Intervention Survey: Code Blue Readiness Evaluation for Medical-Surgical Nurses

1. Unit/ Department:
2.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Average Response (from 1-5):
1. I feel confident in and prepared for a code blue.	7 (4.3%)	16 (9.9%)	40 (24.7%)	68 (42%)	31 (19.1%)	3.6
2. I feel confident recognizing and calling a code blue.	2 (1.2%)	5 (3.1%)	6 (3.7%)	76 (46.9%)	73 (45.1%)	4.3
3. I feel confident providing and assessing high quality chest compressions (100-120 compressions/min; at least 2 inches deep; lower sternum position) during a code blue.	1 (0.6%)	5 (3.1%)	25 (15.4%)	71 (43.8%)	60 (37%)	4.1
4. I feel confident administering ventilations with a bag valve mask attached to 15L O2.	1 (0.6%)	13 (8%)	37 (22.8%)	64 (39.5%)	47 (29%)	3.9
5. I feel confident bringing the crash cart and applying the backboard under the patient during a code.	2 (1.2%)	3 (1.9%)	11 (6.8%)	76 (46.9%)	70 (43.2%)	4.3
6. I feel confident monitoring vital signs and heart rhythms during a code blue.	3 (1.9%)	13 (8%)	24 (14.8%)	76 (46.9%)	46 (28.4%)	3.9
7. I feel confident operating the Zoll Defibrillator during a code (applying chest pads, turning on AED mode, following announced steps, administering shock as advised).	6 (3.7%)	21 (13%)	41 (25.3%)	66 (40.7%)	28 (17.3%)	3.5
8. I feel confident in providing SBAR handoff to the code team (including admission diagnosis, relevant lab values, and events leading up to code).	6 (3.7%)	12 (8%)	26 (16%)	77 (47.5%)	40 (24.7%)	3.8
9. I feel confident scribing during a code blue until additional support arrives.	9 (5.6%)	31 (19.1%)	44 (27.2%)	57 (35.2%)	21 (13%)	3.3
10. Participating in simulated crisis scenarios and team debriefing is beneficial to maintaining my code blue readiness.	0 (0%)	3 (1.9%)	13 (8%)	86 (53.1%)	60 (37%)	4.3

3. My code blue readiness could be further improved in the following ways:

Common responses included:
More consistent unit-based mock code simulations
Quarterly clinical review training
More practice and education
Hands-on practice using Zoll defibrillator

Appendix E

Initial Survey: Code Blue Readiness Evaluation (for Critical Care Nurses)

1. When I arrive on scene to a code blue scenario:

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Average Responses (from 1-5):
I witness high quality chest compressions being performed.	1 (4.5%)	4 (18.2%)	2 (9.1%)	7 (31.8%)	8 (36.4%)	3.8
The bag valve mask is placed correctly.	1 (4.5%)	5 (22.7%)	3 (13.6%)	6 (27.3%)	7 (31.8%)	3.6
The crash cart is in the room, and the backboard and defibrillator pads are placed correctly.	2 (9.1%)	6 (27.3%)	3 (13.6%)	4 (18.2%)	7 (31.8%)	3.4
The Zoll Defibrillator is on and EKG rhythm is on display.	2 (9.1%)	7 (31.8%)	4 (18.2%)	3 (13.6%)	6 (27.3%)	3.2
SBAR handoff is communicated efficiently.	2 (9.1%)	7 (31.8%)	4 (18.2%)	4 (18.2%)	5 (22.7%)	3.1
There is effective closed-loop communication amongst floor nurses and code team.	1 (4.5%)	6 (27.3%)	5 (22.7%)	5 (22.7%)	5 (22.7%)	3.3

2. Code blue readiness could be further improved in the following ways:

Common responses included:

All equipment set up and ready including suction, defibrillator pads on before code team arrives, primary RN staying in room during code to answer questions, crowd control and defined roles in room during a code, more training to floor nurses on using Zoll defibrillator

Appendix F

Mock Code Educational Lesson Plan

Mock Code Lesson Plan	
Lesson Objectives:	At the end of this Mock Code the BLS Staff will be able to demonstrate the following competencies: **BLS Staff Competencies:** 1. Establish unresponsiveness (absence of pulse or respirations) 2. Code Called (know code status) 3. Chest Compressions started 4. RT/RN begins bag valve mask ventilation with O2 on 15L if available 5. Crash Cart Obtained 6. Place backboard under patient, continue CPR 7. Zoll One-Step Multifunction Pads Placed on Patient 8. Zoll Defibrillator function turned on to AED mode while continuing CPR 9. Steps for AED or Defibrillator functions utilized 10. Shock if advised after clearing all staff 11. Place BP cuff on Patient begin cycling every 1 minute 12. Bedside RN stays in patient room, gives admit diagnosis, history, and events leading up to code
USF Nursing Students will introduce themselves and the nature of the Mock Code scenario.	**Opening Introduction:** • We are nursing students from USF here to help improve nurse code blue readiness and confidence • We will be running "mini mock codes" for you to practice and be familiar with the equipment on your unit that is used for a crash cart • We reviewed the survey responses and wanted to tailor the training to what you wanted to learn about • We are not here to judge or grade you on your competency skills, we are just here to help you feel more prepared if a code blue occurs
USF Nursing Students will introduce the following: 1) Role of each Nurse 2) Equipment necessary	**Nurse 1 (Primary CPR):** "As a primary nurse, you are likely to be the one who finds the patient unresponsive" • Establish unresponsiveness by checking pulse • Lower the bed, CPR release • Make sure nurse calls for help then start compressions ASAP • Help place backboard when crash cart arrives • Ensure compressions are 2-2.5in deep • 30 compressions:2 breaths ratio going at 100-120 compressions/min • Ask to switch out after 2 mins if tired • SBAR readiness and staying with the patient for entirety **Nurse 2 (Crash Cart/Defibrillator):** • Bring crash cart to room • Place One-Step pads and backboard correctly and adjusting CPR sensor as needed (i.e. if larger breast tissue or obese) • Turn on to defib, Analyze, Shock (as needed), vocalize "All Clear" • Monitor compressions on Zoll (rate & depth); be ready to switch out doing compressions as needed • Listen to and vocalize commands from Zoll

	Nurse 3 (BVM): • Decompress the BVM • Attach tubing to O2 valve on wall (Christmas Tree looking attachment) • Turn up O2 valve to max ~15L • Place face mask over patient airway using c-clamp grip to ensure a good seal • Administer two breaths per 30 compressions • Ensure O2 is clear of bed when/if shock is delivered. • Remove BVM from patient and bed during "All Clear" instruction from the defibrillation **Manager (Intro/Patient Handoff/SBAR):** • Outline of mock code simulation (brief introduction to equipment, mock code scenario, debrief and Q&A) • Switching out: best to switch roles during rhythm analysis • Switch between CPR & defibrillator • Patient Handoff for Primary Nurse o Patient admit diagnosis and health history o Time of last shock? (check CPR countdown on Zoll) o What has been done so far? o How did you find the patient/what events led up to code? o Rhythm prior to code? (if on telemetry) o Labs: Potassium, Magnesium, Glucose o Meds?
Presentation of Mock Code Scenario	**Patient Scenario/Report:** D.B. is a 50 year old male that was admitted for chest pain. He has a history of DM2, high cholesterol, and HTN. During your medication pass, you walk into D.B's room AND START SCENARIO SBAR person: "You walk in and you see your patient what do you do" "Patient does not respond" "No pulse"
Checks for Understanding	1. Each Nurse will be paired with a USF Student who will observe and provide feedback during and after the code scenario. 2. There will be a post-assessment at the end of the scenario.
Equipment Necessary	• Crash Cart • BVM and tubbing • CPR mannequin • Zoll Defibrillator • Heart Rhythm device • Defibrillator pads • Back board • Chest compression sensor • Gloves/PPE
Extension or Further Exploration	1. Review EPIC Code Narrator 2. Preparation of suction equipment 3. Application of PPE due to Sars-Cov-2 Virus 4. Zoll defibrillator professional development videos
Reminders	1. Zoll is code ready (pads plugged in, just attach pads to patient) *2.* Monitor depth and chest recoil of compressions because Zoll can't differentiate 3. Emphasis on **team dynamics** & **communication**

Appendix G

Post-Intervention Survey: Code Blue Readiness Evaluation for Medical-Surgical Nurses

1. Did you participate in the training? Yes or No
2. Unit/Department:
3.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Average Response (from 1-5):
1. I feel confident in and prepared for a code blue.	0 (0%)	0 (0%)	6 (18.2%)	18 (54.5%)	9 (27.3%)	4.1
2. I feel confident recognizing and calling a code blue.	0 (0%)	0 (0%)	1 (3.0%)	19 (57.6%)	13 (39.4%)	4.4
3. I feel confident providing and assessing high quality chest compressions (100-120 compressions/min; at least 2 inches deep; lower sternum position) during a code blue.	0 (0%)	0 (0%)	2 (6.1%)	16 (48.5%)	15 (45.5%)	4.4
4. I feel confident administering ventilations with a bag valve mask attached to 15L O2.	0 (0%)	0 (0%)	3 (9.1%)	18 (54.5%)	12 (36.4%)	4.3
5. I feel confident bringing the crash cart and applying the backboard under the patient during a code.	0 (0%)	0 (0%)	4 (12.1%)	15 (45.5%)	14 (42.4%)	4.3
6. I feel confident monitoring vital signs and heart rhythms during a code blue.	1 (3.0%)	1 (3.0%)	7 (21.2%)	14 (42.4%)	10 (30.3%)	3.9
7. I feel confident operating the Zoll Defibrillator during a code (applying chest pads, turning on AED mode, following announced steps, administering shock as advised).	0 (0%)	2 (6.1%)	5 (15.2%)	19 (57.6%)	7 (21.2%)	3.9
8. I feel confident in providing SBAR handoff to the code team (including admission diagnosis, relevant lab values, and events leading up to code).	0 (0%)	1 (3.0%)	5 (15.2%)	20 (60.6%)	7 (21.2%)	4.0
9. I feel confident scribing during a code blue until additional support arrives.	0 (0%)	4 (12.1%)	9 (27.3%)	16 (48.5%)	4 (12.1%)	3.6
10. Participating in simulated crisis scenarios and team debriefing is beneficial to maintaining my code blue readiness.	0 (0%)	0 (0%)	3 (9.1%)	12 (36.4%)	18 (54.5%)	4.5

4. Would you be interested in participating in additional mini mock code trainings? If so, do you have any suggestions to improve the training?

Majority: yes; suggestions included quarterly code blue refresher, more advertisement about when trainings will happen, examination of the crash cart, review on scribing during a code

Appendix H

Graphics Displaying the Comparison of Pre- and Post-Intervention Survey Results

Figure 1:

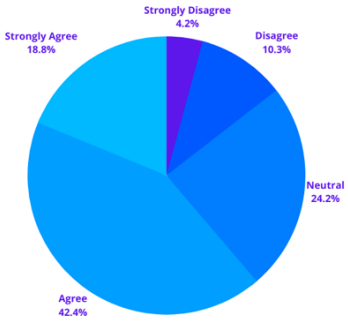


Figure 2:

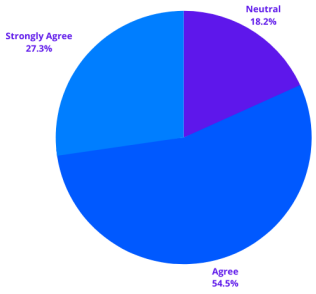


Figure 1: Pie chart of pre-survey responses to: "I feel confident in and prepared for a code blue."
Figure 2: Pie chart of post-survey responses to: "I feel confident in and prepared for a code blue."

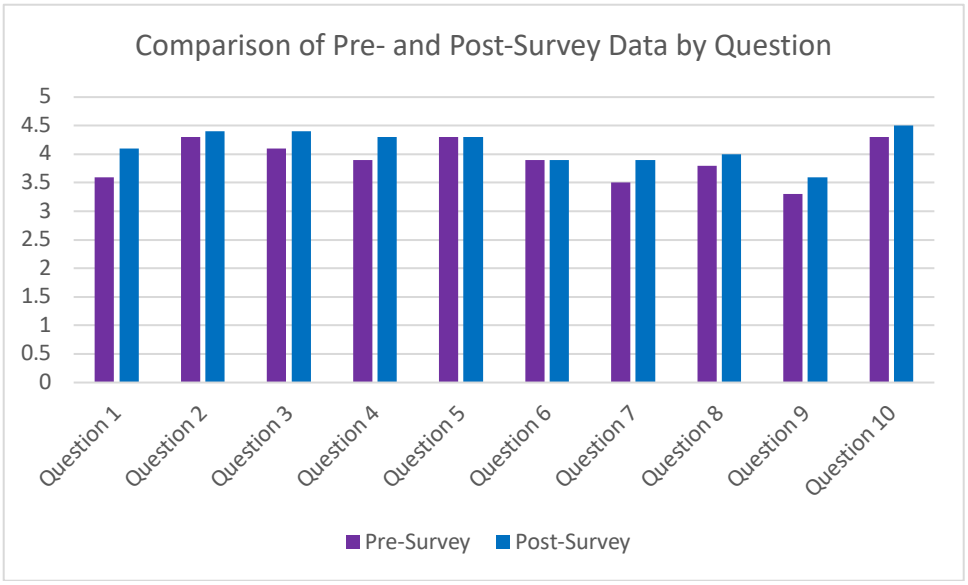


Figure 3: Bar chart displaying the average response from 1-5 of each survey question. Purple is pre-survey average responses, and blue is post-survey average responses.