Walden University ScholarWorks

Walden Dissertations and Doctoral Studies

Walden Dissertations and Doctoral Studies Collection

2015

The Use of Mock Code Training in Improving Resuscitation Response

Maureen Anne O'Brien
Walden University

Follow this and additional works at: https://scholarworks.waldenu.edu/dissertations

Part of the Nursing Commons

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact ScholarWorks@waldenu.edu.

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Maureen O'Brien

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Marilyn Murphy, Committee Chairperson, Health Services Faculty
Dr. Patrick Palmieri, Committee Member, Health Services Faculty
Dr. Janice Belcher, University Reviewer, Health Services Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2015

Abstract

The Use of Mock Code Training in Improving Resuscitation Response

by

Maureen O'Brien

MSN, University of Pennsylvania, 1985

BSN, Fairfield University, 1980

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2015

Abstract

The American Heart Association's Get With the Guidelines (GWTG) has established measures for how quickly a resuscitation team is to respond in a cardiac arrest with performance of cardiopulmonary resuscitation (CPR) and defibrillation. Two of the core measures for GWTG require initiation of CPR within 1 minute of cardiac arrest and defibrillation within 2 minutes in at least 85% of cases. The problem of interest in this Doctor of Nursing Practice (DNP) project was that the facility had not been able to reach 85% on these 2 measures. The purpose of this project was to achieve nursing response times for CPR and defibrillation to meet the core measures. Using the logic model, the project leader implemented mock code training over an 8-week period on the medical-surgical units. The study design for this project was a nonexperimental, retrospective chart review. Compliance data were obtained from the American Heart Association's GWTG database for the facility before and after implementation of mock code training. The results included a review of 10 cardiac arrest cases that occurred after implementation of training. There was 100% compliance with initiation of first compression within 1 minute of cardiac arrest. However, of 2 cases that required defibrillation, only 1 received the shock within 2 minutes. Quantitative descriptive analysis used percentages and a runs chart to compare response times prior to training with response times after training. The chart showed improvement in the area of first compression in meeting the goal of 85% compliance. As a result, the facility will continue to implement mock code training on a routine basis in its effort to improve patient outcomes, including survival and quality of life.

The Use of Mock Code Training in Improving Resuscitation Response

by

Maureen O'Brien

MSN, University of Pennsylvania, 1985

BSN, Fairfield University, 1980

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2015

Dedication

This project is dedicated to my husband, Cliff, and sons, James and Chris. They have been extremely patient through my DNP journey. This project would not have been possible without their loving support.

Acknowledgments

I wish to thank my preceptor, nurse administrators, and colleagues for their continued support and guidance throughout my DNP project. I also wish to thank Dr. Marilyn Murphy for her expertise and encouragement in every step.

Table of Contents

List of Tables

List of Figures

Section 1: Nature of the Project

Introduction

Cardiac arrest, also known as *cardiopulmonary arrest*, is a sudden stop in blood circulation due to failure of the heart to contract effectively. A cardiac arrest may result from a lethal heart rhythm such as ventricular fibrillation that does not produce a cardiac contraction. The resulting lack of cardiac output causes the person to have no pulse and become unresponsive; death results in minutes without intervention. The treatment for cardiac arrest is immediate defibrillation if a lethal rhythm is present, or cardiopulmonary resuscitation when there is an absent heart rhythm. Cardiopulmonary resuscitation (CPR) efforts include immediate chest compressions to produce a cardiac output. Defibrillation provides an electrical shock to the patient's chest to convert the ventricular fibrillation into an organized rhythm.

Last year, 209,000 hospitalized patients experienced a cardiac arrest in the United States (AHA, 2013a). Despite resuscitation efforts, less than 24% of cardiac arrest patients survive to discharge (AHA, 2013a), and nearly 160,000 patients do not survive. Thus, it is essential for the response by the healthcare providers to a cardiac arrest or "Code Blue" event be immediate and efficient. Get With the Guidelines (GWTG) from the American Heart Association (AHA) offers resuscitation teams guidance about response times and performance of CPR and defibrillation for cardiac arrest.

GWTG includes a database for facilities to record and track their Code Blue cases, including patient demographics, interventions, and patient outcomes (AHA, 2013b). Two measures of the guidelines are initiation of CPR within 1 minute and defibrillation within 2 minutes of recognition of a cardiac arrest. In addition, the AHA established targets for these measures to be met in at least 85% of cases. Participation in the GWTG program provides facilities the ability to track cardiac arrest response times and outcomes. In 2013, the facility that was the focus of this project did not reach this target. Reasons for staff not initiating these measures in a timely manner may have included lack of appropriate equipment, inadequate clinical knowledge and/or skills, and clinician fear of the emergency situation.

The aim of this project was to improve measures for CPR and defibrillation within the organization. The project method to achieve the aim was a staff-development program, which included weekly training over 8 weeks to allow nursing staff the opportunity to learn about the expected response times in cardiac arrest. The training sessions included a “mock code” method that replicated the steps of a resuscitation event through a practice scenario. The mock codes utilized equipment such as automatic external defibrillators and various forms of simulation manikins to replicate an actual Code Blue scenario. The simulated code scenario lasted 10 minutes, followed by a 10- to 15-minute debriefing. The debriefing session allowed for additional teaching about the scenario and provided an opportunity for staff feedback. Practice in a simulation setting allowed the nurse to develop clinical and critical thinking skills in the emergency setting. This practice promoted compliance with the core measures set by the AHA. In conclusion, the purpose of this scholarly project was to achieve improved response times of 1 minute for CPR and 2 minutes for defibrillation by nurses in a cardiac arrest situation.

Problem Statement

Despite resuscitation efforts, almost 160,000 patients die in U.S. hospitals from cardiac arrest each year. The GWTG database tracks core measures for resuscitation, including time to first compression and defibrillation after cardiac arrest. The AHA goals are for CPR implementation within 1 minute and defibrillation within 2 minutes in 85% of cases. Despite these goals, the current facility data indicated that these targets were not being achieved.

Purpose Statement and Project Objectives

The purpose of this DNP project was to achieve nursing response times of CPR within 1minute and defibrillation within 2 minutes of cardiac arrest in at least 85% of cases. The objectives for the project were to implement mock code training that trained providers to do the following:

- Initiate CPR within 1 minute of cardiac arrest in over 85% of situations.
- Initiate the first defibrillation shock within 2 minutes of cardiac arrest in over 85% of cases.

Project Question

The project question was “Does mock code training improve the response time in actual cardiac arrest situations in an adult acute care setting?” *Response time* in the question encompassed both CPR and defibrillation. In the project, I looked at the time it took the nurse to initiate CPR, and the time to first shock, upon recognition of cardiac arrest.

Significance/Relevance to Practice

Improvement in response times to a cardiac arrest increases the chance for patient survival and improved neurological outcomes. The earlier the healthcare team initiates treatment, the fewer patients will die from cardiac arrest. It is within the role of the staff nurse to initiate CPR and defibrillation. Mock code training provided the nurses with knowledge of best practices in cardiac arrest survival. If response times during a cardiac arrest are improved, not only will more patients have a chance for survival, but those who do survive may experience fewer long-term complications.

Evidence-Based Significance

Through implementation of an evidence-based practice, I sought to achieve the AHA core measures. New standards of care included implementation of the automatic external defibrillator (AED) equipment on the medical-surgical units as a first line of response. Historically, the medical-surgical units waited for the critical care team to arrive for the initial code response. The mock codes trained the nurses to use an AED in a safe environment. Staff at all levels are more willing to try new procedures if they can assess how well they might work before making a long-term commitment to them (Feldstein & Glasgow, 2008). This evidence-based practice (EBP) project included a thorough review of the literature and used the best evidence in providing a mock code training program.

Implications for Social Change in Practice

With the launching of the 100,000 lives campaign in 2004, many hospitals developed rapid response teams (RRT) for early intervention for deteriorating patient conditions (Berwick, Calkins, McCannon, & Hackbarth, 2006). As a result, this facility, like many others, experienced an increase in RRTs and a decrease in Code Blue events, especially outside of the ICU. However, even with the smaller number of cardiac arrests, the mortality and survival to discharge are poor. In one study using the national GWTG data in the hospital setting, the median hospital survival rate from adult cardiac arrest was 18%, and interestingly, survival was lower on the night shift (Meaney et al., 2013). Mock code training in this project was provided on all shifts.

One of the key messages in the IOM's Future of Nursing (2010) report is that "nurses should be full partners, with physicians and other health care professionals, in redesigning health care in the United States" (p. 3). Advanced practice nurses need to determine what knowledge, skill, and cultural barriers exist for nurse noncompliance with code response. Through implementation of evidence-based projects, the DNP can make a positive impact on healthcare team responses and patient outcomes.

Definition of Terms

The following terms are used throughout this project:

Get With the Guidelines (GWTG): A national database sponsored by the American Heart Association to collect resuscitation data including patient demographics, time to first compression, and time to first shock in cardiac arrest.

Simulation: Refers to the use of manikins and training equipment to demonstrate the skills used during a Code Blue scenario. *High-fidelity simulation* (HFS) refers to how closely the device replicates real human life. *Human patient simulators* (HPS) are computerized manikins that are capable of producing a human-like response to treatment. The SimMan 3G at this facility is a high-fidelity simulator and has the capability of producing heart rhythms, lung sounds, cyanosis, pupil changes, voice, and diaphoresis.

Mock code: An education session reproducing a Code Blue or cardiac arrest emergency response using a simulated patient, equipment and scenarios.

Automatic external defibrillator (AED): Device used to treat the lethal cardiac rhythms of ventricular fibrillation or pulseless ventricular tachycardia. AED competency is provided as part of basic life support training given to non-critical care staff and laypersons.

Debriefing: A session following a mock code to allow for staff evaluation of training, self-reflection, and feedback.

Assumptions and Limitations

Assumptions

One assumption for this project involved the organization's readiness for change. Discussions at resuscitation committee meetings demonstrated an environment in which members were willing to improve scores. The vision for the project and desired outcomes needed to be communicated with the staff and leadership team (White & Dudley-Brown, 2012). The leaders had communicated support for this project. Facilitators included other nurse educators, managers, and members of the resuscitation committee. Continued communication with managers was provided regarding time commitment, support during mock codes, and staff coverage. Although the managers related support for the project, the required time commitment for their staff was clearly outlined. A significant staffing impact on implementation of this project was on staffing mix during the training sessions. Other educators in the department offered to help with patient coverage during the training.

Fortunately, funding and expenses were not limitations to the project. Although there was no budget for this project, it was assumed that financial barriers would not have a major impact. Inputs included support from the facility in providing the salary for the staff, meeting room space, and computers. The project leader used unpaid time for the implementation. Staff members of the GWTG team were present during work time, or used the time as part of their clinical ladder project. Staff attending the mock code training sessions did so during work time. Nursing administration gave support for the use of this time. Equipment costs were minimal, as the emergency equipment already located on the unit was used, along with a rhythm simulator supplied by the education department. Some of the mock codes used a SimMan 3G manikin and computer provided by the system simulation training center. This equipment had previously been purchased through a grant.

Limitations

Barriers in this project were similar to those outlined by McCluskey and Middleton (2010) and included staff training time and a need for change in attitudes, roles and behavior. Among the behaviors, barriers to meeting the goals may have been due to the staff's fear in emergency situations, inadequate knowledge of the immediate steps to take in an emergency, and skill in using equipment such as an AED. Another limitation involved having a location to perform the training. It would be more realistic to implement the mock codes in an empty patient room on the unit; however, with the high patient census, rooms were not always available. As stated previously, survival is lower during the night shift. Therefore, it was important for the mock code training to be available on all shifts. Staff cooperation was another barrier. Nursing units can be extremely busy, and taking time for a mock code was seen as an annoyance. It was important to plan times that were best for the staff to participate.

Limiting the project to only one small community hospital with four units decreased the number of sessions and staff involved. Other limitations included a lack of standardization of equipment. The defibrillators on the hospital code carts are from the same manufacturer, but not all have the same AED function. Even with an AED available, the medical-surgical nurses were reluctant to use them and would wait for the Code Blue team to initiate defibrillation. Another equipment issue was the time source used during a code. The staff nurses recording the event used inconsistent sources for documenting the time of the event including the room clock, the time on the code cart, and their personal watches.

Summary

The problem for this DNP project was an inadequate response by nurses during a cardiac arrest situation in the acute care units. This EBP used mock code training to improve response times for CPR and defibrillation. The AHA's Get with the Guidelines for Resuscitation database was used to determine the effectiveness of mock code training. The goals were for CPR to be implemented within 1 minute and defibrillation within 2 minutes of cardiac arrest. Barriers to meeting these goals were the staff's fear in emergency situations, inadequate knowledge of the immediate steps to take in an emergency, and skill in using equipment such as an AED. Discussions at resuscitation committee meetings demonstrated an environment in which members were willing to improve the scores.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Search Strategy

A systematic review of databases of nursing and health-related literature from 2004 to 2014 was performed. Search criteria included adult, scholarly, peer-reviewed articles in English. Although there were several articles on mock code training from the late 1990s, there was also a large amount of recent literature. Given that the technology of simulation has been relatively new in the last decade, there was an abundance of current literature. The "Get With the Guidelines" concept is also a new program developed in the last few years, producing more literature. The keywords for the literature search included *mock code*, *simulation*, *Get With the Guidelines*, *GWTG*, and *resuscitation*.

Several databases were used for the literature search, including CINAHL Plus, Medline, Joanna Briggs, PubMed, Cochrane, Google Scholar, DARE, OVID, and Thoreau. When all of the keywords were entered together, there were no results. When *resuscitation* alone was entered, there were over 9,000 results. Combinations of the keywords *mock code*, *resuscitation*, and *simulation* yielded smaller results with. "Get With the Guidelines" produced results with the keyword of *resuscitation*. Many of the studies addressed issues in pediatrics and with nursing students. Once these were eliminated, the search resulted in 71 articles for review (Figure 1). Search questions that were explored in the research literature were related to the currency of the study, the study population, the method of training, the timeliness of the code response, the occurrence of a debriefing, and the outcome of the training. Research articles were reviewed for their strengths, weaknesses, and level of evidence. It was also noted whether the project used a conceptual model or theory.

Specific Literature

A systematic review of nursing and healthcare literature included papers related to mock code training, simulation, and programs such as Get With the Guidelines. The review produced 71 papers, of which 49 papers were determined to be relevant research. These relevant papers were rated by level of evidence per the American Association of Critical-Care Nurses (AACN) scoring (Figure 2). From the 49 research-related articles, 11 were rated as having a high quality of evidence, Levels A and B, while the remaining 38 were rated as having low-quality evidence. From the literature review, a number of themes were identified.

Mock Code Literature

Several of the studies described mock code training projects that were very similar to the plan for this DNP project. They gave conclusions on how to approach mock code training and hold debriefings. For example, Banks and Trull (2012) used Code Blue champions on each unit and reported a 74% survival rate compared to the national average of 44%. Several studies emphasized the need for high-quality CPR and frequent review of skills (Carpico & Jenkins, 2011; Curran, Fleet, & Greene, 2012; Hamilton, 2005; Meaney et al., 2013). In an observational study of in-hospital cardiac arrests, Abella et al. (2005) found that the quality of CPR was inconsistent even by well-trained hospital staff. The ACLS guidelines were revised in 2010 to emphasize the need for reduced interruptions during CPR.

The literature included the frequency and locations of the mock code training (Delac, Blazier, Daniel, & N-Wilfong, 2013; Hill, Dickter, & Van Daalen, 2010; Huseman, 2012). Hill et al. (2010) also described training on nights and weekends. The frequency of training ranged from every week to quarterly. It was also noted if there was difficulty in finding available rooms. Aspects of teamwork and communication are very important. Nurses often were confused by the roles in a code situation. In a randomized study by Hunziker et al. (2013), nurses waited for physician commands before responding to the situation.

Overall, the literature search provided evidence that mock code training improved the knowledge levels and comfort of nursing staff in Code Blue scenarios (Delac et al., 2013; Hill et al., 2010). Researchers reported the benefit of debriefings following the mock code scenario (Hill et al., 2010). Although high-fidelity simulation enhances the training experience for the staff, there was not a universal difference in outcomes in mock code training without high-tech simulation (Hoadley, 2009).

Get With the Guidelines Literature

The Joint Commission requires that acute care hospitals measure the performance of potentially high-risk processes such as resuscitation. The American Heart Association (AHA) developed the National Registry of Cardiopulmonary Resuscitation (NRCPR) in

1999 to collect data on the effectiveness of CPR (AHA, 2013b). In 2010, this program became part of Get With the Guidelines (GWTG) for resuscitation.

Cardiac arrest results from cardiac rhythms such as ventricular fibrillation (VF), ventricular tachycardia (VT), pulseless electrical activity (PEA), and asystole. VF and VT are treated with an electrical shock or defibrillation, whereas asystole and PEA are only treated with CPR and medications. Approximately 20% of cardiac arrest rhythms are shockable (Chan et al., 2010; Girotra et al., 2012). In nearly a third of these shockable rhythms, defibrillation is delayed, leading to a lower chance of survival to discharge (Bradley et al., 2012).

Currently, there are 742 hospitals participating nationwide in the resuscitation registry, with data having been collected on over a half million patients. The GWTG-Resuscitation program reviews the latest resuscitation research on a frequent basis. Nationwide, GWTG collects data from thousands of patient cases, including response times, survival, demographics, and interventions. A multivariate regression study of over 84,000 in-hospital cardiac arrests using the GWTG registry found that survival to discharge increased from 13.7% in 2000 to 22.3% in 2009 (Girotra et al., 2012). Studies have found that hospital participation in the Get With the Guidelines program has improved survival rates in cardiac arrests. Bradley et al. (2012) reported that survival of a VF or VT event increased from 60.2% in hospitals participating in GWTG for 1 year to 69.9% in hospitals participating for 10 years.

The database also provides information regarding the type of hospital and time of day the cardiac arrest occurs. Meaney et al. (2013) reported a lower survival rate on the night shift, at 15%, compared with a 20% survival rate on the day shift. A study of 433 hospitals and over 100,000 adult patients with cardiac arrest found a higher rate of arrests in smaller hospitals (Merchant et al., 2012). This could be due to more availability of equipment and rapid response teams at larger hospitals. This study also found ethnic differences in survival rates at different hospitals.

Simulation Literature

A second search was performed with a focus on the simulation literature. With the advancement of simulation technology in the last decade, there were over 800 articles with the keyword *simulation* in the literature search. Articles describing simulation education as it is used in medical and nursing schools as well as in pediatrics were eliminated from the review. However, studies describing interdisciplinary education and teamwork were included.

The range of simulation applications spans from low technology task trainers to highly technical, computerized manikins. High-fidelity human patient simulators (HF HPS) are capable of producing physiological responses such as pulses, respirations, and pupil reaction (Durham & Alden, 2008). The limitations of this technology include the cost, which can range from $30,000 to $200,000, and the length of time required for faculty training (Durham & Alden, 2008; Foster, Sheriff, & Cheney, 2008).

An important component of simulation training is the posttraining discussion or debriefing. In many cases, the debriefing may take longer than the simulation scenario. It is through the debriefing that the student reviews his or her performance, uses self-reflection, and develops critical thinking skills (Dreifuerst, 2009; Jeffries, 2005; Kuiper et al., 2008). Advantages to high-fidelity simulation include the ability to record the learner's responses through video, computer data, and the practice of skills without risk to a live patient (Durham & Alden, 2008). Viewing a video of the simulation experience can assist with feedback during the debriefing.

Although the literature showed that staff enjoyed learning with simulation, simulation did not necessarily improve performance. A review of the literature by Sanford (2010) found a lack of literature supporting the use of simulation. "Many of the studies appear to be little more than an opinion poll without the rigor of a full-fledged qualitative study" (Sanford, 2010, p. 1010). While the research did not always support that high-fidelity simulation alone improved performance, it did indicate an increase in learner satisfaction and confidence through this method of learning (Gordon & Buckley, 2009; Hoadley, 2009; Kaddoura, 2010).

General Literature

Articles reviewed under general literature included topics such as explanations of American Heart Association guidelines and participant learning styles. The literature indicates that annually, over 200,000 patients in U.S. hospitals experience a cardiac arrest (Bradley et al., 2012). Although the AHA recommends that CPR be initiated within 1 minute of cardiac arrest, several researchers have looked at the quality of CPR, including the rate, depth, and interruptions. Abella et al. (2005) suggested that use of mechanical compression and monitoring devices may improve CPR. Although there is evidence to support use of AEDs, Chan et al. (2010) found that use of AEDs was not associated with survival. The reason may be delay in applying the AED, especially in nonshockable rhythms. Wilson, Phelps, Downs, and Wilson (2010) pointed out that nurses often lose their "first responder instincts" and perform roles they are comfortable with, such as preparing the room for the code team.

Other articles gave a history of the development of simulation technology and its effects in healthcare education. Durham and Alden (2008) and Galloway (2009) described the generation gap in healthcare training, and how "millennial learners" prefer high-technology simulators. Advanced life support training provided through electronic learning compared to conventional classroom learning showed a slightly lower pass rate for cardiac arrest simulation tests but similar scores on knowledge tests (Perkins et al., 2012).

Conceptual Models and Theoretical Frameworks

The model that served as a framework for this project is the logic model. Among the components of the logic model are inputs, activities, output, and outcomes (Centers for Disease Control and Prevention [CDC], 2008). Program planning requires application of steps, including defining the problem, assessing the population, analyzing the problem, assessing needs, strategizing, designing the program, determining data measurement, using information technology, evaluating, and budgeting (Kettner, Moroney, & Martin, 2013). The logic model is a pictorial diagram to view these steps (Figure 3). Inputs can include clients, consumers, facilities, and equipment. Throughputs or activities in the logic model are the interventions that are related to the objectives. The interventions included implementation of the education sessions and mock code training. The outputs of the model determined whether the interventions were provided, and the outcomes measured whether the program made a difference in improving response times in cardiac arrest. Outcomes included not only results of data collection, but also feedback from the target population as to the perceived benefit of the training.

To maintain organization in the program design, a Gantt chart was developed (Figure 4). Gantt charts provide a visual outline of the tasks in a project against a timescale to give an instant overview of the project (Mind Tools, 2011). The Gantt chart includes time frames for inputs, activities, outputs, and outcomes. Using the logic model as a framework, the steps of the project were listed on the Gantt chart from the planning phase through implementation and evaluation.

Summary

A systematic review of the nursing and healthcare literature found an abundance of studies related to resuscitation and training. The literature review focused on the themes of mock codes, Get With the Guidelines, and simulation. The findings in this literature provided information for the frequency, location, and type of equipment to use in mock code training. The logic model was reviewed as a framework for the project.

Section 3: Methodology

Project Design and Methods

The study design for this project used a nonexperimental, retrospective chart review. Following IRB approval, preintervention data were collected to include the response times for initiation of CPR and defibrillation. The mock code training sessions were planned weekly over an 8-week period to include four adult nursing units on each shift (7a and 7p). A team of staff members including nurses and respiratory therapy participated in the project. After mock code training, the GWTG data were reviewed for improvement in CPR and defibrillation initiation times.

The training was a standard hospital education program, and similar training had been routinely offered in the facility. It was supported by the nurse managers and the resuscitation committee with the intention that multiple live sessions would include all medical-surgical nurses. Sessions were scheduled to provide an opportunity for all of the medical-surgical nurses to participate. The mock codes were scheduled in advance with the nurse managers and respiratory therapy director for times that would be less intrusive for the staff.

The location for the mock code sessions included empty patient rooms or procedure rooms on the unit. In a study by Wilson et al. (2010), mock code training on the various patient care units and during the shift was viewed as very helpful by the staff in assisting them to successfully learn their role in code situations. The hospital switchboard was notified ahead of time and announced the code overhead, but not through the administrative pager system. The medical director for the hospitalists was also notified, and he decided whether the hospitalists were included in all of the codes or only at select times.

The sessions included the use of low-fidelity and high-fidelity simulation. The staff from the organization's simulation lab participated one day and brought the SimMan 3G to the facility. When the 3G was not available, a simple BLS manikin was used with a cardiac rhythm simulator. Scenarios and objectives were developed prior to each training session. The focus was on the first 5 minutes of a cardiac arrest, followed by a debriefing. The program consisted of brief case scenarios describing a patient condition that deteriorated into a cardiac arrest. The sessions lasted approximately 20 to 30 minutes, including a 10-minute scenario and 10 to 15 minutes for a debriefing. It was important for the staff to have a more realistic experience in which to practice the steps for resuscitation. In a mock code scenario, staff can feel safe while practicing the skills. Frequent practice was intended to lead to an increased knowledge base and competency in the arrest situation. Debriefings reviewed outcomes such as communication issues, safety, and staff confidence.

Population and Sampling

The practice setting for this project was a 176-bed acute care community hospital, or Hospital S. Hospital S is located in a suburban community on the East Coast of the United States. The target population for this project was acute care registered nurses (RNs). The RNs on these units varied in experience level. Although not mandatory, participation of staff on duty was encouraged by the managers. The plan allowed for the approximately 80 medical-surgical nurses on four units to have exposure to a training session on at least two separate occasions. The units ranged from 20 to 30 beds each for a total of 110 patients.

The organization consists of five acute care facilities including a large tertiary facility. The smaller hospitals have access to these services and resources. Hospital S joined the larger system in 2010. Since that time, the health system has standardized policies, computerization, equipment, and programs across all of the hospitals. The nursing educators and clinical nurse specialists work collaboratively within a corporate nursing education department. The benefits to this system are its access to a simulation lab with technologically advanced equipment, which is staffed by DNPs trained in simulation. The organization is also supported by a center for nursing research with doctorally prepared nurses. The organization has achieved magnet accreditation in its first three facilities and will be applying for recertification with all five facilities in 2016. Through this “magnet journey,” there has been a culture of nursing advancement, quality, and safety. An advantage for this DNP project is access to the many resources throughout the organization.

Because Hospital S. is not a teaching hospital, medical care is delivered primarily through the attending physicians. For emergency situations, a hospitalist group is on staff 24 hours a day. The code team includes a hospitalist, a critical care unit (CCU) nurse, a respiratory therapist, a supervisor, and unit staff. The CCU nurses have Advanced

Cardiac Life Support (ACLS) certification, but medical-surgical unit nurses do not. The DNP student for this project is the critical care clinical specialist and a member of the facility's resuscitation committee.

The average level of education held by RNs at this facility is an associate's degree, although this is rapidly shifting toward bachelor of science in nursing (BSN) with organizational tuition support and the goal of magnet status. By the end of 2013, 41% of the RNs in the facility had a BSN. On the medical-surgical units, the BSN rates varied from 25% to 48%. The average percentage of nurses with national certification in the facility was 64% at the end of 2013.

Data Collection

The data collected consisted of preintervention and postintervention response times for initiation of CPR and defibrillation. Baseline real event data were obtained from the American Heart Association's "Get With the Guidelines" (GWTG) database for the facility prior to implementation of mock code training (AHA, 2013b). The preintervention data were from the AHA database for the facility from 2013. There were a total of 52 patients in 2013. Data were collected by the facility from all Code Blue records and entered into the AHA database. Data included time of arrest, time to first compression, and time to first defibrillation. After mock code training, the GWTG data were reviewed for improvement in CPR and defibrillation initiation times.

This project involved the collection of code data pre- and post-mock code training from code events. Interventions during a cardiac arrest were recorded on a Code Blue form (Figure 5). Copies of these code forms were sent to the nursing office for review by the resuscitation committee. Code events were also noted in a switchboard log and case management reviews. The code data from the Code Blue form were entered into the online GWTG database. Data included demographics such as age, gender, ethnicity, and medical condition of patients without identifiers. Specific data from the code event included time of arrest, location, time of arrival of the code team, time of identification of the pulseless rhythm, time of first compression, time of first defibrillation, and survival. Other data collected by the project leader included the number of mock code sessions provided, what shift the session occurred on, and the number of participants attending. A simple table format was used to record this information.

Data Analysis

The posttraining data following the 8 week mock code training were compared with the pretraining data obtained through a report generated by the GWTG database. The AHA program provides hospitals with a web-based tool that offers real-time benchmarking capabilities and other performance improvement methodologies (AHA, 2013b). When patient data were entered from the Code Blue form, the AHA Get With the Guidelines database provided the percentage of patients who met the criteria for time to CPR and defibrillation. The AHA determined the core measures for resuscitation and the target of 85%. Pre and post sets were analyzed to determine whether at least 85% of events were compliant with the GWTG core measures of CPR within 1 minute and defibrillation within 2 minutes of cardiac arrest. A statistical process control (SPC) was used to test the hypothesis about the intervention effects using data collected over time (Polit & Chaboyer, 2012). SPC was used to compare the pretraining data prior to mock code training with monthly data over a course of 12 weeks from implementation of training. A comparison of response times prior to training with response times after training was made, and an Excel runs chart (Figure 6) was created to compare the data pre and post intervention.

Project Evaluation Plan

With the recognition that there are multiple types of evaluation (formative, summative, process, impact, and outcome evaluation; Hodges & Videto, 2011), I focused this project on an impact evaluation to determine the extent to which the program simulated short-term changes in the target population. Indicators that were logged and evaluated were how many education sessions were provided, how many staff participated in the programs, and feedback from debriefings. In evaluating the translation of a project, the questions that were considered included the following: how success was measured; how indicators were measured; whether outcomes were achievable with the proposed interventions; whether timelines and resource allocations were met; and how outcomes would be sustained (White & Dudley, 2012). An impact program evaluation determines whether an outcome is attributable to the program (Kettner et al., 2013). As a result of the project, mock code training will become a mandatory part of nursing orientation and annual competencies. The data were reviewed for the long-term impact on patient mortality. An aim for the project was sustainability. Through sharing of the positive outcomes, the project can be maintained.

Program evaluation included six steps: (a) engage stakeholders; (b) describe the program with its mission and objectives; (c) focus the evaluation design; (d) gather credible evidence; (e) justify conclusions; and (f) ensure use and share lessons learned (Koplan, 1999). The logic model was used as a framework for viewing these steps. The outputs of the model were to determine if the interventions were provided, and the outcomes measured whether the program made a difference in improving cardiac arrest response. Outcomes included not only results of data collection, but also feedback from the target population as to the perceived benefit of the training.

Mock code training results were distributed to internal and external stakeholders. When publicly disclosed, quality data and evaluation findings encourage stakeholders to take action for quality improvement (Hampton, 2011). Initially, the results were reviewed by the GWTG team, the resuscitation committee, and the nursing department. Successes were celebrated, and failures were reworked. With project advancement, the results will be shared internally throughout the organization via defined programs, including the yearly EBP seminar, the nursing quality scholars' conference, and the advanced practice nurse monthly forum. Externally, a future goal is to present the project at a scholarly conference and then to publish the project in a scholarly journal such as the *American Journal of Critical Care*.

Although there was no budget requirement for this project, evaluation included potential future funding needs. If the program expands, the facility may seek funding for a simulation lab, more equipment, educators, and staff education time. Other financial considerations are the purchase of updated resuscitation equipment such as AEDs, code carts, and atomic clocks.

Summary

Cardiac arrest is a significant problem that harms many hospitalized patients. The American Heart Association recommends an adequate response and intervention, including CPR and defibrillation, when indicated. The purpose of this EBP project was to achieve an adequate response time in at least 85% of cardiac arrests, CPR within 1 minute, and defibrillation within 2 minutes. The project incorporated mock code training as an intervention to improve staff response to cardiac arrest. With the logic model guiding the project, stakeholder involvement was a central theme. The key steps were developing a vision and mission for the project. In this EBP project, nurses needed to know why the change was necessary. The vision for successful implementation of this project was to increase the chance for patient survival during cardiac arrest.

Organization leadership was crucial to successful implementation and sustainability of evidence-based practice initiatives. As part of the facility’s magnet journey, transformational leadership, or “creative innovation, questioning, and challenging existing structures” (Bamford-Wade & Moss, 2010, p. 815) is an advantage for success. The DNP student in this evidence-based project provided leadership as an expert clinician and change agent. In addition, the DNP student reviewed the current evidence and translated new knowledge into strategies for improving existing practice (Terry, 2012). The challenge inherent in this project was in creating an environment for staff engagement and sustainable practice change.

Use of the logic model in implementing each step of the process helped to guide the project and promote its effectiveness. The project leader also needed to consider the financial analysis of the program and the return on investment (ROI). In order to sustain the program, the immediate benefits were evaluated, along with future benefits. Although finances were not an issue for this project, future financial support may be needed for long-term sustainability. It is very possible in the future that meeting the GWTG core measures will be tied to reimbursement by CMS. In that case, the facility will need to make a greater investment in ensuring the success of resuscitation training. In a Magnet environment, the doctoral nursing practice scholar can combine transformational leadership, shared governance, and action for sustainable change processes at both a unit and organizational level (Bamford-Wade & Moss, 2010).

Section 4: Findings, Discussion, and Implications

Results

Upon committee and institutional review board approval (study 02-04-15-0366929), project implementation began on February 6, 2015, and continued through 8 weeks. A total of 15 mock codes, including eight on the night shift, were provided, which were attended by 87 nurses. The mock codes were located on the adult medical-surgical units. Education included a simple manikin with code cart, defibrillator with AED (automatic external defibrillator), and rhythm simulator. One mock code event was taught with the SimLab APNs using a SimMan 3G manikin. Each nurse had an opportunity to demonstrate initiation of compressions, application of an AED, and performance of a shock within 2 minutes of cardiac arrest. Because this was similar to an inservice, nurses were asked to complete an evaluation of the learning experience. The objectives for the mock code were for the participant to be able to demonstrate implementation of CPR within 1 minute of cardiac arrest and initiate the first defibrillation within 2 minutes of cardiac arrest. The two questions on the evaluation asked, “Did this inservice meet the objectives?” and “Did this inservice meet your expectations?” There was also an area for comments and suggestions for future education. Feedback on the evaluation forms was very positive. All of the participants stated that the objectives for the mock code were met.

Summary of Findings

Data from actual patient resuscitation events were recorded on a Code Blue form. The forms were collected by the nursing supervisor after each code. The resuscitation committee abstracted the data and entered the data into the American Heart Association's Get With the Guidelines database. Quarterly data were reported at the resuscitation committee. The quarterly compliance for initiation of first compression in 2013 ranged from 83-100% and in 2014 ranged from 71-100%. In the 3 months following implementation of mock code training, there were 10 patient cardiac arrest events. Compliance with initiation of first compression within 1 minute of cardiac arrest was 100% during this time period (Table 1). Demographic data collected on the patients in 2013 showed an average age of 73 years, with 64% male and 36% female. Data on patients post intervention showed an average age of 74 years, with 50% male and 50% female.

Quarterly compliance for initiation of a shock within 2 minutes of cardiac arrest for patients with a shockable rhythm ranged from 0-100% in 2013 and 50-100% in 2014. A shockable rhythm includes ventricular fibrillation or pulseless ventricular tachycardia. In the 3 months following implementation of mock codes, there were only two patients with a shockable rhythm. Eight of the 10 patients had a first rhythm of PEA (pulseless electrical activity) that did not respond to electric shock. Of the two patients with a shockable rhythm, one had an AED applied and received a shock within 2 minutes. In the other case, AED pads were applied immediately; however, the AED responded with "poor pad contact." This required reapplication of pads, which still did not work, and then clipping of the patient's chest hair to provide adequate pad contact on the skin. The first shock was delivered in 3 minutes (Table 2).

Using an Excel runs chart, the pre and post intervention rates were compared with the goal of 85% compliance (Figure 6). The hypothesis was that response compliance for CPR within 1 minute of cardiac arrest would show improvement following mock code training. Another hypothesis was that response compliance for the first shock or defibrillation within 2 minutes of cardiac arrest would be improved after mock code training.

Discussion of Findings

Improvement in response time to first compression was 100% following mock code training. As stated previously, several studies have described delays in initiation of CPR and inconsistency in CPR skill (Abella et al., 2005; Hunziker et al., 2013). With 100% compliance, this project showed improvement in response time for initiation of CPR. The Get With the Guidelines literature showed that only 20% of cardiac arrest rhythms are shockable (Chan et al., 2010; Girota et al., 2012). This is consistent with the two cases of ventricular fibrillation in the 10 cases of cardiac arrest following mock code training.

Much of the literature reviewed survival rates of patients following adequate CPR and defibrillation response times (Bradley et al., 2012; Girotra et al., 2012). Although the focus of this project was not on survival rates but on response times, the survival to discharge rate of the 10 patients with cardiac arrest following mock code training was 44% compared with an annual survival rate of 20% in 2013. Review of the literature on simulation training found that mock code training improved the comfort level of nurses in Code Blue scenarios (Delac, Blazier, Daniel, & N-Wilfong, 2013). Education using high-fidelity simulation with manikins such as SimMan was reported as a favorable experience by nurses (Hoadley, 2009). Feedback on this project's evaluation forms was very positive, with all of the nurses stating that the objectives were met. Comments included statements such as "excellent," "loved the hands-on experience," "much needed," and "great learning experience." Many nurses commented that they would like to have regular mock code sessions on a monthly or quarterly basis.

Implications

There are several implications resulting from this project. Because nursing staff found the training useful and the outcomes were positive, mock code training will be implemented on a regular basis in the facility. A class is provided in orientation to review the Code Blue policy. This class will be expanded to include a mock code and implementation of the AED for new nurses. There will not be any changes to the facility's Code Blue policy, which allows for medical-surgical nurses to initiate defibrillation with the AED mode of the code cart defibrillator. However, because this has not been the practice, regular mock codes will reinforce the policy. Based on the feedback by the staff, mock codes will be provided every 2 months. Mock codes will include all shifts and weekends.

The post training did result in a change of practice for the medical-surgical nurses. The nurses reported increased awareness of the need for immediate application of AED pads in a cardiac arrest situation. Prior to this, medical-surgical nurses would wait for the critical care nurse to initiate defibrillation. Nurses enthusiastically reported applying the pads, although not all cases went on to require defibrillation. The mock code training also demonstrated a need for updated equipment that would match current basic life support (BLS) recommendations. The resuscitation committee has recommended purchase of new defibrillators with AEDs for the code carts. The request for this purchase has been put into the budget for next year.

Although the nurses' feedback on the evaluations was not being measured for this project, this would be a topic for future research. The comments were very positive. It would be interesting to determine whether the nurses' experience level correlated with their response to training. Another area for research is patient outcomes following mock code training. Outcomes could include survival to discharge as well as quality of life measures such as neurological function and the need for rehabilitation. Other measures could compare time of day with resuscitation compliance.

Improvement in cardiac arrest response times would have a significant social impact. An important aspect of the logic model used in this project is the inclusion of a mission. The mission statement was "to develop a safe and effective response for resuscitation of the cardiac arrest patient." Optimum response in resuscitation not only would increase patient survival, but also might reduce complications from cardiac arrest survival. Patients surviving cardiac arrest often have significant brain injury and organ failure. Heart, lung, and kidney failure result in extensive procedures such as coronary artery intervention, cardiac bypass surgery, mechanical ventilation, and dialysis. Prevention of adverse outcomes would reduce the need for these procedures as well as cost and length of stay. This would also affect the patient and family's quality of life. Even if the patient survives cardiac arrest, subsequent mental and physical disabilities may result in depression, loss of independence, and impaired social relationships.

Project Strengths and Limitations

A major strength for this project was the support of the vice president of nursing, the senior manager of education, and the resuscitation committee. The need for improvement in resuscitation response time had been a concern for several years. Therefore, implementation of this project was strongly supported. The enthusiasm of the nurses to learn and improve their performance had a positive impact on the project. I was given liberty to provide mock code training sessions at any time of day or night. The unit nurse managers were often instrumental in supporting their staff's attendance. The director of the hospitalists supported his physicians in attending the mock code sessions. I also had access to equipment for the mock code sessions, including code carts, defibrillators, manikins, and rhythm simulators.

Limitations in the project included time for sessions. The patient census was very high during the implementation period, resulting in lack of available empty patient rooms for the simulation. The ideal scenario was to provide the mock code in an actual patient room to make the training as realistic as possible. I had to be flexible in using treatment rooms, unit conference rooms, and waiting areas. Busy with patient assignments, nurses often had difficulty leaving their patients to attend. Often I had to make several attempts to find a convenient time for staff to attend. The middle of the night after 2:00 a.m. and on weekend afternoons seemed to work the best. Another limitation was the lack of standardization of the AEDs. Most of the nursing units had voice-activated AEDs; however, one unit had an older model that only provided written instructions. The AEDs were over 10 years old and programmed to an older version of the American Heart Association's basic life support recommendations. These older models called for a pulse check after successful defibrillation, whereas newer guidelines call for continuation of CPR for 2 minutes even with return of pulse. The change in the AED's algorithm had to be reinforced during the mock codes.

Recommendations for remediation of these limitations in future mock code training sessions include having scheduled sessions on the unit for nurses to attend at their convenience. Additional programs in a classroom setting could also be scheduled for nurses to attend during non-patient care hours. Another idea would be to have unit champions lead mock code sessions on their units. The hospital system has a clinical ladder program in which nurses can participate in projects. Staff nurses could be provided the training and resources to initiate mock codes on their own units when there is adequate time and opportunity.

The small number of cardiac arrests following implementation of the mock code training was a limitation in the analysis of postintervention results. A runs chart was used, as there were not enough subgroups for a control chart, and even without control limits, runs charts can be used to detect significant special causes, using rules for trends and runs" (Polit & Chaboyer, 2012, p. 89). The runs chart allowed for viewing of data over time.

Analysis of Self

As a DNP scholar, I learned to use steps in the implementation of an evidence-based practice project. The project required identification of a problem, review of the literature for current research on the topic, and development of an implementation plan and timeline. The project taught the importance of involving stakeholders and how to obtain approval by the IRB. Using a theoretical framework helped structure these steps. Finally, the project included analysis and evaluation. It truly captured the essence of the DNP role in translating evidence into practice.

This was a valuable learning experience not only in the implementation of this mock code project, but also for future improvement initiatives I will pursue as a practitioner. The steps I learned in this EBP project can be used in implementation of other healthcare concerns. With the pressure on hospitals to improve patient outcomes for core measures and for reimbursement, it is essential for DNPs to have the knowledge and skills to improve practice. The facility is seeking magnet accreditation in 2016. One of the goals is to mentor staff nurses in developing quality improvement projects. This is an ideal role for the DNP nurse in guiding nurses through the stages of evidence-based practice.

As a project leader, this DNP student had several lessons to learn. One was in involving the stakeholders early in the project to gain support and resources. Support by the unit nurse managers often made the difference in how smoothly a session went. Another lesson was on being flexible in meeting the shifting acuity of the units. Improving response times in resuscitation can lead to other projects to not only increase patient survival, but also promote nursing satisfaction. It would be helpful to engage nurses to become staff champions for providing mock codes on their units. A follow-up project could look at the effectiveness of different types of training. Anecdotally, it seemed that the younger nurses enjoyed the interaction of the mock code, whereas older nurses seemed more comfortable with a discussion. Although only one session was provided with a high-fidelity manikin, a future goal may to develop a simulation lab at this facility. One of the nurses suggested that mock code sessions be included in the RN residency program at the organization.

Summary

Improving response times for CPR and defibrillation in cardiac arrest are essential for increasing the survival of patients to discharge. The use of mock code training sessions has been shown to be an effective method of teaching. Despite the small number of actual cardiac arrests post mock code training, there was an overall improvement in response times. This EBP project was a valuable learning experience for me. It included the important steps needed to promote quality improvement and can be developed into future projects. Through the support of the facility administration and nursing staff, this training will be continued on a regular basis.

Section 5: Executive Summary

When patients in hospitals suffer a cardiac arrest, an immediate resuscitation response is essential for survival. The American Heart Association's Get with the Guidelines has set the goal for CPR within one minute and first shock within two minutes of cardiac arrest in 85% of cases. The literature has shown that hospitals participating in the Get with the Guidelines for Resuscitation report higher survival rates (Girotra et al., 2012; Bradley et al., 2012). The facility for this project had not been able to reach the 85% goal. There are many reasons for a less than optimum time of response in hospitals, including nurses' lack of training. The purpose of this evidence based practice project was to use mock code training to improve the nurses' response time in resuscitation.

The project consisted of an eight week training program to provide mock code sessions on four medical-surgical units in a small community hospital. Over eighty nurses participated in the training. The sessions used a manikin, code cart defibrillator, and rhythm simulator with a cardiac arrest scenario. Each nurse demonstrated initiation of CPR and application of a cardiac shock. The scenarios were followed by a short debriefing session and evaluation. Nurses reported the training to be beneficial. Following implementation of the mock code training, actual patient cardiac arrest cases were reviewed. Cardiac arrest records are recorded into the Get with the Guidelines database. In the ten post-training cardiac arrest cases, 100% received chest compressions within one minute of arrest. Two of the patients required cardiac shock. Due to difficulty with application of the equipment, only one of the cases received a shock within the goal time. Comparison of the response times between cardiac arrest cases prior to mock code training and cases after training showed improved compliance with meeting the 85% goal for initiation of first compression.

The logic model was used as the framework for this project. The project mission within this framework was to improve the care for patients with cardiac arrest. Among the lessons learned from this EBP project was the need for early inclusion of stakeholders and planning training times with the nursing staff. Mock code training will be continued on a regular basis in the facility. Although compliance with cardiac compressions was high following training, it is essential to ensure sustainability. The role of the DNP offers the skills and knowledge for supporting this evidence based practice in improving the patient's chance for survival.

References

Abella, B. S., Alvarado, J. P., Myklebust, H., Edelson, D. P., Barry, A., O'Hearn, N., . . . Becker, L. B. (2005). Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. *Journal of American Medical Association*, *293*(3), 305-310.

American Heart Association. (2013a). *Cardiac arrest statistics*. Retrieved from http://www.heart.org/HEARTORG/General/Cardiac-Arrest-Statistics_UCM_448311_Article.jsp

American Heart Association. (2013b). *Get With the Guidelines—Resuscitation recognition criteria.* Retrieved from http://www.heart.org/HEARTORG/HealthcareResearch/GetWithTheGuidelines HFStrokeResus/GetWithTheGuidelines-Resuscitation/Recognition-from-Get-With-The-Guidelines-Resuscitation_UCM_314500_Article.jsp

Bamford-Wade, A., & Moss, C. (2010). Transformational leadership and shared governance: An action study. *Journal of Nursing Management*, *18*(7), 815-821. doi: 10.1111/j.1365-2834.2010.01134.x

Banks, D., & Trull, K. (2012). Optimizing patient resuscitation outcomes with simulation. *Nursing 2012*, *42*(3), 60-61.

Berwick, D. M., Calkins, D. R., McCannon, C. J., & Hackbarth, A. D. (2006). The 100,000 Lives campaign: Setting a goal and a deadline for improving health care quality. *Journal of American Medical Association*, *295*(3), 324-327.

Bradley, S. M., Huszti, E., Warren, S. A., Merchant, R. M., Sayre, M. R., & Nichol, G. (2012). Duration of hospital participation in Get With the Guidelines—Resuscitation and survival of in-hospital cardiac arrest. *Resuscitation, 83*(11), 1349-1357.

Bruce, S. A., Scherer, Y. K., Curran, C. C., Urschel, D. M., Erdley, S., & Ball, L. S. (2009). Between *g*raduate and undergraduate nursing students: Using a computer-assisted simulator in a mock cardiac arrest. *Nursing Education Perspectives, 30*(1), 22-27.

Carpico, B., & Jenkins, P. (2011). Resuscitation review to improve nursing performance during cardiac arrest. *Journal for Nurses in Staff Development*, *27*(1), 7-12.

Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. (2008). *State heart disease and stroke prevention program evaluation guide: Developing and using a logic model*. Retrieved from http://www.cdc.gov /dhdSP/programs/nhdsp_program/evaluation_guides/docs/logic_model.pdf

Chan, P. S., Krumholz, H. M., Spertus, J. A., Jones, P. G., Cram, P., Berg, R. A., . . . Nallamothu, B. K. (2010). Automated external defibrillators and survival after in-hospital cardiac arrest. *Journal of the American Medical Association, 304*(19), 2129-2136.

Curran, V., Fleet, L., & Greene, M. (2012). An exploratory study of factors influencing resuscitation skills retention and performance among health professionals. *Journal of Continuing Education in Health Professionals, 32*(2), 126-133.

Delac, K., Blazier, D., Daniel, L., & N-Wilfong, D. (2013). Five alive: Using mock code simulation to improve responder performance during the first 5 minutes of a code. *Critical Care Nursing Quarterly*, *36*(2), 244-50.

Dreifuerst, K. T., (2009). The essentials of debriefing in simulation learning: A concept analysis. *Nursing Education Perspectives. 30*(2), 109-114.

Durham, C., & Alden, K. (2008). Enhancing patient safety in nursing education through patient simulation. In *Patient safety and quality: An evidence-based handbook for nurses* (Chap. 51). Retrieved December 10, 2008, from http://www.http /ahrq.gov

Feldstein, A. C., & Glasgow, R. E. (2008). A practical, robust implementation and sustainability model (PRISM) for integrating research findings into practice. *Joint Commission Journal on Quality and Patient Safety, 34*(4), 228–243. Retrieved from http://medqi.bsd.uchicago.edu/documents/SustainabilityQIJCJQPS4_08.pdf

Foster, J. G., Sheriff, S., & Cheney, S. (2008). Using nonfaculty registered nurses to facilitate high-fidelity human patient simulation activities. *Nurse Educator, 33*(3), 137-141.

Galloway, S. (2009). Simulation techniques to bridge the gap between novice and competent healthcare professionals. *Online Journal of Issues in Nursing*, *14*(2), 10913734.

Girotra, S., Nallamothu, B. K., Spertus, J. A., Li, Y., Krumholz, H. M., & Chan, P. S. (2012). Trends in survival after in-hospital cardiac arrest. *New England Journal of Medicine*, *367*, 1912–1920.

Gordon, C. J., & Buckley, T. (2009). The effect of high-fidelity simulation training on medical-surgical graduate nurses' perceived ability to respond to patient clinical emergencies. *Journal of Continuing Education in Nursing*, *40*(11), 491-498. doi:10.3928/00220124-20091023-06

Hamilton, R. (2005). Nurses' knowledge and skill retention following cardiopulmonary resuscitation training: A review of the literature. *Journal of Advanced Nursing, 51(*3), 288-297.

Hampton, C. (2011). Communicating information to funders for support and accountability. Retrieved from the Community Tool Box: http://ctb.ku.edu/en/tablecontents/sub_section_main_1376.aspx

Hill, C. R., Dickter, L, & Van Daalen, E. M. (2010). A matter of life and death: The implementation of a mock code blue program in acute care. *MedSurg Nursing*, *19*(5), 300-304.

Hoadley, T. A. (2009). Learning advanced cardiac life support: A comparison study of the effects of low-and high-fidelity simulation. *Nursing Education Perspectives*, *30*(2), 91-95.

Hodges, B. C., & Videto, D. M. (2011). *Assessment and planning in health programs* (2nd ed.). Sudbury, MA: Jones & Bartlett Learning.

Hunziker, S., Pagani, S., Fasler, K., Tschan, F., Semmer, N. K., & Marsch, S. (2013). Impact of a stress coping strategy on perceived stress levels and performance during a simulated cardiopulmonary resuscitation: A randomized controlled trial. *BMC Emergency Medicine, 13*(8), 1-9.

Huseman, K. F. (2012). Improving code blue response through the use of simulation. *Journal for Nurses in Staff Development, 28*(3), 120-124.

Institute of Medicine. (2010). *Report brief: The future of nursing: Leading change, advancing health*. Washington, D. C.: The National Academies Press. Retrieved from http://iom.nationalacademies.org

Jeffries, P. (2005). A framework for designing, implementing, and evaluating simulations used as teaching strategies in nursing. *Nursing Education Perspectives, 26*(2), 96-103.

Kaddoura, M. (2010). New graduate nurses' perceptions of the effects of simulation on critical thinking and confidence. *Journal of Continuing Education in Nursing, 41*(11), 506-516.

Kettner, P. M., Moroney, R. M., & Martin, L. L. (2013). *Designing and managing programs: An effectiveness-based approach* (4th ed.). Thousand Oaks, CA: Sage.

Koplan, J. (1999). *Framework for program evaluation in public health*. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4811a1.htm

Kuiper, R. A., Heinrich, C., Matthias, A., Graham, M. J., & Bell-Kotwall, L. (2008). Debriefing with the OPT model of clinical reasoning during high fidelity patient simulation. *International Journal of Nursing Education Scholarship, 5*(1), 1-14.

McCluskey, A., & Middleton, S. (2010). Delivering an evidence-based outdoor journey intervention to people with stroke: Barriers and enablers experienced by community rehabilitation teams. *BMC Health Services Research, 10*(18), 1–15.

Meaney, P. A., Bobrow, B. J., Mancini, M. E., Christenson, J., De Caen, A. R., Bhanji, F., . . . Leary, M. (2013). Cardiopulmonary resuscitation quality: Improving cardiac resuscitation outcomes both inside and outside the hospital: a consensus statement from the American Heart Association. *Circulation*, *128*, 417-428.

Merchant, D. C. (2012). Does high-fidelity simulation improve clinical outcomes? *Journal for Nurses in Staff Development*, *28*(1), E1-E8. doi:10.1097/NND.0b013e318240a728

Merchant, R. M., Yang, L., Becker, L. B., Berg, R. A., Nadkami, V., Nichol, G., . . . Groeneveld, P. W. (2012) Variability in case-mix adjusted in-hospital cardiac arrest rates. *Medical Care*, *50*(2), 124–130. doi:10.1097/MLR.0b013e31822d5d17

Mind Tools Ltd. (2011). *Gantt charts: Planning and scheduling more complex projects*. Retrieved from http://www.mindtools.com/pages/article/newPPM_03.htm

Perkins, G. D., Kimani, P. K., Bullock, I., Clutton-Brock, T., Davies, R. P., Gale, M., . . . Stallard, N. (2012). Improving the efficiency of advanced life support training: A randomized trial. *Annals of Internal Medicine*, *157*(1), 19-28.

Peterson, M. H., Barnason, S., Donnelly, B., Hill, K., Miley, H., Riggs, L., . . . Whiteman, K. (2014). Choosing the best evidence to guide clinical practice:

Application of AACN levels of evidence. *Critical Care Nurse*, *34*(2), 58-68. doi:10.4037/ccn2014411

Polit, D.F., & Chaboyer, W. (2012). Statistical process control in nursing research. *Research in Nursing & Health*. 35, 82-93.

Sanford, P. (2010). Simulation in nursing education: A review of the research. *Qualitative Report*, *15(*4), 1006-1011. Retrieved from http://www.nova.edu/ssss/QR/QR15-4/sanford.pdf

Terry, A. J. (2012). *Clinical research for the doctor of nursing practice*. Sudbury, MA: Jones & Bartlett Learning.

White, K. M., & Dudley-Brown, S. (2012). *Translation of evidence into nursing and health care practice.* New York, NY: Springer.

Wilson, B. L., Phelps, C., Downs, B., & Wilson, K. (2010). Using human factors engineering in designing and assessing nursing personnel responses to mock code training. *Journal of Nursing Care Quality, 25*(4), 295-303.

Appendix A: Figures

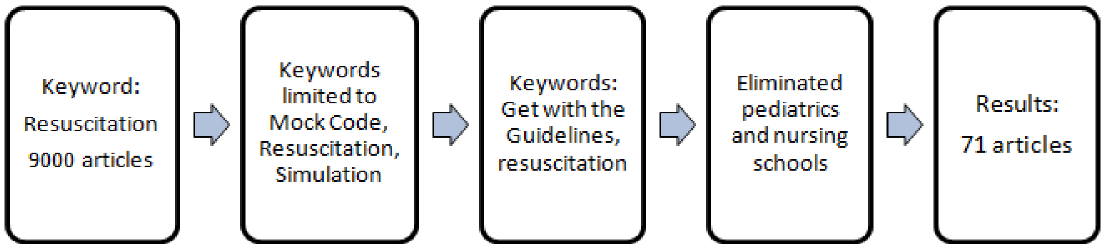
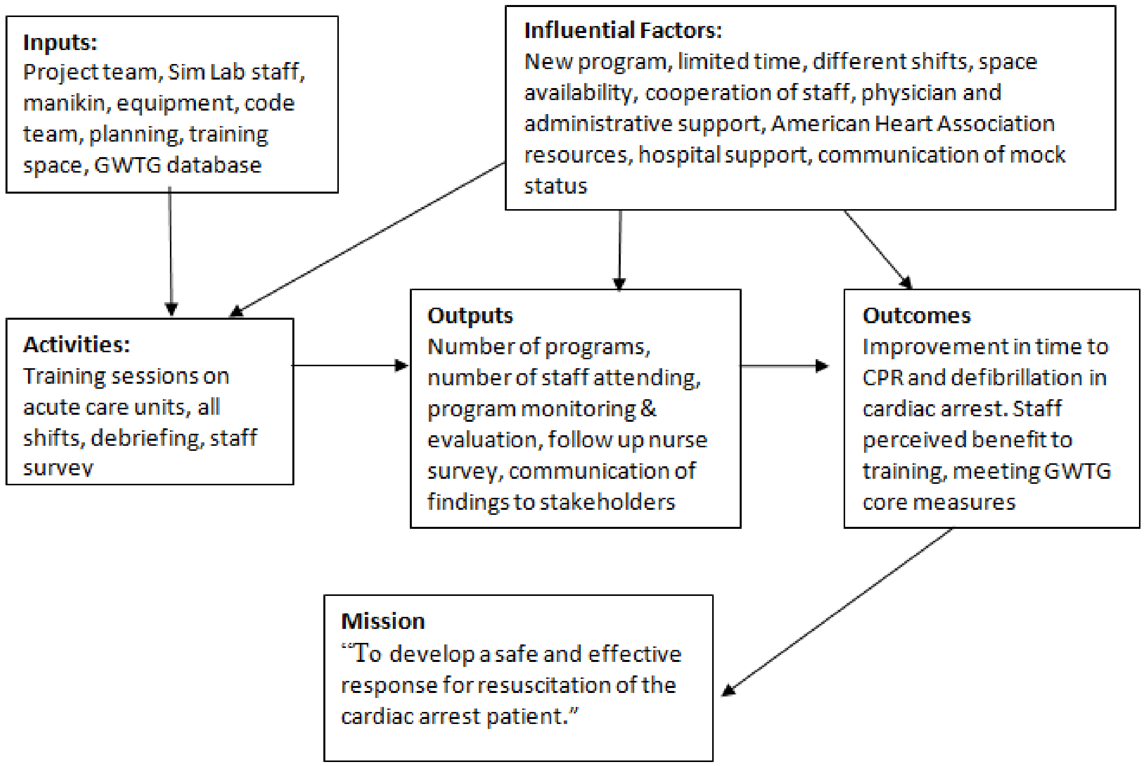


Figure A1. Review of the literature.

Level of Evidence

Level A:	Meta-analysis of multiple controlled studies or meta-synthesis of qualitative studies with results that consistently support a specific action, intervention or treatment
Level B:	Well designed controlled studies, both randomized and nonrandomized, with results that consistently support a specific action, intervention, or treatment
Level C:	Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results
Level D:	Peer-reviewed professional organizational standards, with clinical studies to support recommendations
Level E:	Theory-based evidence from expert opinion or multiple case reports
Level M:	Manufacturers' recommendations only

Figure A2. American Association of Critical-Care Nurses, levels of evidence (Peterson et al., 2014).



Adapted from CDC Basic Logic Model. Retrieved from http://www.cdc.gov/nccdphp/dnpao/hwi/programdesign/logic_model_components.htm

Figure A3. Logic model.

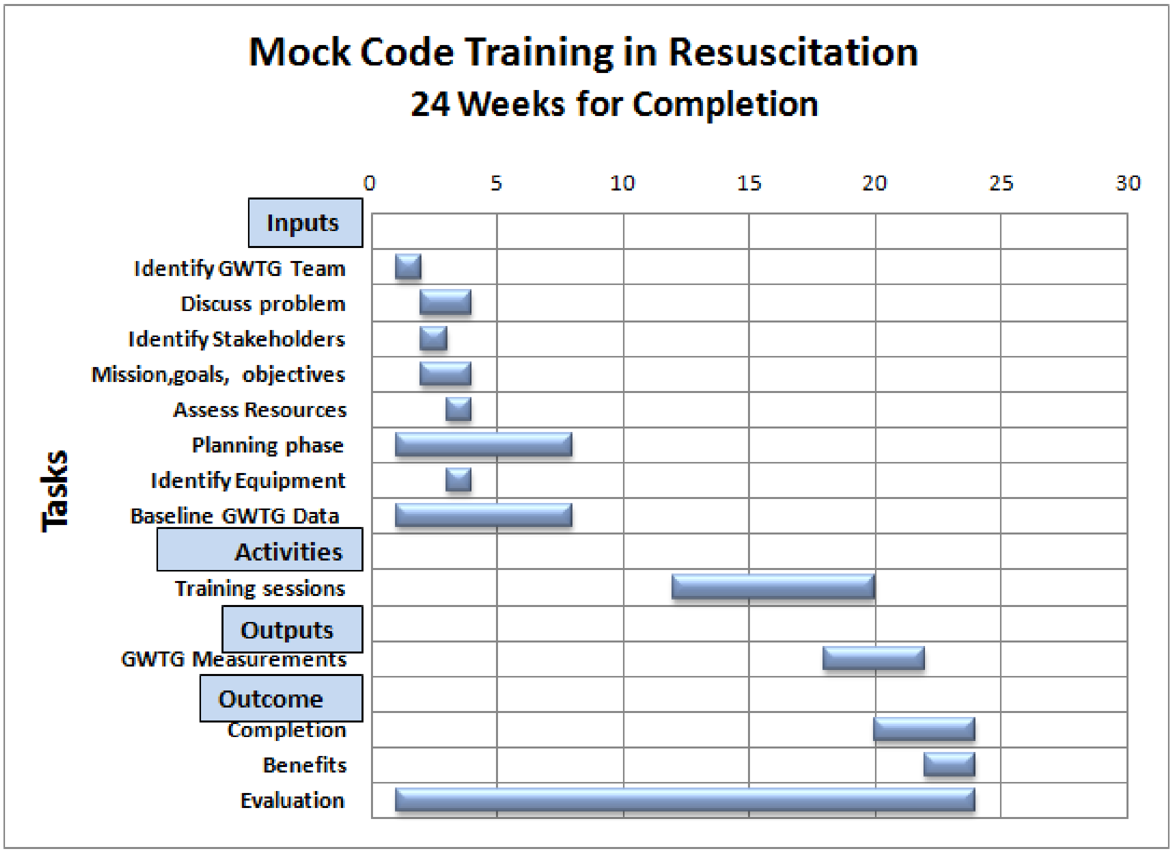
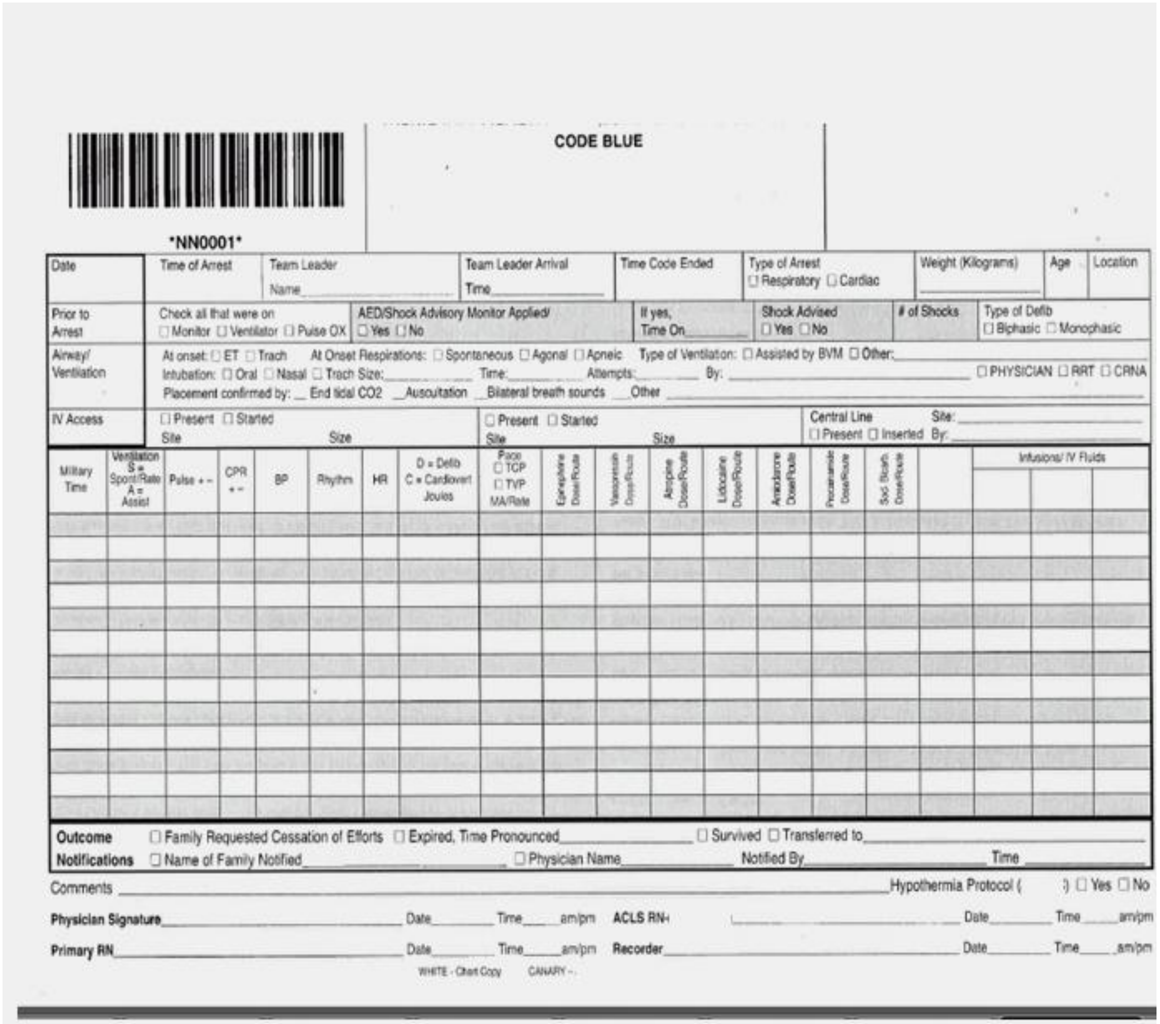


Figure A4. Gantt chart for mock code training project.



NN0001

CODE BLUE

Date	Time of Arrest	Team Leader Name___	Team Leader Arrival Time___	Time Code Ended	Type of Arrest ☐ Respiratory ☐ Cardiac	Weight (Kilograms)	Age	Location

Prior to Arrest: Check all that were on ☐ Monitor ☐ Ventilator ☐ Pulse OX | AED/Shock Advisory Monitor Applied/ ☐ Yes ☐ No | If yes, Time On___ | Shock Advised ☐ Yes ☐ No | # of Shocks | Type of Defib ☐ Biphasic ☐ Monophasic

Airway/ Ventilation: At onset: ☐ ET ☐ Trach At Onset Respirations: ☐ Spontaneous ☐ Agonal ☐ Apneic Type of Ventilation: ☐ Assisted by BVM ☐ Other:___
Intubation: ☐ Oral ☐ Nasal ☐ Trach Size:___ Time:___ Attempts:___ By: ___ ☐ PHYSICIAN ☐ RRT ☐ CRNA
Placement confirmed by: __ End tidal CO2 __Auscultation __Bilateral breath sounds __Other ___

IV Access: ☐ Present ☐ Started Site Size | ☐ Present ☐ Started Site Size | Central Line ☐ Present ☐ Inserted Site:___ By:___

Military Time	Ventilation S = Spont/Rate A = Assist	Pulse + −	CPR + −	BP	Rhythm	HR	D = Defib C = Cardiovert Joules	Pace ☐ TCP ☐ TVP MA/Rate	Epinephrine Dose/Route	Vasopressin Dose/Route	Atropine Dose/Route	Lidocaine Dose/Route	Amiodarone Dose/Route	Procainamide Dose/Route	Sod. Bicarb. Dose/Route		Infusions/ IV Fluids		

Outcome ☐ Family Requested Cessation of Efforts ☐ Expired, Time Pronounced___ ☐ Survived ☐ Transferred to___
Notifications ☐ Name of Family Notified___ ☐ Physician Name___ Notified By___ Time ___

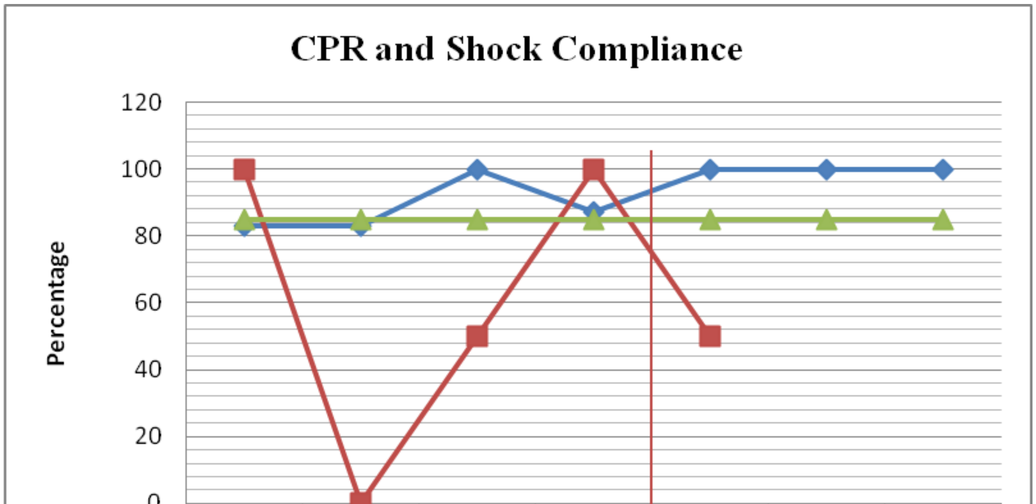
Comments ___ Hypothermia Protocol ( ) ☐ Yes ☐ No

Physician Signature___ Date___ Time___ am/pm **ACLS RN**___ Date___ Time___ am/pm

Primary RN___ Date___ Time___ am/pm **Recorder**___ Date___ Time___ am/pm

WHITE - Chart Copy CANARY -

Figure A5. Code Blue flowsheet.



	1Q2013	2Q2013	3Q2013	4Q2013	Mar-15	Apr-15	May-15
CPR	83	83	100	87	100	100	100
Shock	100	0	50	100	50		
Goal	85	85	85	85	85	85	85

Figure A6. Runs chart for CPR and shock compliance. Time to first chest compression within 1 minute and first shock within 2 minutes of cardiac arrest in adult. Vertical line indicates intervention.

Appendix B: Tables

Table B1

2013 Compliance with First Compression Within 1 Minute of Cardiac Arrest and First Shock Within 2 Minutes of Cardiac Arrest

	1^{st} Quarter (*n* = 12)	2^{nd} Quarter (*n* = 8)	3^{rd} Quarter (*n* = 16)	4^{th} Quarter (*n* = 15)
CPR	83%	83%	100%	87%
Shock	100%	0%	50%	100%

Table B2

Postintervention Compliance With Compressions Within 1 Minute and Shock Within 2 Minutes of Cardiac Arrest (*).

2015	March (n = 5)	April (n = 2)	May (n = 3)
CPR	100%	100%	100%
Shock	NA	NA	50%

Note. Mock code training began in February.

Appendix C: Letter of Support

Hospital Logo

January 16, 2015

Re: Walden University IRB Application

To Whom It May Concern,

This is a letter of support for Maureen O'Brien in implementation of an evidence based practice project on "The Use of Mock Code Training in Improving Resuscitation Response." This is an important quality improvement project in meeting guidelines for cardiac arrest response. I understand that Maureen will use resuscitation response rates that are collected by the facility in measuring for improvement in her DNP project. Maureen has permission to implement this DNP project with the nursing staff at this facility and use the training equipment.

Please feel free to contact me at ######## should you require further information.

Sincerely,

XXXXXXXXX

Vice President of Nursing / Chief Nurse Executive