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Code Blue In Situ Simulation Program

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Abstract

Nursing staff must always be prepared to care for a patient experiencing a cardiac arrest. Fast, high quality interventions are imperative in achieving optimal patient survival and outcomes. A code blue in situ simulation program was piloted at two hospitals in northern Minnesota with the purpose of providing opportunities for learning the knowledge and skills necessary for handling emergency situations, improving staff confidence and performance in caring for a patient experiencing a cardiac arrest, and ultimately, improving patient outcomes. The simulation program focused on the first five minutes of a code blue (cardiopulmonary arrest). During this pilot, 30 simulations were completed with the participation of 152 staff members. Following the simulations, 86.2% of participants reported an increased confidence in their ability to respond to a code blue. Similar learning themes were identified throughout the facilities and included teamwork and communication, utilizing emergency equipment, timely interventions, and high quality cardiopulmonary resuscitation (CPR). Although the majority of staff ranked the quality of interventions provided as being good or exceptional, only 1/3 of units met the American Heart Association’s (AHA) Get with the Guideline: Resuscitation goal of defibrillation in less than two minutes (AHA, 2014). Continuation of the code blue in situ simulation program is recommended with an integration of the facilities’ other emergency response calls including stroke, STEMI (ST elevated myocardial infarction), sepsis, and trauma. 

Keywords: In situ, simulation, mock code blue
Introduction

Nursing staff work on the front lines of healthcare. They are often closest to patients and the first to recognize and respond to a patient needing emergency assistance. These emergencies can be unpredictable and can occur in any public or patient care area. Nursing staff must always be prepared to handle an emergency situation; yet, when over 1,200 nursing staff were surveyed at a select group of hospital in northern Minnesota, over 8% reported a lack of or limited understanding in rapid response (emergency medical response) or code blue (cardiopulmonary arrest) situations (Essentia Health, 2016). To meet the educational needs of staff and improve outcomes for the patients they serve, a code blue in situ simulation program was developed. The purpose of this program was to provide opportunities for learning the knowledge and skills necessary for handling emergency situations, improve staff confidence, improve performance in caring for a patient experiencing a cardiac arrest, and ultimately, to improve patient outcomes. In this scholarly paper, the development, implementation, and outcome of a pilot of this program at two hospitals in northern Minnesota is described.

Background and Significance

Each year, over 200,000 patients are treated for an in-hospital cardiac arrest (Anderson et al., 2016). Survival rates for in-hospital settings can vary considerably, are linked to the quality of cardiopulmonary resuscitation (CPR), and tend to be at their lowest when a patient arrests on a night shift and/or on a weekend (Meaney et al., 2013; Pederdy et al., 2008). Past experiences, technical skills, communication, and leadership abilities of individuals on the code team may also impact resuscitation efforts (Hunziker et al., 2011). It is also recognized that discrepancies exist between knowledge of CPR best practices and actual performance, leading to potentially preventable deaths attributed to cardiac arrest (Meaney et al., 2013). Initial actions including
recognition of the event, rapid activation of the emergency response system, and initiation of high quality CPR are imperative for patient survival (Meaney et al., 2013).

Components of high quality CPR include chest compression fraction > 0.8, chest compression rate 100-120, chest compression depth ≥ 50 mm for adults, full chest recoil, and ventilations to see chest rise (Meaney et al., 2013). Lower survival rates have been seen when teams do not adhere to CPR guidelines or follow algorithms (Hunziker et al., 2011). Survival of an in-hospital cardiac arrest has been shown to drop by 30% when chest compressions are delivered too slowly (Meaney et al., 2013). Inadequate depth, delayed defibrillation, or excessive interruptions to chest compressions are among other potentially fatal mistakes.

All staff need to be knowledgeable in the location and operation of emergency equipment including crash carts and defibrillators (Morrison et al., 2013). When an arresting patient presents with a shockable rhythm they must receive defibrillation within 2 minutes for optimal survival to discharge (Morrison et al., 2013). Patients who receive an initial defibrillation within 2 minutes have been shown to be 50% more likely to survive the event (Anderson et al., 2016). Despite this knowledge, over 30% of patients with shockable rhythms do not receive defibrillation within this timeframe (Morrison et al., 2013). All staff must be prepared and confident in their ability to begin immediate, high quality resuscitation of a patient; however, the high risk, low frequency nature of a cardiac arrest makes it difficult for staff to feel prepared. Skills obtained during basic life support (BLS) courses quickly decline if staff do not have the ability to utilize or practice these skills. This makes it difficult to maintain competency and preparedness for these emergencies (Meaney et al., 2013). Addressing these issues must be a priority as it is now being suggested that “poor-quality CPR should be considered a preventable
harm” (p. 2) (Meaney et al., 2013). One way to address this gap in practice is through the use of simulation.

Simulation has an important role in health care education both in the academic and clinical care setting. Simulation has been defined by the Society of Simulation in Healthcare (2016) as “a technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions” (p. 33). It is an active learning technique that promotes interaction between the participant’s mind, content, and equipment; this technique strives to lead to improvements in a patient’s care, health, and safety (Billings & Halstead, 2012). Participants engage in learning through participation, observation, and debriefing (Billings & Halstead, 2012).

A variety of benefits are recognized related to simulation as a teaching strategy. Simulation offers an opportunity for participants to learn from mistakes without placing patients at risk for harm. It allows for practice of clinical experiences rarely seen and an opportunity for reflection, discussion, and feedback which leads to improved performance in future situations (Billings & Halstead, 2012). Additional benefits include the development of muscle memory for tasks, which frees the participants to then shift their focus to the critical thinking aspects of an event (Society for Simulation in Healthcare, 2016).

The following section provides a brief review of the literature on the use of in situ simulations, outcomes of in situ simulations, and concludes with supporting the use of this teaching technique for this scholarly project program.
Literature Review

Little evidence is available that reports the use of in situ simulations, the outcomes of in situ simulations or the use of this strategy as a teaching technique in the practice setting. The brief review that follows demonstrates a gap in the literature that will be addressed subsequently.

In situ simulation

In situ simulation is a simulation experience that occurs in an actual patient care environment (Society for Simulation in Healthcare, 2016). The realism of a scenario is increased when completed in actual clinical environments. Participants from the multidisciplinary teams often collaborate as they work through scenarios locating and utilizing the resources available to them in their daily practice.

Successes in improving cardiac arrest outcomes, staff confidence, and staff performance in responding to cardiac arrests has been demonstrated through the implementation of ongoing code blue in situ simulation programs. One study reported survival rates increased and were maintained following the implementation of a pediatric in situ code blue program over the four-year course (Andreatta, Saxton, Thompson, & Annich, 2011). Improvements in meeting time to defibrillation and time to CPR goals have been demonstrated to increase by as much as 65% following in situ code blue simulations (Delac, Blazier, Daniel, & N-Wilfong, 2013). These programs have been successful without causing major impacts to the unit. This was demonstrated after an organization had implemented 10 minute in situ code blue simulations in all patient care settings, followed by 10 minute debriefs. Following these events, staff reported the simulations had minimal effect on patient care for the remainder of the day (Wheeler, Geis, Mack, LeMaster, & Patterson, 2013). In addition, in situ simulation offers opportunities to assess systems and identify latent threats (Lok, Peirce, Shore, & Clark, 2015). Latent threats are
the dormant conditions that exists but may not be discovered until an event occurs exposing the unknown issue. In healthcare latent threats may be related to equipment, environment, or human performance factors (Lok et al., 2015).

The development and utilization of a code blue in situ simulation program offers opportunities for staff to learn and develop at an individual and team level in order to better prepare for emergency situations. It was chosen in order to address the gap identified in staff confidence to respond to a code blue as it will offer a safe learning opportunity to help build confidence, improve performance, and ultimately improve patient care outcomes. As identified in the literature, it will offer opportunities for staff to learn and practice with their teams in their actual patient care environments and assess for any potential latent threats. The code blue in situ simulation program will support the facilities as they strive to be the best place to receive care. Lastly, development and implementation of this program offers a unique opportunity to contribute evidence to the literature regarding the use and outcomes of in situ simulation programs in the practice setting.

**Design**

After reviewing the literature, a code blue in situ simulation program was determined to be the best approach for meeting the goals of improving staff confidence and performance in caring for a patient experiencing a cardiac arrest. Assessment of the code blue process at a system level was also desired through this program and will be described later. The following section describes the design of the in situ program including standards used, theoretical approaches and an outline of the approach used.
Standards

To assure best practice, the International Nursing Association for Clinical Simulation and Learning (INACSL) Best Practice Standards and the American Heart Association’s Get with the Guidelines: Resuscitation measures were used as guiding frameworks for this simulation program.

The International Nursing Association for Clinical Simulation and Learning (INACSL) developed nine best practice standards. Although each of these standards was reviewed and utilized during this program, Best Practice Standard IX: Simulation Design was a guiding framework during the developmental stage. According to this standard there are eleven criterion in developing a simulation beginning with a needs assessment and finalized with a pilot. A detailed overview of the development of this program including documentation for each of the eleven criterion can be found in Appendix A.

The American Heart Association’s Get with the Guidelines: Resuscitation measures were also used (AHA, 2014). These guidelines were primarily utilized in determining best practice markers for interventions provided. Get with the Guidelines: Resuscitation is a registry that strives for ongoing quality improvement related to patients who have experienced an in-hospital cardiac arrest (Anderson et al., 2016). Hospitals that are able to consistently meet the standards as set out by Get with the Guidelines: Resuscitation tend to have higher survival rates (Andersen et al., 2016). Time to first chest compressions less than one minute and time to first defibrillation less than two minutes were key markers, chosen from Get with the Guideline: Resuscitation, examined during each simulation.
Theory

Andragogy was important in the development and implementation of this simulation program. The target audience consisted of adult learners with varying backgrounds. During simulation, it is important to recognize that learners arrive with a vast array of experiences allowing for them to further develop their independent skills as well as an opportunity to learn from each other. The development and modification of scenarios specific to varying patient care environments was important to establish relevancy and application to patient care settings.

Nurses work diligently to care for our patients every day. It is essential that leadership support these nurses to succeed in their role. Fostering the growth and development of all individuals on the team through Servant Leadership was at the forefront during the development and implementation of this program. It was important for the facilitator and content expert to develop a safe learning environment and culture of trust, listen to the input and learning of the team, and encourage staff to learn from each other and through their mistakes. The nurse educator has an opportunity to serve those they educate. It is through this service to staff, with an investment in the growth and development of each individual, that our teams will be able to serve and meet the needs of their patients.

Implementation

The in situ simulation program (Appendix A) was piloted over a two-month period at two hospitals. The two hospitals chosen for this pilot are the largest facilities from the group surveyed. They share components of their emergency response teams including joint oversight committees. The hospitals have 380 beds and 165 beds respectively.

Over the course of the pilot a total of 30 simulations were completed on varying shifts. Seven percent of simulations occurred on the evening shift, 20% occurred on night shift, and
73% on day shift. Registered nurses, licensed practical nurses, nursing assistants, respiratory therapists, family medicine residents, pharmacists, certified registered nurse anesthetists, and security officers participated in the simulations. Experience of these staff members varied; however, over 50% of those who participated have worked at the facility for 5 years or less (Figure 1, p. 10).

**Figure 1. Years of employment at facility**

![Pie chart showing years of employment at facility]

*Figure 1. Breakdown of participants in terms of years of employment at the facility.*

A variety of patient care areas were included in these simulation events including each of the inpatient medical surgical floors, intensive care units, intermediate care unit, inpatient rehab, and a few procedural care areas. The demographic breakdown is shown in Figure 2 (p. 11).

The pilot focused on five minute unannounced in situ code blue simulations. Adult medical surgical areas were the primary target for the simulation program. A facilitator with simulation training and a content expert partnered to lead these simulations. Content experts varied throughout the pilot; however, all content experts were certified in both BLS and ACLS.
(advanced cardiac life support). Most were either code team responders or ACLS instructors for the facilities. The facilitator worked with unit leadership to schedule a tentative time for the simulation to occur. Unit leadership was asked to communicate plans for the simulation only with the charge nurse. Unit leadership and the charge nurse were instructed they could cancel the event if needed at any time to ensure the safety of patients on the unit. When it was time for the simulation, the facilitator called the unit with report for the patient being admitted with complaints of shortness of breath. Variations to report were outlined to best meet the reality of the varying units. If the patient care area did not typically accept admissions (i.e. inpatient rehab), participants were presented with a patient background during the pre-brief phase.

**Figure 2. Unit Demographics**

![Pie chart showing the distribution of units participating in code blue in situ simulations. Pre/post procedural care accounts for 37%, intermediate care (IMC) for 33%, ICU for 7%, MH for 7%, Med/Surg Area for 13%, and Others for 3%.]

*Figure 2. The breakdown of units participating in the code blue in situ simulations are shown here: pre/post procedural care, intermediate care (IMC), intensive care units (ICU), mental health (MH), medical/surgical, and others.*

At the time of report, the facilitator was given a room number which had to be communicated with the emergency response control center. The control center was notified at this time as to whether or not the page should be sent out to the code blue team. All calls being
paged to the entire team were to be announced as “mock code blue.” One simulation per month was announced through the paging system and the entire code blue team was to respond. On arrival to the unit, the facilitator would assist in moving the patient (an ALS manikin) into bed and provide the bedside nurse with a short pre-brief. At this time staff were instructed to treat the simulation as realistically as possible. During this time the content expert would interchange simulation supplies with actual crash cart supplies. The first line drug tray, airway box, and defibrillator were replaced with clearly marked simulated supplies. All real supplies were placed at the nurse’s station to ensure a central location in case a real emergency came up. Additionally, this ensured the medications locked in the removed drug tray were monitored during the simulation. The crash cart was re-locked and monitored by the content expert until use.

Once the facilitator and content expert both completed their tasks the patient was placed into a pulseless ventricular tachycardia or ventricular fibrillation. Participants then worked through the code blue process. During this time clarification was provided related to any simulation questions if they arose, but no other guidance was offered.

Five minutes after the patient became pulseless the simulation ended. Participants in attendance were asked to stay for a short debrief. During the debrief, participants were guided to reflect on the simulation experience. They had an opportunity to ask questions and were provided with feedback. Debriefing was kept to under ten minutes. At the conclusion of the debrief, staff were encouraged to review their crash cart. The facilitator and content expert returned unit supplies to the cart, and the charge nurse was asked to complete outdate checks prior to relocking the cart with the lock provided. All simulation supplies brought to the unit were counted prior to leaving each unit.
Evaluation Methods

Participants were asked to complete an evaluation at the end of each simulation. Evaluations focused on components of quality of intervention, teamwork, and confidence. Participants were asked to rate these components based on a 1-5 point Likert scale. In addition, participants were asked to identify strengths or areas for improvement, key learning points, something they found valuable, and something they found difficult about the simulation.

During the simulation, observations were recorded by both the facilitator and the content expert. The facilitator utilized The American Heart Association’s Full Code Pro App (2015) to record the timeline of interventions completed. The content expert focused more closely on the quality of interventions completed by utilizing “The First 5 Minutes Adult Mock Code Observation” form modified from its original version created by Health Partners (2014). Following the simulation events, a latent threat assessment was completed utilizing “A risk matrix for risk managers” created by the National Patient Safety Agency, (2008). Additional details on these tools can be found in Appendix A.

Results

Of the 152 staff members that participated in the simulation pilot, 123 participants completed and returned evaluations.

Confidence to Respond to Code Blue

The majority of participants (86.2%) reported an increased confidence in their ability to respond to a code blue following the simulations. Twelve percent of participants were neutral and less than 1% indicated the simulation did not increase confidence to respond to a code blue (Figure 3).

Figure 3. Reported Increase in Confidence
Following this simulation, I have increased confidence in my ability to respond to a code blue.

Quality of Interventions

Participants were asked to rate overall performance, individually and as a team, in providing high quality interventions. Eighty-five percent of participants felt their team performed high quality interventions (Figure 4, p. 15) while 74% of participants reported they performed high quality interventions as an individual (Figure 5, p. 15).

Observations from the facilitator and content expert were also tracked. Data tracked from these observations focused on time to first chest compression and time to first defibrillation. Chest compressions and defibrillation goals were measured during the simulations from the time staff first recognized pulselessness. Chest compression goals were met in 93% of the simulations (Figure 6, p. 16).
Defibrillation goals were met in 23% of simulations (Figure 7, p. 16). In 13% of simulations defibrillation was missed. All of the missed defibrillations occurred on ACLS floors. The average time to first chest compression was 28.5 seconds and the average time to first defibrillation was 179.9 seconds (excluding units that did not shock). Additional observations and learning themes are included in the discussion.
Figure 6. Time to first compressions were measured during each simulation from the time staff first recognized pulselessness.

Figure 7. Time to first defibrillation was measured during each simulation from the time staff first recognized pulselessness.

Teamwork and Communication
Eighty-eight percent of participants responding felt their team worked effectively together, leaving 12% of participants responding neutral (Figure 8). Communication offered more variance in responses as 76% reported their team communicated clearly, 23% responded neutral, and less than 1% did not think their team communicated clearly (Figure 9, p. 18).

**Figure 8. Teamwork**

![Teamwork Bar Chart]

*Figure 8. Our team worked effectively together.*

**Latent Threats**

Following the simulation events, a latent threat assessment was completed. Latent threats identified during these simulation events included incorrect pads stocked for an AED, no universal adapter for defibrillation pads, and missing pediatric supplies on a combo cart. The latent threats were rated utilizing The National Patient Safety Agency’s (2008) risk matrix. Utilizing this matrix, these threats scored moderate to high risk. Each risk was addressed with leadership and if able corrected at the time of discovery. Follow-up with the unit occurred either via reassessment at next simulation or follow-up with unit leadership to ensure the threat was
corrected. Latent threats identified were also presented at the organization’s internal code blue committee.

**Figure 9.** Clear Team Communication

![Bar chart showing team communication survey results]

*Figure 9. Our team communicated clearly with one another.*

**Discussion**

**Learning Themes Identified**

Common learning themes emerged during the simulations. These themes included teamwork and communication, utilizing emergency equipment, timely interventions, and high quality CPR.

**Teamwork and communication.** Participant feedback through evaluations and debriefs frequently mentioned components of teamwork and communication. These are vital elements of emergency care. Literature recognizes “a lack of leadership and poor teamwork result in poor clinical outcomes for groups performing CPR and other emergency tasks” (Hunziker, et al., 2011). While some groups identified strengths in their teamwork and calm demeanor, many
groups identified teamwork and communication as an area for improvement. Establishing roles was difficult for many groups. This included establishing a leader (ideally with hands off) and delegating tasks prior to code team arrival to ensure all necessary actions are being completed. One participant wrote, “(we) need to improve on calling out roles, ‘Grab the crash cart, get the AED, you record.’” Additionally, one participant from a group who did not defibrillate wrote, “I should have more loudly communicated the rhythm, should have shocked.” An assumption had been made in this simulation that once the rhythm was stated someone would defibrillate; however, this life-saving intervention was not completed. Communication is frequently found to be at the root of human errors and adverse events (Hunziker et al., 2011) making it an important topic as staff learn through the simulation of these emergency events.

**Equipment.** A variety of learning opportunities presented related to code blue equipment. When asked to identify on thing found valuable about the simulation a staff member responded, “Practice with BLS, ambu, pads, and crash cart always helps.” Multiple units demonstrated difficulty or reported a lack of familiarity with opening their crash cart as well as identifying the location of crash cart contents such as the airway supplies needed in the simulation. Some staff members struggled with breaking locks and requested scissors for the twist to break locks on select supplies. After each simulation, staff were encouraged to review the crash cart and practice with the latch prior to relocking the cart.

Another common equipment difficulty was correct defibrillator pad placement. Some groups provided peer feedback on placement to make corrections if needed during the simulation. Other times, if pad placements were incorrect feedback was provided to the group during the debriefing session.
Utilizing the bag valve mask was another common equipment issue. Issues with the bag valve mask varied, but included locating, understanding how to expand the bag, and ensuring a seal with the mask. The importance of utilizing a bag valve mask or other barrier device also came up on multiple units as staff were unsure if they should provide mouth to mouth. Staff familiar with the bag valve mask were able to offer assistance and tips to peers who were less comfortable with the device.

**Timely defibrillation.** As identified in the results, many groups struggled with timely defibrillation. Interestingly, the only groups to miss defibrillation all together were ACLS areas including some of the intensive care units. It is important to note that on some occasions a strong leader was observed taking a step back allowing for other staff to work through the situation, encouraging them to utilize their resources and algorithms when they were unsure of the need for defibrillation. This action offered great learning opportunities, but likely a different outcome than if a real patient was in cardiac arrest. However, other groups simply missed defibrillation altogether, perhaps even giving epinephrine without a single shock. Regardless of area or frequency of cardiac arrests, it was important that all areas were included in this program with a focus on first 5 minute early interventions.

The facilities have much opportunity for growth, as under 1/3 of units provided defibrillation in less than 2 minutes from the time they recognized the loss of pulse. Real life scenarios make this goal even more difficult as staff may not be in the room at the time of the rhythms change allowing even more time to pass before defibrillation. One participant shared, “During the mock code, we assumed the team was coming; therefore, there was a delay in applying AED, lesson-do not delay applying AED.” This was a great learning opportunity that reoccurred during simulations. Many units verbalized that they waited for the code team to come
before shocking. Even with quick response times from the code team, this goal is difficult to meet as two minutes passes quickly and leads to worse outcomes.

**High quality CPR.** As described earlier, it is well known that high quality CPR is essential to improving patient outcomes. However, very few groups addressed the quality of CPR providing necessary feedback during the simulations. When asked how to tell if high quality CPR is being delivered a common response was to feel for a pulse during chest compressions. Literature does not support this practice, but instead recommends utilization of qualitative feedback from the leader, or advanced monitoring such as end tidal carbon dioxide (ETCO2) levels (Meaney et al., 2013). During the simulations, all groups had opportunities to improve on at least one key component (compression depth, compression rate, full chest recoil, chest compression fraction, and 30:2 compression ventilation ratio). Discussions commonly revolved around identifying ways to optimize care such as ensuring a backboard and positioning self in order to optimize compression depth.

Interestingly, the majority of staff ranked the quality of interventions provided as being good or exceptional; yet, during the debrief the facilitator and content expert as well as teams recognized many gaps between knowledge of high quality CPR components and skills demonstrated during the simulation. Additionally, gaps remain in meeting the timely interventions as set by Get with the Guidelines: Resuscitation.

Many great learning opportunities were presented during the simulations. Key learning themes were communicated with leadership and other staff on the units through a feedback form. On this form a recap of the simulation, simulation timeline, and a few key learning points or reminders were described. Unit leadership was asked to share this information with all unit staff
in an attempt to expand learning beyond the few individuals who participated in a given situation.

**Limitations and Special Considerations**

In the beginning of this pilot, simulation days utilized only 50% of the simulation slots available for the day. This was expected as Walker et al. (2013) had reported similar issues with over a 50% cancellation rate reported for their facility. Although expected, this made the simulations more resource intensive as paid instructors were not able to work to their fullest capacity on these dates. Bed availability and high census issues were contributing factors to this low unit participation. Concerns also existed related to manager buy-in for some of these units. This seemed to improve over the course of the pilot, with two of the days utilizing seven of the eight available simulation slots available.

Moving simulation out of the simulation lab offered many benefits, but also required additional planning. Recommendations provided by Walker et al. (2013) were utilized for this program. Recommendations include: arrange time with leadership to ensure the simulation will not present any risk, assess clinical commitments around the hospital prior to an in situ simulation to ensure it is safe to run the simulation, communicate clearly with patients and families in the vicinity to avoid raising concern or distress, recruit a staff member from the in situ location to pre-brief on situation, offer direction to set expectations, followed by minimal involvement of facilitators, debrief at the end of the simulation event, and follow-up on any latent threats identified. With the utilization of these recommendations, no complaints were received related to patient safety or satisfaction during the simulations.

Another limitation for participants is the level of realism. Even with the use of high fidelity manikins, the manikins do not show all of the signs or symptoms that would be exhibited
by real patient. For example, their color does not change and the manikin will not looked distressed in the way a real patient might. Staff occasionally needed cues to let them know that something had changed. Another obstacle was that the patient was not in the electronic record. Many staff, especially in pre-procedural areas, felt they would have typically utilized this record in order to know more detail about their patient prior to arrival and the emergency situation. Other individuals struggled with the lack of the response or different response from the code team. The code team did not respond to most of the simulations. Some staff members struggled with this as they know in reality they would have additional resources. However, in these situations, the content expert and facilitator stressed the importance of interventions prior to code team arrival and possibility of delays due to paging issues or simultaneous emergency events.

All staff must know and be prepared to respond prior to arrival of the code team. Emergency response pages that were called to the teams were always announced as mock. Not all team members participated in these events as they had ongoing patient care responsibilities that they may not be able to leave for educational purposes at a moment’s notice.

Long term outcomes will focus on patient mortality data. These outcomes will monitor a combined mortality rate for code blue and rapid response calls. At this time, the facility does not have the ability to separate this data for comparison to national averages. With ongoing simulation, education opportunities, and improvements to system processes mortality rates are expected to improve.

**Considerations for the Future**

Continuation of the code blue in situ simulation program is recommended. This pilot has demonstrated the ability to improve staff confidence to respond to a cardiac arrest. It has also demonstrated a gap in early defibrillation for both BLS and ACLS floors in both facilities.
Ongoing monitoring of time to defibrillation should be monitored for improvements. Due to multiple requests by varying emergency response leaders, an ongoing, integrated, in situ emergency response simulation plan is recommended. This plan should include STEMI (ST elevated myocardial infarction), stroke, trauma, and code blue in situ simulations for the adult patient care areas. It may also be necessary to consider emergency response specific to other patient populations served in these facilities. Integration of the varying emergency responses will offer opportunities to prepare staff for any emergency situation including the pre-arrest state. Rotating simulations will also require participants to work through varying scenarios avoiding preconceived notations and jumping to conclusions about the simulation.

**Nurse Educator Application to Practice**

Great opportunities exist for the nurse educator to influence practice and outcomes in patient care. This project has offered many opportunities to lead in quality improvement as the facilities strive to be leaders in cardiovascular and resuscitation care. Understanding the organization and opportunities for growth allowed for application of the nurse educator role as a change agent and leader. This project offered opportunity to address a need and move the organization forward with multidisciplinary involvement to better meet the needs of the patients served at these facilities. This simulation program has required the nurse educator to develop a new educational program to facilitate learning. It was necessary for the nurse educator to address outcome development and evaluation methods to determine the effectiveness of the program. Learner development and socialization was also an important aspect of this program. Maintaining a safe learning environment while promoting staff reflection and open conversations are all important aspects of simulation and incorporated within the code blue in situ simulation program.
Conclusion

This code blue in situ simulation program has demonstrated favorable outcomes and feedback from participants and leadership. The code blue in situ simulation pilot has demonstrated the ability to increase staff confidence to respond to an emergency situation. Opportunities remain for improving staff performance in care of the patient experiencing a cardiac arrest as well as other emergency response situations supporting the ongoing implementation of this program.
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