Code Blue in Situ Simulation Program

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Code Blue In Situ Simulation Program

JoAnn Tingum

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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 infraction), 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 exist 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]

- <1 year: 18%
- 1-5 years: 33%
- 6-10 years: 19%
- 11-15 years: 19%
- >15 years: 11%

*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**

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/post Procedure</td>
<td>7%</td>
</tr>
<tr>
<td>IMC</td>
<td>37%</td>
</tr>
<tr>
<td>ICU</td>
<td>13%</td>
</tr>
<tr>
<td>MH</td>
<td>33%</td>
</tr>
<tr>
<td>Med/Surg Area</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
</tbody>
</table>

*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

![Graph showing reported increase in confidence](chart)

*Figure 3. 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 chest compressions

![Graph showing time to first chest compressions with goals](image)

*Figure 6.* Time to first compressions were measured during each simulation from the time staff first recognized pulselessness.

**Figure 7.** Time to first defibrillation

![Graph showing time to first defibrillation with goals](image)

*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**

![Bar chart showing teamwork responses]

**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](chart.png)

*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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Health Partners. (2014) The first 5 minutes adult mock code observation. (Form).


Appendix A:

In Situ Simulation Program Overview

Code Blue In-situ Simulation Program

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Proposal

When a patient experiences a cardiac arrest, survival rates are linked to the quality of cardiopulmonary resuscitation (CPR) (Meaney et al., 2013). 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, and excessive interruptions to chest compressions are among other potentially fatal mistakes. Meaney and colleagues (2013) state, “Poor-quality CPR should be considered a preventable harm” (p. 2). All staff must be prepared and confident in their ability to begin immediate, high quality resuscitation of a patient prior to the arrival of the code team. Quality improvement education can help improve patient outcomes (Meaney et al., 2013). Due to the uncommon nature of cardiac arrests, the quality of skills obtained during BLS courses may quickly decline (Meaney et al., 2013). I propose the development and implementation of an acute code blue in-situ simulation program at St. Mary’s Medical Center (SMMC) and Essentia Health Duluth (EHD).
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Needs Assessment

Organization
Essentia Health is committed to their patients and their community. The Professional Nursing Practice model can be seen in Figure 1. This model drives nursing practice at the organization and includes both the organizational mission “We are called to make a healthy difference in people’s lives” and values quality, hospitality, respect, justice, stewardship, and teamwork (Essentia Health, 2016). As an organization, Essentia Health strives to be the best place to receive care. We work to provide patients and their families with the safe, evidenced based care in order to achieve the best outcomes.

Literature and practice guidelines
“Poor-quality CPR should be considered a preventable harm” (Meaney et al., 2013 p. 2). Due to the uncommon nature of cardiac arrests, the quality of skills obtained during BLS courses may quickly decline (Meaney et al., 2013). Survival is dependent on fast, high quality interventions. 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). Get with the Guidelines-Resuscitation (American Heart Association, 2014) offers high quality measures that must be met during each cardiopulmonary arrest to provide patients with the best chance at survival.

These measures include, but are not limited to:

- Chest compressions begin within less than one minute
- Defibrillation within less than 2 minutes
- Chest compression depth > 50 mm
- Chest compression rate ≥ 100 (100-120 per 2015 BLS guidelines, not reflected in GWTG-R to date)
- Chest compression fraction > 0.8
Staff Survey
In a survey of staff (primarily RNs, LPNs, CNAs and Surgical technicians) in the East Region, over 8% of staff report a limited or lack of understanding related to responding to Rapid Response or Code Blues (Figure 2). When it comes to emergencies, all staff must be prepared to respond quickly.

This group of staff also indicated that hands-on learning is their primary learning preference, followed by visual learning (Figure 3, p. 34).

Latent Threats
Latent threats are those issues or risks in the clinical system that could potentially harm or significantly impact patient care (Lok, Peirce, Shore, & Clark, 2015). Through in-situ simulation, the program will offer an opportunity to see real problems related to performance, processes, or equipment on actual patient units. Finding these problems during simulation, offers opportunity to correct proactively.

Ex: An in-situ simulation completed at a critical access hospital found that the defibrillator in use could not charge adequately to deliver a shock at 150 joules. This defibrillator had passed its last energy check completed that morning. It was found to be unplugged from the back of the machine. This issue was resolved after the defibrillator was recharged for 24 hours. The immediate issue was corrected without harm to the patient. Additionally, changes were made to the defibrillator checks to always ensure the machine is plugged into the wall and that the cord is not lose on the back of the defibrillator.

Figure 2. A total of 1,424 staff responded to Essentia Health’s Needs Assessment survey. This question had 1,254 responses. Staff surveyed included RNs, LPNs, CNAs, HUCs, behavior health technicians, and surgical technicians. From Essentia Health. (2016) Nursing education needs assessment 2016.
CODE BLUE IN SITU SIMULATION PROGRAM

SWOT Analysis

A SWOT analysis was completed. Details can be found in Figure 4.

Figure 3. Preferred Learning Modality from Essentia Health. (2016) Nursing education needs assessment 2016.

<table>
<thead>
<tr>
<th>Internal</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>1. Low cost-facilitator will work within scheduled hours (salaried position)</td>
<td>1. Will not reach all staff during education</td>
</tr>
<tr>
<td>Staff will participate in education within their scheduled shift</td>
<td>2. Staff buy-in</td>
</tr>
<tr>
<td>2. Simulation resources are available</td>
<td>3. No CEUs available due to short timeframe of education sessions</td>
</tr>
<tr>
<td>3. Simulation facilitators are already trained in running the manikins</td>
<td>4. Unpredictable staffing and hospital fluctuations and needs→there may be times when an open room is not available on a unit, a real event is occurring, staff are already working with limited resources or staff</td>
</tr>
<tr>
<td>4. The ALS manikin is very easy to transport to any location</td>
<td>5. Not all staff like simulation</td>
</tr>
<tr>
<td>5. In-situ allows for staff to use real equipment (AED and manual defibrillators) in real setting</td>
<td>6. Competition for equipment with other programs</td>
</tr>
<tr>
<td>6. Most staff are familiar with the simulation manikins</td>
<td>7. Unplanned maintenance issues</td>
</tr>
<tr>
<td>7. Safe learning environment</td>
<td></td>
</tr>
<tr>
<td>8. Opportunity for objective feedback to staff</td>
<td></td>
</tr>
<tr>
<td>9. Leadership support—education department and acute code blue committee</td>
<td></td>
</tr>
<tr>
<td>10. Improve quality of code blue interventions and patient care</td>
<td></td>
</tr>
</tbody>
</table>

| External                          |                                                          |

We strive to meet a variety of learning needs so please share how you learn best

<table>
<thead>
<tr>
<th></th>
<th>Views</th>
<th>Lecture</th>
<th>On-Line</th>
<th>Auditory</th>
<th>Hands-on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked</td>
<td>1,412</td>
<td>325</td>
<td>330</td>
<td>174</td>
<td>103</td>
</tr>
<tr>
<td>Rate</td>
<td>99.2%</td>
<td>23.3%</td>
<td>26.9%</td>
<td>21.8%</td>
<td>76.2%</td>
</tr>
</tbody>
</table>

Table 1: Least Preferred Learning Method

<table>
<thead>
<tr>
<th>Learning Method</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Views</td>
<td>1.00</td>
<td>5.00</td>
<td>3.00</td>
<td>3.10</td>
<td>1.80</td>
</tr>
<tr>
<td>Lecture</td>
<td>1.00</td>
<td>5.00</td>
<td>3.00</td>
<td>3.10</td>
<td>1.80</td>
</tr>
<tr>
<td>On-Line</td>
<td>1.00</td>
<td>5.00</td>
<td>3.00</td>
<td>3.10</td>
<td>1.80</td>
</tr>
<tr>
<td>Auditory</td>
<td>1.00</td>
<td>5.00</td>
<td>3.00</td>
<td>3.10</td>
<td>1.80</td>
</tr>
<tr>
<td>Hands-on</td>
<td>1.00</td>
<td>5.00</td>
<td>3.00</td>
<td>3.10</td>
<td>1.80</td>
</tr>
<tr>
<td>Opportunities</td>
<td>Threats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Support Chest Pain and Resuscitation Center Certification</td>
<td>1. Patient safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Provide exemplar of efforts on teamwork, patient safety, and debriefing to Joint Commission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Assess latent threats on units</td>
<td>2. Customer Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reinforce new evaluation and debriefing processes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Interdisciplinary education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Team building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 4. SWOT analysis*

**Goal, Objectives, and Outcomes:**

**Goal:** Staff will be able to care for a patient experiencing a cardiopulmonary arrest with effective teamwork and meeting best practice measures.

**Objectives**

- Demonstrate high quality response to patients experiencing a respiratory and/or cardiac arrest as defined by Get With The Guidelines Resuscitation
- Evaluate components of teamwork and communication utilized during the simulation
- Report improved confidence to respond to a patient experiencing a cardiac arrest

**Outcomes**

SMMC and EHD will consistently meet the standards set by the American Heart Association’s Get with the Guidelines.
Purpose, Theory, Modality and Structure

Purpose

The purpose of the acute code blue in-situ simulation program is to improve individual and system response.

This formative education will provide staff opportunities for hands on practice caring for a patient experiencing a cardiac arrest. Debriefing and feedback will assist participants in growing in their individual practice. They will learn through a combination of hands on skills, reflection, discussions, and objective feedback.

Additionally, this education will help the organization grow at a systems level. It will provide an opportunity for assessment of any latent threats. Any latent threats uncovered will be addressed proactively. System wide reporting, will allow for these threats to be addressed in the area where they were discovered as well as any other area that could potentially experience the same issue or threat.

Theory

All participants are adult learners employed at SMMC or EHD. This simulation will provide learning a variety of disciplines from our multidisciplinary team. The largest group of participants is expected to be nursing including RNs, LPNs, and CNAs. Only one simulation per in-situ simulation day will be called through the emergency response system requiring participation from the code blue team in its entirety. Staff have varying experience levels from novice to expert.

Knowles Adult Learning Theory has been considered throughout the development of this program.

Patient survival rates at EHD and SMMC will meet the rates seen by the highest performing hospitals. These rates are projected to meet 34.5%, but currently observed at 22.4% (Anderson et al., 2016).
**Modality**
In-situ Simulation will be utilized for this program.

**Structure**

---

### Brief Case Summary

Report will be called to the nursing unit regarding a patient being admitted with c/o SOB. The manikin will be brought to the patient unit. Upon being moved into bed the patient will experience a cardiopulmonary arrest. Staff will be expected to complete five minutes of BLS. At four minutes, a facilitator will enter the room as a code team responder. As a confederate (code team leader) they will provide participants with real time feedback and offer an opportunity for staff to correct any issues in BLS performance. At five minutes, the patient will achieve ROSC and the simulation will end.

---

### Suggested priority Interventions

<table>
<thead>
<tr>
<th>Patient Assessment Data</th>
<th>Expected Interventions</th>
<th>Script</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Settings:</strong> Wheezing HR 110 BP 95/52 RR 24 Sat 94% 3L nc HR 51/52</td>
<td>□ AIDET □ Move patient into bed</td>
<td>Pt:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family:</td>
</tr>
<tr>
<td><strong>Case progression details:</strong> Cardiac arrest Pt loses consciousness V-fib</td>
<td>□ Check for a pulse □ Check code status □ Call a code blue □ Start CPR □ Place backboard □ Defibrillate □ BVM □ Support family member</td>
<td>Family: “what’s wrong? Why is he so grey? He doesn’t look good. Do something.”</td>
</tr>
<tr>
<td><strong>Case progression details:</strong> At 4 minutes</td>
<td>□ SBAR report to code responder</td>
<td>Code blue team responder (facilitator): enter room provide any needed direction/demonstration with a focus on BLS measures</td>
</tr>
<tr>
<td><strong>Case progression details:</strong> 5 minutes Pt achieves ROSC Coughing HR 100 BP 93/50 Sats 90%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical Scenario

Multiple clinical scenarios will be used to increase relevance to floor receiving patient. The scenarios have the same base with slight modifications.

Gen med floors:
George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Sats on arrival 86% on RA, appeared distressed, accessory muscle use. 3 L O2 nc and neb given. Current VS: 92% on 3L, HR 110 SR, BP 105/62, RR 23. SIRS criteria met: BCx2, and antibiotics started. Hospitalist

IMC:
George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Sats on arrival 82% on RA, appeared distressed, accessory muscle use. Neb given and placed on Bipap. Current VS: 92% on 40% bipap, HR 110 SR, BP 105/62, RR 23. SIRS criteria met: BCx2, and antibiotics started. ABGs 7.35, PO2 65, PCO2 50, HCO3 22. Alert and Oriented. Hospitalist

NTIMC
George Simonson is a 65 y/o male admitted 2 days ago with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Brought in by EMS: sats 72% on RA, appeared distressed, accessory muscle use. Intubated/extubated yesterday. HR 90 SR, BP 105/62, RR 23. Need to transfer out quickly for 2 traumas coming in. Critical care posted a hospitalist.

ICU
George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Brought in by EMS: sats 72% on RA, appeared distressed, accessory muscle use, intubated in field. Current VS: 94% on 60% vent (PRVC Vt 500, RR 20, P5), HR 110 SR, BP 105/62, RR 23. BCx2, and antibiotics started. ABGs 7.35, PO2 65, PCO2 60, HCO3 22. Versed at 2, fentanyl at 50. Sedated. Critical care is posted to see.

Fidelity

Physical Fidelity
An ALS manikin (high fidelity) will be utilized for these simulations. This manikin offers key components including:
• Rhythm generation
• Vital signs (monitor and manual abilities)
• Pulse-radial and carotids
• Chest rise
• Vocal capabilities
• Ability to perform chest compressions
• Ability to defibrillate with manual defibrillator
• IV access

The in-situ simulation will provide the highest level of environmental fidelity. Real patient care areas and actual emergency response systems will be called.

The following real equipment will be utilized.

• Crash carts
• Manual defibrillators
• Respiratory box

The following simulation equipment will be utilized

• Simulation medication trays
• Training AED

Conceptual Fidelity
Content experts from the code blue committee reviewed the scenario to ensure the scenario is as realistic as possible.

Psychological Fidelity
The ALS manikin supports an active voice for active conversation prior to the event. Confederates including a code team responder and family member will be utilized as able. The priority confederate role will be the code team responder.

Facilitator Approach
At least one facilitator for each simulation will have completed an approved facilitator training course. The facilitator will allow participants to complete all actions without interruption (with the exception of any potential safety concerns) until four minutes. All staff participating in the simulation have completed BLS certification and should have the appropriate base knowledge to be successful in this simulation experience.

Briefing
This simulation will be unannounced to the staff participating. Communication will go out in advance to hospital leadership. Day of communication will be completed with leaders of departments and disciplines involved as determined by the communication plan.
**Participant Briefing**

Participant briefing will be brief due to the unannounced nature of the simulation. At the time the “patient” is placed in the bed the facilitator will provide basic instruction including:

- Treat this as a real scenario
- You may utilize all of your normal resources
  - Anything off limits must be disclosed at this time

**Debriefing and Feedback**

**Debriefing**

Debriefing for these simulations will occur immediately following the simulation. All staff who participate are expected to stay for debrief as able. A facilitator who observed the simulation and has completed training in debriefing is to lead the debrief in collaboration with a content expert.

A safe learning environment is to be upheld throughout the debrief as facilitators guide participants to reflect on the experience.

<table>
<thead>
<tr>
<th>Debriefing Guide</th>
<th>Debriefing Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>- What are you feeling after this simulation?</td>
<td>- Hand placement 2 hands on lower ½ of sternum</td>
</tr>
<tr>
<td>- Facts of the case</td>
<td>- Defibrillation within 2 minutes</td>
</tr>
<tr>
<td>- I noticed.....tell me about....</td>
<td>- Airway management within 1 minute (visible chest rise)</td>
</tr>
<tr>
<td>- Ex: I noticed the patient was shocked after 3 minutes. Tell me about defibrillation....when? why?</td>
<td></td>
</tr>
<tr>
<td>- High quality BLS is a priority. Tell me about some of the key components of high quality CPR (30:2). Were there any difficulties in achieving high quality BLS? Was there anything that might have helped?</td>
<td></td>
</tr>
<tr>
<td>- Chest compression initiation within 1 minute</td>
<td></td>
</tr>
<tr>
<td>- Rate 100-120</td>
<td></td>
</tr>
<tr>
<td>- Depth between 2-2.4 inches</td>
<td></td>
</tr>
<tr>
<td>- Full chest recoil (do not lean on the patient between compressions)</td>
<td></td>
</tr>
<tr>
<td>- Minimize interruptions (&lt;10 seconds)</td>
<td></td>
</tr>
<tr>
<td>- Teamwork and communication are essential during emergency situations. When you think about teamwork and communication, what went well? What are some opportunities for improvement?</td>
<td></td>
</tr>
<tr>
<td>- Closed loop communication</td>
<td></td>
</tr>
<tr>
<td>- SBAR</td>
<td></td>
</tr>
<tr>
<td>- Respect</td>
<td></td>
</tr>
<tr>
<td>- Roles</td>
<td></td>
</tr>
<tr>
<td>- Leadership</td>
<td></td>
</tr>
<tr>
<td>- Is there anything you would do differently next time?</td>
<td></td>
</tr>
<tr>
<td>- What are some key take always from today’s simulation?</td>
<td></td>
</tr>
</tbody>
</table>
Feedback
Real time feedback will be provided by the content expert/facilitator during the final minute of the simulation.

Any feedback provided must be respectful and objective in nature.

Following the simulation, a Unit Feedback Form (Figure 5) will be completed and provided to unit leadership to share with additional staff.

Evaluation
This simulation will be evaluated in a variety of ways.

Full Code Pro app (Figure 6) will be utilized by a facilitator to evaluate and record timing and quality of interventions. This data will be utilized in the feedback provided to the units. Click here to link to website.

First Five Minute Code Blue Simulation Form (p. 47) will be utilized for observation related to details and quality of interventions.

A latent threat evaluation will be completed for every simulation event. Identifying latent threats will help evaluate the organization at a systems level. The National Patient Safety Agency’s (2008) Consequence Score will be utilized for evaluating latent threats (Figure 7). All latent threats scoring high to extreme risk will be reported through Essentia Health’s patient safety reporting system. Moderate risk scores will be evaluated case by case and may be reported through the patient safety reporting system. Low risk threats will not be reported.

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Catastrophic</td>
<td>Rare</td>
</tr>
<tr>
<td>4 Major</td>
<td>15</td>
</tr>
<tr>
<td>3 Moderate</td>
<td>4</td>
</tr>
<tr>
<td>2 Minor</td>
<td>2</td>
</tr>
<tr>
<td>1 Negligible</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: the above table can be adapted to meet the needs of the individual trust.

For grading risk, the scores obtained from the risk matrix are assigned grades as follows:
- 1–3: Low risk
- 4–6: Moderate risk
- 8–12: High risk
- 15–25: Extreme risk

Figure 7. Consequence Score from The National Patient Safety Agency, 2008
Staff will be required to complete an evaluation form (p. 49) on high quality BLS, teamwork, and confidence level following the simulation event.

Outcomes will be evaluated for growth over an extended time (annual data reports). Metrics and data for following outcomes are being worked on by the Regional Code Blue Committee.

**Participant Preparation**
No participant preparation is required for this simulation. All staff are required to keep BLS certification current.

**Pilot**
The was completed in September-November 2016.
CODE BLUE IN SITU SIMULATION PROGRAM

In-situ Simulation Policy Draft

DEPARTMENTAL POLICY AND PROCEDURE

SUBJECT: In-situ simulation
SCOPE: 
SECTION: Adult Acute Care, Clinical Education
PRIMARY AUTHOR: Nursing Professional Development Specialist
APPROVAL AND DATE: This policy has not been reviewed or approved by any group at this time.

KEY WORDS: simulation, in-situ, in situ, patient care unit, education

PURPOSE:
I. To provide clear guidelines for in-situ simulation
II. To provide a consistent procedure for facilitating simulation on a patient care unit.
III. We are called to make a healthy difference in people’s lives by providing a safe environment that promotes a high-quality care, hospitality, respect, and justice through teamwork.

DEFINITION:
I. In-situ: Taking place in the actual patient care setting/environment in an effort to achieve a high level of fidelity and realism
II. Debriefing: A formal, collaborative, reflective process led by a facilitator following a simulation session. Participants’ reflective thinking is encouraged and feedback is provided regarding the participants’ performance while various aspects of the completed simulation are discussed. Participants are encouraged to explore emotions and question, reflect, and provide feedback to one another.
III. Evaluation: A broad term for appraising data or placing a value on data gathered through one or more measurements. It involves rendering a judgment including strengths and weaknesses. Evaluation measures quality and productivity against a standard of performance.
IV. Facilitation: A method and strategy that occurs throughout simulation based learning experiences in which a person helps to bring about an outcome by providing unobtrusive guidance.
V. Facilitator: An individual who provides guidance, support
VI. **High stakes evaluation:** An evaluation process associated with a simulation activity that has a major education or employment consequence (such as pass or fail implications, a decision regarding competency, merit pay, promotion, or certification)

VII. **Participant:** One who engages in simulation-based learning activity for the purpose of gaining or demonstrating mastery of knowledge, skills, and attitudes of professional practice

VIII. **Safe Learning Environment:** The positive emotional climate that facilitators create by the interaction between facilitators and participants. In this positive emotional climate, participants feel at ease taking risks, making mistakes, or extending themselves beyond their comfort zone. Facilitators should be thoroughly aware of the effects of unintentional bias, aware of cultural differences and attentive to their own state of mind in order to effectively create a safe environment for learning.

IX. **Unit Leadership:** Depending on the area and simulation, this may be defined as the manager, director, clinical nurse specialist, assistant head nurse, or charge nurse.

**POLICY:**

I. In-situ simulation may be completed when simulation will be enhanced by an actual patient care setting.

II. In-situ simulations must be carefully planned in collaboration with unit leadership to ensure patient care and safety is not negatively impacted by the in-situ simulation event.

III. In-situ simulations must strive to promote the development of the individuals, teams, and system through education, ultimately improving the care delivered to our patients.

IV. A safe learning environment will be promoted during all phases of in-situ simulation.

V. Facilitators, participants, and all individuals involved in the simulation are expected to uphold Essentia Health’s mission and values. All staff must demonstrate the highest levels of professionalism and respect. All participants are expected to actively engage in the simulation and debriefing. Every interaction is to be conducted with the dignity and respect that is required to bring excellence to the work we do.

**PROCEDURE:**

I. Communication and planning
a. The facilitator is to collaborate with unit leadership to ensure appropriateness and safety of simulation in a patient care area. Any equipment not to be used during the simulation should be identified.
b. The facilitator is responsible for communicating with leadership of disciplines expected to be impacted by the simulation.
c. Unit leadership may cancel a simulation at any time due to unit needs, patient safety concerns, or patient care needs.
d. Unit leadership is to communicate with patients and families as applicable to ensure positive patient care experiences.
e. Any simulations being called through the emergency response system must be identified as “mock”

II. Simulated medications

a. Only simulated medications are to be used during in-situ simulation sessions.
b. All simulated medications must be clearly marked as educational use only
c. All simulated medication must be clearly labeled with actual contents
d. Simulated medications must be counted before and after in-situ simulation event. Facilitators are not allowed to leave patient care unit until final count is complete and each simulated medication brought to the unit is accounted for.

III. Patient care equipment

a. Patient care equipment may be utilized during in-situ simulation as appropriate. Any equipment that is not to be used during simulation must be communicated prior to the start of the simulation.
b. Any emergency equipment utilized must be properly restocked and locked as applicable at the end of the simulation event.
c. Unit leadership is responsible for following restocking procedures for any emergency equipment unlocked during simulation.

IV. Debriefing, Evaluation, and Feedback

a. All simulation sessions must include a planned debriefing session aimed toward promoting reflective thinking.
b. Debriefing should be led by a facilitator who
   i. Observed the simulation event
   ii. Has training in debriefing
c. Content experts should assist with debrief following simulation
d. Individuals
i. Any planned high-stakes evaluations must be explained to participants prior to simulation experience

ii. Any concerning behaviors or performance observed may be shared with unit leadership regardless of situation

e. Teams

f. System In-situ simulation offers valuable opportunities to assess our response at a systems level

i. Latent threats need to be assessed after every in-situ simulations. It is recommended that facilitators utilize the National Patient Safety Agency’s Risk scoring.

ii. Latent threats should be submitted to patient event reporting system

1. Utilizing the National Patient Safety Agency’s Risk Scoring, all extreme and high risk threats must be reported. Moderate risks should be evaluated case by case and reported as necessary. Low risk threats do not need to be entered into the patient event reporting system.

REFERENCE(S):


<table>
<thead>
<tr>
<th>Time</th>
<th>Correct Critical Actions</th>
<th>Incorrect Critical Actions</th>
<th>Comments</th>
</tr>
</thead>
</table>
| 1    | Assess patient/establish patient stability | ☐ Obtain history/report SBAR  
☐ Assess ABCs-primary & secondary assessment; vital signs  
☐ Determine instability | ☐ No history/report obtained  
☐ Only partial assessment of ABCs  
☐ No vital sign assessment  
☐ Does not recognize instability | ☐ Prompt required |
| 2    | Call for help/get assistance | ☐ Activates rapid response alert if indicated  
☐ Uses staff assist button to call out for help  
☐ Uses emergency light (pull cord out) for help  
☐ Delegates staff for help  
☐ Crash cart brought into the room | ☐ Leaves patient to get help or supplies  
☐ Does not use established methods for emergency notification  
☐ No delegation for assistance_SUPPLIES_  
☐ Crash cart not brought into the room | ☐ Prompt required |
| 3    | When manikin becomes pulseless; start stopwatch 0000 | ☐ Checks for pulse ≤ 10 seconds | ☐ Not done  
☐ > 10 seconds | |
| 4    | Staff establishes unresponsiveness | ☐ Activates code blue  
☐ Code cart brought to room if not previously done  
☐ Teamwork; delegation of tasks to staff | ☐ Leaves patient to get help or supplies  
☐ Does not use established methods for emergency notification  
☐ Does not have closed loop communication  
☐ No teamwork or delegation of tasks  
☐ Crash cart not brought into the room | ☐ Prompt required |
| 5    | Activates Code Blue  
Delegation of tasks  
Code cart arrival | ☐ Patient in a flat and supine position  
☐ Backboard placed prior to or slightly after chest compressions | ☐ Patient not in a flat and supine position  
☐ Backboard not placed  
☐ On floor | ☐ Prompt required |
| 6    | Patient positioned/backboard | ☐ Time to compressions ≤ 20 sec  
☐ No pause of BVM ventilation  
☐ Compression rate at least 100/min  
☐ Compression depth @ 2 inches  
☐ Compression hand positioning at the mid nipple line of the sternum  
☐ Recoil  
☐ Performs 2 min uninterrupted CPR | ☐ Time to compressions > 20 sec  
☐ Pauses or starts CPR after airway device  
☐ Compression rate too slow  
☐ Inadequate compression depth  
☐ Hand positioning too high or low  
☐ No recoil  
☐ Stops CPR before 2 min (any reason) | ☐ Prompt required |
| 7    | Code status verified | ☐ Patient positioned | ☐ Not done | ☐ Prompt required |
| 8    | Chest compressions started | ☐ Head-chin tilt or jaw thrust  
☐ Mask positioned correctly  
☐ Adequate mask seal  
☐ Establishes chest rise  
☐ Full expansion of bag  
☐ BVM attached to oxygen  
☐ Oxygen turned to 10-15 liters  
☐ OPA or NPA used as applicable  
☐ Advanced airway present  
☐ Respiration @ 1 every 6-8 seconds (8-10/minute) | ☐ Absence of head-chin tilt  
☐ Mask positioned incorrectly  
☐ Inadequate mask seal  
☐ Chest rise not established  
☐ Bag partially expanded  
☐ BVM bag not attached to oxygen  
☐ Oxygen not turned to 10-15 liters  
☐ Mouth to mouth (no airway device used)  
☐ Advanced airway present  
☐ Ventilations too fast or slow  
☐ Ventilations synchronized with | ☐ Prompt required  
☐ 1 person airway  
☐ 2 person airway |
The First “5 Minutes” Adult Mock Code Observation

References:
- HealthPartners Clinical Simulation and Learning Center. “The First 5 Minutes Adult Mock Code Observation/Critique”
Code Blue In-situ Simulation Evaluation

Date: _______________ Unit: _______________

Rating of 1 to 5 with 5 being the *highest* rating

<table>
<thead>
<tr>
<th>High quality interventions</th>
<th>Poor</th>
<th>Fair</th>
<th>Neutral</th>
<th>Good</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall my performance in providing high quality resuscitation measures during this scenario was</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Overall the team’s performance in providing high quality resuscitation measures during this scenario was</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

<table>
<thead>
<tr>
<th>Teamwork</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Our team worked effectively together</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Our team communicated clearly with one another</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify one strength and/or one area for improvement for your team.
CONFIDENCE

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. Following this simulation, I have increased confidence in my ability to respond to a code blue.

List one key learning point you will apply to future practice.

Please list the one thing found valuable about today’s simulation:

If there was anything that you found difficult about today’s simulation, please explain:
Case Scenario for Simulation

Code Blue in situ simulation

Preparation for Simulation

- Contact the following individuals prior to initiating simulation for the day
  - **Leader for each unit** - ensure appropriateness of code blue simulation and appropriate timing for unit.
    - Provide contact information for emergency cancelations
  - **Hospitalist**
  - **Critical Care**
  - **Security**
- **Facilitators and Roles**
  - Facilitator to run manikin
  - Facilitator to evaluate response
  - Family member confederate (optional)
- **Call report to charge nurse for ED admit or ICU transfer (See report scenarios)**

Scenario Overview

- **Target Group:** Inpatient nurse
- **Focus:** First 5 minutes code blue
- **Setting:** ICU Patient Room
- **Simulation Activity:** 5
- **Debriefing time:** 15 minutes

Brief Case Summary

Report will be called to the nursing unit regarding a patient being admitted with c/o SOB. The manikin will be brought to the patient unit. Upon being moved into bed the patient will experience a cardiopulmonary arrest. Staff will be expected to complete five minutes of BLS. At four minutes, a facilitator will enter the room as a code team responder. As a confederate (code team leader), the facilitator will provide participants with real time feedback and offer an opportunity for staff to correct any issues in BLS performance. At five minutes, the patient will achieve ROSC and the simulation will end.

Report

Gen med floors:
George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Sats on arrival 86% on RA, appeared distressed, accessory muscle use. 3 L O2 nc and neb given. Current VS: 92% on 3L, HR 110 SR, BP 105/62, RR 23. SIRS criteria met: BCx2, and antibiotics started. Hospitalist

6 W IMC:

George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Sats on arrival 82% on RA, appeared distressed, accessory muscle use. Neb given and placed on Bipap. Current VS: 92% on 40% bipap, HR 110 SR, BP 105/62, RR 23. SIRS criteria met: BCx2, and antibiotics started. ABGs 7.35, PO2 65, PCO2 50, HCO3 22. Alert and Oriented. Hospitalist

NTIMC

George Simonson is a 65 y/o male admitted 2 days ago with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Sats on arrival 82% on RA, appeared distressed, accessory muscle use. Intubated/extubated yesterday. HR 90 SR, BP 105/62, RR 23. Need to transfer out quickly for 2 traumas coming in. Critical care posted a hospitalist.

ICU

George Simonson is a 65 y/o male being admitted with SOB. He has a history of smoking 1 pack/day, hasn’t doctored in years, no home medications, probable COPD. Brought in by EMS: sats 72% on RA, appeared distressed, accessory muscle use, intubated in field. Current VS: 94% on 60% vent (PRVC Vt 500, RR 20, P5), HR 110 SR, BP 105/62, RR 23. BCx2, and antibiotics started. ABGs 7.35, PO2 65, PCO2 60, HCO3 22. Versed at 2, fentanyl at 50. Sedated. Critical care

---

**Learning Objectives:** Upon completion of this simulation, staff will be able to:

- Demonstrate high quality response to patients experiencing a respiratory and/or cardiac arrest as defined by Get With The Guidelines Resuscitation
- Evaluate components of teamwork and communication utilized during the simulation
- Report improved confidence to respond to a patient experiencing a cardiac arrest

---

**Environment Preparation for Simulation**

- ALS Manikin
  - Arm band
  - IV
  - Nasal cannula
- Green oxygen tank
- IV Fluid- NS
- Belongings bag
- Head set
- Simulation equipment
  - AED or manual defibrillator with adapters
  - Ambu bag

### Suggested priority Interventions

<table>
<thead>
<tr>
<th>Patient Assessment Data</th>
<th>Expected Interventions</th>
<th>Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Settings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheezying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR 110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP 95/52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sat 94% 3L nc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR 51/52</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>□ AIDET</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Move patient into bed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pt:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family:</td>
<td></td>
</tr>
<tr>
<td>Case progression details: Cardiac arrest</td>
<td>□ Check for a pulse</td>
<td></td>
</tr>
<tr>
<td>Pt loses consciousness V-fib</td>
<td>□ Check code status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Call a code blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Start CPR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Place backboard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Defibrillate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ BVM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Support family member</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Family: “what’s wrong? Why is he so grey? He doesn’t look good. Do something.”</td>
<td></td>
</tr>
</tbody>
</table>

Case progression details: At 4 minutes
- SBAR report to code responder

Case progression details:
- 5 minutes
  - Pt achieves ROSC
  - Coughing
  - HR 100
  - BP 93/50
  - Sats 90%

### Debriefing Guide

- What are you feeling after this simulation?
• High quality BLS is a priority. Tell me about some of the key components of high quality CPR (30:2)
  o Chest compression initiation within 1 minute
    • Rate 100-120
    • Depth between 2-2.4 inches
    • Full chest recoil (do not lean on the patient between compressions)
    • Minimize interruptions (<10 seconds)
    • Hand placement 2 hands on lower ⅔ of sternum
  o Defibrillation within 2 minutes
  o Airway management within 1 minute (visible chest rise)

• Teamwork and communication are essential during emergency situations. When you think about teamwork and communication, what went well? What are some opportunities for improvement?
  • Closed loop communication
  • SBAR
  • Respect
  • Roles
  • Leadership

• Is there anything you would do differently next time?

• What are some key take always from today’s simulation?

References


Description of event

Thank-you to all who participated!

These simulations offer opportunities for staff to practice code blue situations as a team as well as offering an opportunity to assess for latent threats or areas needing further attention. Ultimately we will improve care to our patients. No event will go perfectly. It is important to recognize we are not testing individuals; rather, we are looking for opportunities to improve our processes and our teams as a whole. More simulations will be coming. Thank-you for the continued support!

Areas identified for improvement
A code blue simulation program is being initiated at SMMC and EHD.

Over 5% of nursing and support staff recently surveyed from Essentia Health’s East region reported a limited or lack of understanding related to rapid response and code blue situations. All staff need to be prepared to immediately respond to a cardiac arrest with high quality interventions. This program will work to improve staff confidence and abilities to respond to these events. Ultimately, it will help our organization provide patients and their families with safe, high quality, and evidence based care in order to achieve the best outcomes.

Staff will have an opportunity to practice this high risk, low volume situation in their patient care setting.

The initial focus will be on med/surg units. A goal of eight simulations will be completed in one day, focusing on the first 5 minutes of CPR. One simulation during the day will be paged out to the multidisciplinary team requiring a system wide response.

This program aims to improve patient outcomes. Facilitators will track Get with the Guideline-Resuscitation measures including time to first compressions, time to first defibrillation, and quality of CPR. Debriefing and "Today, a large gap exists between current knowledge of CPR quality and its optimal implementation, which leads to preventable deaths attributable to cardiac arrest.” (Grayson et al. 2013)
participant evaluations will focus on quality of interventions, staff confidence, and teamwork. Additionally, a latent threat evaluation will be completed following every simulation offering a proactive approach to improve our system. Information from these events will be shared at unit and system leadership including the code blue committee to optimize opportunities for improvement across our organization. It is important to recognize this program is not testing individuals; rather, it provides an opportunity for learning and improvements.


Any questions or concerns can be directed to JoAnn Tingrum at joann.tingrum@essentiahealth.org, ext 64827

Expectations:

- Tentative simulation dates will be communicated at the beginning of each month.
- A facilitator will attend the bed huddle on the day of the planned simulation to assess the status and appropriateness of the simulation event.
- Every effort should be made to hold planned simulation as scheduled; however, simulation experiences may need to be canceled due to staffing, volume, or other unforeseen events occurring in the hospitals.
- Unit leadership (manager, charge nurse, clinical supervisor, or CNS) may cancel the event at any time if necessary due to patient care needs.
- All staff should participate as able in the simulation and debriefing.
- Leadership and management will support the program. This may include being present during the simulation event, talking to patients and families in the area, encouraging and supporting staff participation, and/or engaging unit-specific follow-up as needed.
- A safe learning environment must be maintained. Simulation offers an opportunity for learning from our success and failures. It is okay if errors are made or goals are not met. It will offer opportunities for learning and improvement.
- Real equipment will be utilized as able for these events. Stocking and outdate checks should be completed by the charge nurse or designated unit leadership prior to locking the crash carts after each event.
- Any calls made through the emergency paging system will be identified as “mock.”

8.11.16 JCT
**Simulation Check List and Schedule**

**Acute code blue in-situ simulation checklist**

**Planning phase**

- Advanced communication with code blue team members
  - Committee presentation date ____________
  - Email to all committee members
  - Meetings
    - Directors/managers
    - Risk Management
    - By request
    - Security
- Enlist facilitator support
  - Evaluator
  - Family member confederate
- Tentative dates
- Attend bed huddle for green light

**Implementation day timeline:**

**0800-0900**

- Day of communications
  - 815 Bed Huddle
  - Security ongoing communication on day of simulation
  - Physicians
  - Units: complete schedule

**0900-1400**

- Schedule in half hour blocks
  - 5 min for report/settle into bed, 5 minute simulation, 10 minute debrief....pack-up and move to next unit

**Following Simulation**

- Clean-up
- Upload feedback assessments
- Complete follow-up forms and send to unit leadership
- Debrief planning group
References


http://www.heart.org/idc/groups/heart-public/@private/@wcm/@hcm/@gwtg/documents/downloadable/ucm_434082.pdf


http://dx.doi.org/10.1016/j.ecns.2013.04.001


