NON-CRITICAL CARE NURSES'

CONFIDENCE

PARTICIPATING IN CODE BLUES

A Major Paper Presented

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NON-CRITICAL CARE NURSES' CONFIDENCE PARTICIPATING IN CODE BLUES

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Abstract

Over 500,000 people suffer a cardiac arrest each year in the United States with approximately 290,000 of those being in-hospital cardiac arrests (IHCAs). Despite advances in medicine and improved survival rates over the years, survival from IHCA remains suboptimal. Literature has demonstrated that current American Heart Association (AHA) resuscitation guidelines are effective, but basic life support (BLS) and advanced cardiac life support training (ACLS) every two years is too infrequent for nurses to feel confident in their resuscitation knowledge and skills. After a literature search revealed little research exploring non-critical care nurses' confidence levels participating in code blues, this quality improvement project sought to address this gap. Benner's Novice to Expert model (1982) served as the theoretical framework. The project was conducted at a 247-bed urban teaching hospital. Twenty nurses from four medical-surgical units completed an electronic survey. The results demonstrated that nurses felt confident recognizing and initiating a code blue. Confidence levels of performing different skills during a code including chest compressions, bag-valve mask ventilation, applying defibrillator pads, and giving medications varied. The results support that training every two years is too infrequent to allow for confidence and skill retention. Nurses believed that multi-modal methods of education could improve their knowledge and confidence participating in codes. This is important for advanced practice nurses (APNs) because they provide direct support, education, and leadership to staff nurses. Improving non-critical care nurses' knowledge and skills will improve confidence participating in codes and could lead to better patient outcomes.

Keywords: code blues; knowledge; confidence; in-hospital cardiac arrests; non-critical care nurses'

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Non-Critical Care Nurses' Confidence Participating in Code Blues

Background/Statement of the Problem

Each year in the United States approximately 500,000 people suffer a cardiac arrest. Over 290,000 of those cardiac arrests occur in a hospital setting (Cheng et al., 2018). Despite advances in medical science, overall survival rates and outcomes for in-hospital cardiac arrests (IHCA) remain poor. The American Heart Association (AHA, 2018) sought to identify gaps in current training for cardiac resuscitation in order to improve patient survival from IHCA. Cheng et al. (2018) stated that a multimodal educational approach is needed to effect successful performance and positive patient outcomes during cardiac arrest since skills learned in online training and in person cardiopulmonary resuscitation (CPR) courses decline if they are not used often. Much like the AHA, a study by Herbers et al. (2016) suggested that nurses and health care providers who do not routinely participate in cardiac resuscitation measures often lack the knowledge, skills, and confidence to perform optimally under these circumstances.

After a review of the current literature, very few studies investigating nursing knowledge and confidence participating in code blues were discovered highlighting a potential gap in research. Evidence has shown that patients with witnessed, in-hospital cardiac arrests, especially with shockable rhythms, have the best outcomes if care is rendered quickly. For every minute delay in initiating CPR and calling for assistance, cardiac arrest survival may decrease by 10% (Herbers et al., 2016). It is imperative that staff members in all departments be trained and capable of responding to cardiac arrests. Approximately half of cardiac arrests occurring in the hospital happen on regular medical-surgical floors (Andersen et al., 2019). There is very little research examining

how comfortable non-critical care nurses feel taking part in cardiac arrest resuscitation. The purpose of this study is to explore non-critical care nurses' confidence levels participating in a code blue. The specific research question was: How confident do non-critical care nurses feel participating in code blues?

Literature Review

A review of the literature was conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed databases with the search terms: nursing knowledge, nursing confidence, codes, code blue, rapid responses, medical emergencies, ACLS, mock codes, simulation, in-hospital cardiac arrests, patient outcomes, and outcomes. The search limits were: inclusion of peer reviewed English language journals from 2016 to 2021, and exclusion of studies involving pediatric or neonatal populations. The search terms yielded over 100 articles. Articles that were not related to in-hospital cardiac arrest, resuscitation training, and/or nursing perspectives about cardiac arrest resuscitation were eliminated with 13 articles ultimately included.

In-hospital Cardiac Arrests

Overview

There are over 290,000 in-hospital cardiac arrests in the United States each year (Andersen et al., 2019). The average age of cardiac arrest patients is sixty-six years old with men affected more often than women. Survival rates have been documented as high as 40% in some literature, but on average survival rates are approximately 20% (Andersen et al., 2019). One-year survival rates vary from 13% to 58% one year after arrest. Despite these relatively low numbers, survival outcomes have improved in the last twenty years. About half of all in-hospital cardiac arrests occur on regular medical floors, and the other half occur in intensive care units, operating rooms, and other departments (Andersen et al., 2019).

The majority of cardiac arrests (81%) in the hospital are non-shockable rhythms like asystole and pulseless electrical activity (PEA) (Andersen et al., 2019). Over half of

arrests (50-60%) are related to cardiac causes such as myocardial infarction, heart failure, or arrhythmias. The second most common cause of cardiac arrest is respiratory failure and respiratory arrest (15-40%) (Andersen et al., 2019).

Basic Life Support and Advanced Cardiac Life Support Training

Most healthcare workers receive resuscitation training every two years, in the form of basic life support (BLS) or advanced cardiac life support (ACLS). Current guidelines for CPR include a compression rate of 100 to 120 compressions per minute, a depth of at least two inches, and less than ten second interruptions in chest compressions (Kaplow et al., 2020). Early recognition of emergencies and initiation of high quality CPR remain the mainstay of treatment and best indicator of patient outcomes (Anderson et al., 2019).

Other key treatments include ventilation, early defibrillation, identification of causes (often referred to as "Hs" and "Ts"), and post-cardiac arrest care including targeted temperature management (TTM). The Hs and Ts (Table 1) are reversible causes of arrest, such as hypoxia, that are important to consider in order to fix the immediate cause of arrest, prevent additional arrest or injury, and allow providers to anticipate possible complications during post cardiac arrest care (UpToDate, 2021). Targeted temperature management (TTM) is the initiation of protective hypothermia to improve neurologic function after arrest (Andersen et al., 2019).

Table 1

Hs and Ts

Hs	Ts
Hypoxia	Toxins
Hypothermia	Tamponade
Hypo/hyperkalemia	Thrombus (pulmonary)
Hypovolemia	Thrombus (coronary)
Hydrogen ions (acidosis)	Tension pneumothorax

Evidence has shown that if the skills learned in BLS and ACLS training are not utilized, they deteriorate. The AHA believes that rather than developing new treatments or protocols, the best way to improve overall outcomes from cardiac arrest is to improve staff and provider training. The primary indicators of patient survival during cardiac arrest are high quality CPR skills, appropriate implementation of the hospital chain of survival or emergency/rapid response teams, and adequate staff education (Cheng et al., 2018).

Patient Survival

Due to the high prevalence of and lack of research surrounding in-hospital arrests, Andersen et al. conducted a review to examine factors that affect patient survival (2019). The use of rapid response teams and scoring tools based on vital sign changes may identify early changes and prevent patient deterioration. Of the roughly 20% of patients with shockable rhythms at the time of their arrest, the more quickly defibrillation occurred, the better the outcome. Patients with shockable rhythms like ventricular tachycardia and ventricular fibrillation were two to three times more likely to survive than those with non-shockable rhythms. Early administration of epinephrine for non-shockable arrests was also associated with improved outcomes. Additionally, patients

that were on telemetry monitoring and patients that had witnessed events were also more likely to have positive outcomes (Andersen et al., 2019).

Patient specific factors can also influence cardiac arrest survival (Andersen et al., 2019). Patients over seventy years old often had worse outcomes than younger patients. Racial disparities exist, with Black and Hispanic patients having worse outcomes than white patients. Patients with comorbidities such as cancer, sepsis, liver disease, and kidney disease were also less likely to survive. Lastly, patients who had a myocardial infarction that caused their cardiac arrest actually demonstrated higher survival rates. Throughout the country there are also variations in survival rates for in-hospital cardiac arrests (Andersen et al., 2019).

Adherence to American Heart Association Guidelines

An observational study was conducted to examine the effect of adherence to AHA guidelines on return of spontaneous circulation (ROSC) at twenty-four hour survival, discharge from the intensive care unit, and discharge home (Kaplow et al., 2020). Data from medical records, code recording sheets, and Zoll defibrillator data were reviewed from 200 codes at one academic medical facility between 2016 and 2018.

The average age of patients included in the study was 55.8 years old, and 56% of participants were male. In more than half of the cases, the patients were in the intensive care unit (61%), and the most common rhythm was PEA (58.5%). The review of data demonstrated a lack of adherence to AHA guidelines. Sixteen of the 200 patients were defibrillated inappropriately, medications were not administered correctly 54.5% of the time, and there was only 27.4% compliance with both rate and depth of chest compressions. Return of spontaneous circulation was achieved for 125 of the 200

patients. At the twenty-four hour mark ninety-four patients were still alive, fifty were discharged from the intensive care unit (ICU), and forty-seven were discharged from the hospital (Kaplow et al., 2020). Deviation from AHA guidelines suggests a need for further education or practice of resuscitation skills.

Further analysis demonstrated that 34.7% of patients that did not survive had compressions that were deeper than the guidelines. In contrast with other literature, patients with ventricular tachycardia or fibrillation who received one shock or more were actually less likely to survive. Patients that were in the intensive care unit (ICU) also had lower survival rates at the twenty-four hour mark, even if ROSC was initially obtained. The low survival rate was likely due to their critical illness, and those with more than one type of organ support or life support were less likely to survive. One of the most significant findings revealed that patients with more than one pause in compressions were less likely to survive. A possible limitation to this study is placement of pads that could affect collection of compression data, e.g., if pads were not placed accurately, it could affect rate and depth of compression measurements and pauses in compressions (Kaplow et al., 2020). The survival rate of patients in this study matches the average survival rates in the literature.

A similar study by Honarmand et al. also determined that adherence to ACLS guidelines improves patient outcomes (2018). A chart review was done of in-hospital cardiac arrests and deviations from ACLS guidelines during codes from three hospitals between 2010-2014. The primary outcome measures evaluated were whether or not ROSC was obtained and survival to hospital discharge. Out of the 160 codes included, ROSC occurred in seventy-five cases, and twenty patients (12.5%) survived to hospital

discharge. The average age of patients was seventy-one years old. There were 147 codes in which the patient had a non-shockable rhythm. Approximately 57% occurred on the day shift, 67.5% were witnessed, and 45% of codes occurred with patients on telemetry monitors (Honarmand et al., 2018).

Adherence to and deviation from ACLS guidelines was examined. Codes led by resident physicians had more deviations than codes led by attending physicians or fellows. Epinephrine was given in 87.5% of the codes, with an average of five minutes elapsed before the first dose was given, which is longer than recommended by the AHA. For rhythms that were shockable, defibrillation occurred within one minute in most cases. Overall, there was an average of 2.3 deviations from ACLS in codes that ended with ROSC and an average of 3.9 deviations in codes in which the patient did not survive. None of the unwitnessed arrests survived in this study (Honarmand et al., 2018).

The results of these two studies indicate that adherence to current ACLS guidelines during resuscitation leads to improved patient outcomes. The research demonstrates the need for improved education and reinforcement of that education and AHA guidelines to nurses and other staff participating in cardiac resuscitation.

American Heart Association Recommendations Related to Resuscitation Education

The International Liaison Committee on Resuscitation (ILCOR) performed a systematic review of science related to resuscitation (Cheng et al., 2018). Physicians, nurses, and other members of the interdisciplinary team were represented among the panel of researchers. The research findings led the AHA to develop eight focus areas (Table 2) for improved cardiac arrest education that they believed would lead to better patient outcomes (Cheng et al., 2018).

Table 2

American Heart Association's Eight Focus Areas

Focus Areas	Content
Focus area 1	Mastery learning and deliberate practice
Focus area 2	Spaced learning
Focus area 3	Contextual learning
Focus area 4	Feedback and debriefing
Focus area 5	Innovative educational strategies
Focus area 6	Assessment
Focus area 7	Faculty development
Focus area 8	Knowledge translation and implementation

Research demonstrated that learning skills in shorter sessions, such as two four-hour blocks of ACLS rather than one eight-hour class resulted in less loss of skills fourteen months later (Cheng et al., 2018). Hybrid and didactic learning such as hands on skill sessions and online modules improved skill acquisition. The AHA also suggested that over learning skills could help prevent the decline in skills that occurs over time. Evidence has shown that within one to six months after ACLS or BLS courses, skills often decline. Spaced learning can improve knowledge retention by providing shorter, more frequent learning opportunities. "Booster training" can serve as a follow up to regular trainings to reinforce infrequently used skills or concepts (Cheng et al., 2018, p. e87).

The review emphasized the importance of cardiac arrest training geared toward individuals' roles and scopes of practice. Research suggested matching learning objectives and methods to the specific learner or team of learners. It also found that more realistic patient situations, providing some external stress at a low level, and use of high fidelity manikins all improved performance and knowledge retention. One study showed

that adding supplemental team training to ACLS and BLS improved patient survival two-fold. Pre-briefing, timely feedback, and debriefing or reflection can also help reinforce important concepts and improve training success. Using non-traditional educational methods such as games for learning, blogs, and podcasts also improved knowledge retention. Appropriate assessment throughout the learning process, rather than just at the end, using validated tools along with ongoing faculty development and translation of knowledge were also key points (Cheng et al., 2018). Using innovative and multimodal education methods could improve healthcare provider knowledge about cardiac resuscitation.

Additional Resuscitation Training: Simulation & Mock Codes

Simulation

Evidence has shown the benefits of simulation based learning in nursing for skill acquisition and knowledge retention compared with traditional learning methods. A 2017 study by Crowe et al. explored the effectiveness of simulation on increasing nursing knowledge and confidence in the recognition of a deteriorating patient. Many times there is a delay in recognizing early signs of deterioration. This study took place across ten general medical floors in a 650-bed Canadian hospital. Registered nurses and licensed practical nurses from the units participated. Nurses with ICU experience, advanced licenses, and student nurses were excluded. Hospital data from three months before and three months after the simulation were analyzed to determine if the intervention had an influence on patient outcomes (Crowe et al., 2017).

The study began with a survey prior to the simulation to obtain baseline knowledge. Seven four-hour long high fidelity simulations took place, and an hour was

devoted to lecture about the care of deteriorating patients. Stations were set up to review essential emergency equipment. Nurses took a post simulation survey immediately after completing the simulation and again three months later to assess knowledge retention (Crowe et al. 2017).

There were 161 nurses who participated in the pretest, simulation, and posttest. Of those 161 nurses, seventy-nine responded to the three-month follow-up survey. Approximately 76% of nurses in the survey had participated in a code blue previously. Both knowledge and confidence scores were improved at the posttest and sustained at the three-month mark. There was an increase in calls to the critical outreach nurse, who provides consultation to nurses with decompensating patients at the hospital, from 67% before the intervention to 74% after (Crowe et al., 2017).

The number of code blues decreased by 14% after the simulation. The number of emergencies called for pre-arrest patients increased, which emphasized improved recognition of patient decline. The number of codes where ROSC was obtained also increased after the simulations. The sample size in this study was small and limited to one hospital. The tool utilized was also not a validated tool (Crowe et al., 2017).

A quality improvement project conducted in a North Carolina hospital investigated the benefit of using cardiac arrest simulations to increase staff response times and confidence levels. A twenty-four-bed unit in a large academic medical center was the site of the project. There were twenty-six nurses and eighteen nursing assistants working on the unit and thirty-six of them participated in the study (Adcock et al., 2020).

A pre-intervention survey was given to all participating staff. The eleven-item survey borrowed from the *First Five Minutes Program* assessed their confidence

participating in a code. (The *First Five Minutes Program* was first developed by the Winter Institute for Simulation, Education, and Research (Adcock et al., 2020). It was developed to focus on medical-surgical nurses' performance in the first five minutes of a code, prior to code team arrival.) In this study, a five-minute code simulation was conducted, followed by a five-minute debriefing. An additional five-minute code was then performed after the debriefing to review skills. The simulations were held on different shifts and days to include multiple staff members. Defibrillation pads collected data about chest compressions and an observational checklist was filled out during the code simulations. The process was repeated four months later, and the confidence survey was administered again. There were twelve simulations during the initial portion of the program and four done at the four-month mark (Adcock et al., 2020).

The results of this study demonstrated improved staff response times and confidence levels as a result of the simulation. The checklists indicated significantly decreased time to complete twelve of the sixteen tasks. The post intervention surveys revealed improvement in confidence in seven out of nine items. The additional questions regarding knowing how to call a code had only one participant that did not know how to do it pre-intervention, and all reported they knew how to call a code at the repeat survey. CPR data obtained from the defibrillation pads indicated the CPR quality at the four-month mark was poorly sustained. Both rate and depth of compressions declined at four months compared with the first intervention (Adcock et al., 2020).

Overall, this study determined that confidence participating in a code could be improved through practice. The researchers acknowledged that some limitations included realism of the simulations, participants being fully engaged as if it were a real

patient, and time constraints (Adcock et al., 2020). Additionally, the study reiterated what other research has shown about the frequency of poor CPR quality. It is also important to note that half of the participants in this study had participated in another simulation within eighteen months of this program, and it is possible that this could affect skills and pre-intervention scores.

Simulation was also utilized in an exploratory descriptive cross-sectional study that examined the efficacy of nurse-initiated defibrillation. This study was conducted in a 615-bed hospital with four intensive care units. Eighty-two ICU nurses who had completed a survey about their knowledge, skills, and attitudes related to CPR and defibrillation were invited to participate in this project. A high-fidelity code simulation was developed along with a pretest and posttest (Vincelette et al., 2018).

Twenty-two nurses participated in the simulation, 55% of whom did not have any CPR certification. The majority of participants had completed simulations previously. Two observers watched the simulations and utilized a checklist to grade participants. Approximately 91% of nurses were able to correctly identify ventricular fibrillation and the need for defibrillation. The proper amount of joules used to deliver the shock was correctly selected by 77% of nurses. The majority of participants (86%) knew to check for a pulse and assess mental status prior to defibrillation. The average time it took to call for help was twelve seconds, and CPR was initiated in less than twenty-nine seconds (Vincelette et al., 2018).

Early defibrillation has been shown to improve patient outcomes in cardiac arrest. The ability of nurses, especially those trained in CPR, to defibrillate patients in ventricular fibrillation or tachycardia before the code team arrives could improve patient

outcomes. Nurses need appropriate training on defibrillation, and as this study demonstrated, simulation can be an effective way to do it. Participants from this study believed that the simulation was helpful and that they could benefit from further training (Vincelette et al., 2018).

A study by Demirtas et al. investigated the use of simulation based CPR training for senior nursing students (2020). A mixed methods design was utilized to assess confidence and skills of fourth year nursing students participating in CPR. Nursing students completing clinical rotations in the emergency department were included in the study. Eighty-nine nursing students participated in the quantitative portion of the survey, and twenty-four students participated in the qualitative portion (Demirtas et al., 2020).

Nursing students took a ten-item CPR knowledge questionnaire based on AHA guidelines and performed CPR skills while being observed. After the nursing students filled out a satisfaction and self-confidence survey, they were given a forty-five minute lecture about CPR and viewed a demonstration about how to perform CPR. Following this, another simulation was conducted, and the self-confidence survey was filled out again. A repeat knowledge questionnaire was administered three weeks later. Twenty-four students also participated in focus groups to gather more information about their experiences (Demirtas et al., 2020).

The ages of nursing students participating in this study ranged from twenty to twenty-three years old. Cardiopulmonary resuscitation knowledge scores from pre-intervention to post intervention improved from a mean of 5.66 to 8.38 out of 10. Scores on skills checklists from each simulation improved from 22.29 to 32.51 pre-intervention to post-intervention. The results of the focus groups revealed several themes. The first

theme was anxiety prior to the training. Many of the students reported that they did not feel comfortable doing CPR or that they were apprehensive that they knew how to perform it correctly. The other major theme was satisfaction with the simulation training. Students felt more confident and knowledgeable about CPR, less afraid of making a mistake, and believed that other students would benefit from the training (Demirtas et al., 2020).

One of the limitations of this study was the small sample size and only including students from one school (Demirtas et al., 2020). Additionally, the focus of this study was on students rather than registered nurses. It is important to consider that fourth year students participating in this study were preparing for graduation. New graduate nurses who do not have a lot of experience with codes and performing CPR often staff medical-surgical floors of hospitals. As demonstrated by the previous studies, simulation can be an effective technique to improve nurses' confidence and knowledge responding to patients in emergency situations.

Mock Codes

Mock codes are a specific type of simulation and a beneficial tool to improve education and provide opportunities for practicing cardiac resuscitation skills. Mock codes differ from regular simulations because they are often conducted in situ on units rather than in classrooms or simulation labs. Some mock codes are performed unexpectedly and provide a more realistic scenario than classroom simulations. They also allow staff to see how a code would run on their unit, who responds from the code team, where supplies are kept, and other important aspects. Literature has demonstrated that codes are high stress, high-risk situations that occur infrequently for most staff in the

hospital. Many nurses and providers do not feel confident in their ability to perform effectively in a code situation. Positive patient outcomes (i.e., survival) depend on quick recognition of an emergency situation, and patient survival decreases up to 10% for every minute delay in calling for help during a code blue (Herbers et al., 2016).

A quality improvement project at the Mayo Clinic was developed to determine if a mock code program could improve nursing confidence and staff response to codes. The mock code program was developed on two intermediate care units. There were 124 registered nurses and twenty-eight nursing assistants between the two units. All of the nurses had both BLS and ACLS certifications, and all nursing assistants had BLS. Prior to the start of the program, ninety nurses and nursing assistants were surveyed. Staff rated their confidence levels initiating CPR, participating in a code, and being team leader of a code. Twenty minute mock codes were conducted at random during a two-year period. Staff members that participated in a mock code were asked to fill out a post survey within two weeks (Herbers et al., 2016).

Eighty-six nurses completed the post mock code surveys. Data on time to initiate a code, initiate CPR, and defibrillate a shockable rhythm were also collected over that time frame. During the two-year period there was an improvement in confidence and performance. Staff participation in codes increased from pre-intervention to post-intervention and CPR confidence scores improved by 18%. Staff confidence being team leader increased from 50% to 67.4% post intervention. The goal time frame was less than twenty seconds for activating a code and less than sixty seconds to initiate CPR. Time to call for help decreased 12%, time to start CPR decreased by 52%, and defibrillation times improved 37% at the end of the two years (Herbers et al., 2016).

Overall, the mock code intervention was successful. Response times on the units improved and staff reported increased confidence levels. Some benefits to the mock codes included having to act out the situation rather than just verbalize skills, getting to see how to activate the code team in their departments, and troubleshooting issues with equipment. Some limitations noted by the researchers were different facilitators, different units participating, and using a variety of code scenarios (Herbers et al., 2016). The researchers also did not disclose how often they conducted these mock codes or how many were done during the two-years. Lastly, the Mayo Clinic also includes CPR skills as part of their yearly competencies in addition to ACLS and BLS, so that may have contributed to fairly high pre-intervention survey scores (Herbers et al., 2016).

A similar study on a smaller scale examined mock codes as part of a new nurse residency program (McPhee, 2018). An already existing mock code program was modified based on requests for further practice from new nurses who felt unsure of their skills during a code. Previously nurses participated in a code simulation once during their residency in groups of three to four peers. The new program incorporated a deliberate practice approach to learning skills. Prior to simulation, they reviewed the code carts, and one person was designated primary nurse. Once the primary nurse found the patient and activated the code, peers joined into the simulation. Periodically throughout the resuscitation, they paused to talk with the facilitator about what was happening. Roles were also changed throughout, so each person had the chance to do chest compressions, manage the airway, use the defibrillator, and practice other skills (McPhee, 2018).

After the change to the mock code portion of the residency, 135 nurses participated in the revamped version. Many of them reported that deliberate practice and repetition helped to reinforce the skills. They felt that pausing to talk about skills was also helpful rather than distracting. The majority of the new nurses believed that it was an improvement to the old program. All of them found it useful, and 98% thought that it covered important skills and knowledge for responding to a deteriorating patient (McPhee, 2018). It was a small study focusing on only new graduate nurses, but the results could apply to nurses in any setting where codes are not encountered frequently.

Mock codes can be a useful method for nurses to practice skills related to CPR and participation in codes. Mock codes also provide time for unemotional debriefing as well as data collection that can be used to improve practice and outcomes. Like simulation, they provide repetition and practice in a safe and lower stakes environment than a real code blue.

Nurses' Perspectives Participating in Codes

During the review of the literature, very little research was found that explored nurses' and healthcare providers' perspectives on participating in code blues. Studies have examined knowledge or confidence before and after specific interventions. In all of these studies, scores were lower before the intervention. A study in *Critical Care Medicine* investigated perspectives and confidence levels participating in and leading codes (Peltan et al., 2019). The study took place within a large hospital network in Utah and Idaho. An online survey was sent to 1,600 nurses, resident physicians, and attending physicians at twenty-one facilities via email, and nearly 1,000 replied. After excluding staff that noted they were unlikely to be part of cardiac arrest resuscitation efforts within

two years, there were 874 respondents. Cardiac arrest statistics were also collected from the hospital system (Peltan et al., 2019).

The study included 190 attending physicians and 110 resident physicians from a variety of specialties. Additionally, 574 nurses with an average of thirteen years of experience participated in the study. There were 552 nurses who were ACLS certified (96.2%) and 371 (64.6%) who were specialized in critical care. Over 90% of nurses had participated in a mock code within the previous year (Peltan et al., 2019).

Between 2013 and 2016, there were 428 cardiac arrests within twelve of the hospitals included. Return of spontaneous circulation was obtained in 62% of cases. Approximately 74% of participants were involved in six or fewer codes per year. Staff rated their self-perceived confidence levels responding to codes and leading codes. The number of staff who reported they felt confident participating in codes was 92%. Despite that confidence level, 85% of residents and 43% of nurses feared that they would make a mistake during the code. Over 25% of nurses and 48% of residents did not feel comfortable leading a code (Peltan et al., 2019).

The results suggest that those who participated in cardiac resuscitation more frequently had greater confidence in their skills than those who did so less frequently. The results further revealed uncertainty in some skills for both nurses and residents, which were more pronounced among residents. Based on the size of each hospital, the composition of staff on the code teams varied. The researchers suggested that smaller facilities could benefit from expanding code training, using simulation, and consultation with experts over the phone during emergency situations (Peltan et al., 2019).

The cohort of nurses who participated in this particular study may not be representative of nurses throughout all hospitals in the United States. Over half of them had critical care specialization, which may not reflect the confidence levels of nurses working on regular medical-surgical floors. Additionally, over 95% of the nurses had both ACLS and BLS certification, which may not be required in all facilities or units. Over 90% of these nurses had participated in a mock code within the previous year. Mock codes and ACLS may have had a positive effect on overall nursing confidence levels reported in this study.

Similarly, a cross sectional survey conducted by Tiscar-Gonzalez et al. in Spain explored nurses' knowledge related to cardiopulmonary arrest (2019). This study utilized the Knowledge and Attitude of Nurses in the Event of a Cardiorespiratory Arrest (CAEPCR) questionnaire to examine knowledge as well as ethical perspectives of nurses related to cardiac arrest. The CAEPCR questionnaire was distributed to 2,180 nurses and 347 participated. The tool utilized eleven multiple choice questions related to knowledge of CPR and twelve statements about ethics answered via a Likert scale. At the time of the study, it had been over two years since half of the participants had undergone CPR training, and 21% had never had formal CPR instruction (Tiscar-Gonzalez et al., 2019).

The average number of correct responses on the knowledge portion of the survey was six to seven out of eleven questions. Nurses who were older or had been practicing for longer had lower scores than newer nurses. Those participants that had been involved in a code or taken a CPR refresher within the past six to twelve months had higher scores. Less than 25% of nurses felt prepared to participate in CPR in their workplace, and 51% of staff felt that CPR refreshers should be held every six to twelve months. Ethical

questions addressed attitudes about presence of family during CPR, do-not-resuscitate orders, and other topics (Tiscar-Gonzalez et al., 2019).

The results of this study echo the results of research in the United States. There is a decline in knowledge and skills after CPR training, and many nurses lack confidence participating in codes. One significant limitation to this study is that it took place outside of the United States where BLS and ACLS requirements vary. It is likely that nursing curricula also vary. Improving nursing education or finding innovative ways to provide training to staff about cardiac resuscitation can increase nursing confidence and positively impact patient outcomes (Tiscar-Gonzalez et al., 2019).

A review of the literature demonstrated that overall patient outcomes from in-hospital cardiac arrest remain poor. Despite improvements in outcomes over the past twenty years and advances in science and treatments, mortality rates remain high. The AHA has suggested that improving nursing and staff education could be the most beneficial way to increase patient survival. The small amount of cardiac arrest and resuscitation education in nursing programs and training such as BLS and ACLS courses offered every two years is insufficient. Simulation specific to cardiac arrest along with mock code programs have shown positive benefits as adjuncts to standard BLS and ACLS training and can enhance nursing knowledge and confidence related to participating in code blues.

There is a lack of literature exploring confidence levels participating in codes among non-critical care nurses. With over half of all in-hospital cardiac arrests occurring on medical-surgical floors, it is crucial to understand nurses' confidence and knowledge levels related to participating in code blues (Anderson et al., 2019). Determining how

non-critical care nurses' feel about participating in code blues can highlight focus areas for increased education and subsequently improve patient outcomes.

Theoretical Framework

An important and well-known theory in nursing education is Benner's (1982) Novice to Expert Model, which describes five stages of skill and knowledge acquisition in nursing. The stages are novice, advanced beginner, competent, proficient, and expert (Benner, 1982). The theory can be used to guide collegiate nursing education, new hire orientation, staff professional development, and other realms of nursing education.

Benner's research is based on the Dreyfus Model of Skill Acquisition. Benner conducted a study in 1982 at six hospitals that included sixty-seven nurse clinicians, new graduate nurses, and senior nursing students. Through observations and interviews, she concluded that the Dreyfus Model and its five stages could be applicable to nursing knowledge and skill development (Benner, 1982). Each stage has certain characteristics, as well as ways to target education to nurses in each stage.

According to Benner, novice nurses lack experience in patient care, so they follow lists, protocols, and objectives in order to complete tasks. An advanced beginner starts to build on prior experience, recalling attributes and aspects of care from previous situations (Benner, 1982). In both of these first two stages, nurses lack prioritization skills. In the third stage, competent nurses are more organized, are able to set priorities, and have improved decision-making skills. They are able to see the long-term plan for the patient. The proficient nurse has a more holistic view of patient situations, having learned from prior experiences, and completes tasks faster and more efficiently than the novice, advanced beginner, or competent nurse. In the last stage, expert nurses have a breadth of knowledge and rely on intuition when caring for patients (Benner, 1982).

There are also seven domains of nursing knowledge and clinical practice that Benner described. These domains include teaching-coaching, patient monitoring, managing rapid changes, administering therapeutic interventions and observing results, helping, ensuring quality of health care practices, and achieving work-related competencies (Cherry & Jacob, 2014). As nurses move sequentially through each phase of Benner's model, they build on the previous phase and acquire more knowledge and skills within each of the seven domains.

Benner's Novice to Expert Model can be applied to this quality improvement needs assessment. The purpose of this needs assessment is to examine nurses' confidence related to participation in code blues. As previously discussed, the AHA has identified a gap in knowledge related to cardiac resuscitation. The AHA has suggested that nurses who do not practice resuscitation skills often lose the skills to effectively participate in code blues and other emergency situations (Cheng at al., 2018). Of Benner's seven domains, managing and responding to rapid changes and emergency situations is the domain that this project primarily focuses on. Other relevant domains include monitoring patients and administering therapeutic interventions (Brykczynski, 2017).

Nurses working in different departments within a hospital may fall into any of Benner's stages depending on the number of years they have practiced, the types of units they have worked on, and other prior experiences. Nurses that are experienced in critical care are likely to be competent, proficient, or expert at participating in codes. Non-critical care nurses that do not regularly use these skills are more likely to be novice, advanced beginner, or competent. Understanding where nurses fall into Benner's model

can serve as a guide to tailor appropriate educational interventions and improve nursing knowledge and confidence related to participation in codes. Benner's Novice to Expert Model will provide a framework to organize this quality improvement needs assessment project.

Method

Purpose

The purpose of this quality improvement needs assessment was to explore non-critical care nurses' confidence levels related to participating in a code blue.

Design

A one-time survey was utilized (Appendix A). The survey was created for this project and reviewed by several classmates for content validity. The survey consisted of multiple-choice questions to obtain information about the participant's years of nursing experience, if participants had BLS versus ACLS/BLS certification, and the average number of codes per year the participants took part in. Participants were asked to rate their confidence levels performing specific tasks during a code blue on a Likert scale. These tasks included recognizing an emergency, recognizing lethal rhythms, calling for help, starting chest compressions and ventilation, placing defibrillator pads, and giving code medications. One additional question allowed participants to select from a list of factors that they believed might improve their confidence during a code blue such as participating in simulations or mock codes.

Sample

The proposed participants were registered nurses on four different medical-surgical floors in the hospital. Any nurses that worked on the units or were floating to those units were able to participate. There were approximately 100-150 potential participants.

Site

The site of this project was a 247-bed urban teaching hospital. This project took place on four medical-surgical units. Two of the units were 30-bed units, one was a 32-bed unit, and the last was a 36-bed unit.

Procedures

Prior to beginning this quality improvement needs assessment, permission was obtained from the unit managers where the survey was going to take place. Approval was also obtained from both the hospital's and Rhode Island College's institutional review boards. An invitation email (Appendix B) was sent to nursing staff on the units prior to the survey explaining the purpose of the project (to explore non-critical care nurses' confidence levels participating in a code blue) and explaining participation in the project. The survey period lasted for seven weeks. Email reminders (Appendix C) were sent when there were two weeks left and one week left in the survey period.

An electronic survey format using Qualtrics was utilized for this project. The link for the survey was sent to potential participants at the start of the survey period. A colorful flyer was placed in each unit's break room stating the purpose of the project and asking nurses to check their email and to participate in the project. In addition, a QR code on the flyer was available to take participants to the survey. Nurses were asked to fill out only one survey per person. There was no incentive or penalty if nurses chose to participate or not participate in the survey. By filling out the anonymous survey, nurses gave implied consent, and this was also stated on the survey.

Once the survey period was completed, de-identified data were entered into an Excel flow sheet. The results were reviewed in a private location. The individual

surveys were not shared with anyone not directly involved with the project. The survey data was saved to a flash drive that was also stored in a secure locked location.

Measurement

Descriptive statistics were used to measure outcomes. Central tendencies were used (mean/median/mode) along with frequency distributions (Polit & Beck, 2014). Charts and tables were also included to display the data.

Anticipated Timeframe

Approval from the institutional review boards was obtained during the fall of 2021. This project was carried out on the units from November 2021 to January 2022.

Organizational/Systems Factors

Approval was sought from the unit managers at the hospital. Institutional review board approval was obtained from the hospital and Rhode Island College. The period of time during which the survey was open, the availability of surveys via email, and provision of a QR code made the survey easily accessible to participants. Another enabling factor was that the hospital is a teaching hospital that is familiar with the Rhode Island College master's projects and other quality improvement initiatives. Some barriers to participation could have been willingness or time for staff to fill out the survey.

Desired Outcomes

The desired outcome was to have at least one third of the nurses from each unit participate in the survey; this outcome was not met. The goal of this project was to examine how confident non-critical care nurses' felt about participating in a code blue. This would provide the hospital with information that could help them prioritize how to allocate professional development resources. Based on the results of the survey, the

hospital could focus time, money, and training on the most effective educational interventions to improve nurses' confidence and knowledge related to participation in codes.

Ethical Concerns

The project was open to any nurses working on or floating to the units on which the survey was conducted. The survey was available for seven weeks, on all shifts so there was equal access for staff to participate. Demographic information was not collected other than years worked as a nurse, which was grouped into broad categories to prevent identification of participants (e.g., < 2 years, 3-5 years, 6-10 years, 11-14 years, and >15 years). The project involved human subjects, so approval was sought from the hospital institutional review board, as well as the institutional review board at Rhode Island College.

Evaluation Plan

The results were analyzed using descriptive statistics. The results of the survey indicated how confident non-critical care nurses' felt about participating in code blues. The survey results highlighted areas for improvement and indicated whether staff felt that ACLS training, mock codes, or other factors could help to improve nurses' confidence participating in code blues.

Dissemination Plan

The results of this quality improvement needs assessment were disseminated in several ways. Results were presented during the MSN Poster Presentations at Rhode Island College during the spring of 2022. The final project was published in the Digital Commons at Adams Library. The results were also shared with leadership at the hospital,

including the managers on the participating units, the hospital professional development department, and the hospital Code Review Committee.

Results

Experience

The electronic survey was available to over 100 nurses for seven weeks on four different inpatient medical-surgical nursing units. During that time twenty nurses completed the survey, yielding a low response rate. All but one survey was completely filled out. The results of the incomplete survey were included because only question was skipped. (It was a select all that apply question at the end of the survey, and the lack of response to that question had no impact on the results of the rest of the survey.) Three nurses (15%) had been working for more than fifteen years, two nurses (10%) had been working 3-5 years, and the other fifteen nurses (75%) had less than two years of nursing experience. Of the twenty nurses, a quarter of them (25%, N=5) had both BLS and ACLS. The remaining three quarters (75%, n=15) had only BLS certification.

Confidence Participating in Codes

Nurses reported that they had been part of one or two (45%, n=9), three to five (5%, n=1), and more than five (5%, n=1) codes during the past year. Nearly half of participants (45%, n=9) had not participated in any codes. Participants were asked to rate their confidence performing different tasks and skills during a code blue on a Likert scale. The results are shared below.

Recognition of a Code Blue

Three questions addressed nurses' confidence recognizing a medical emergency or code blue. When asked if participants felt that they could confidently recognize a patient in cardiac or respiratory arrest, the majority of nurses either agreed (55%, n=11) or strongly agreed (25%, n=5). Several nurses responded that they felt neutral (15%, n=3) and only one participant (5%) disagreed. The next question addressed recognition

of lethal cardiac rhythms such as asystole, ventricular tachycardia, ventricular fibrillation, and pulseless electrical activity. The results were similar to the prior question. The majority of respondents either agreed (55%, n=11) or strongly agreed (25%, n=5). Only one respondent disagreed (5%, n=1) and 15% (n=3) were neutral. The last question addressed calling for help and initiating a code once the emergency was recognized. The majority of nurses agreed (65%, n=13) or strongly agreed (30%, n=6) that they felt confident doing so. None of the participants disagreed and only one (5%) felt neutral.

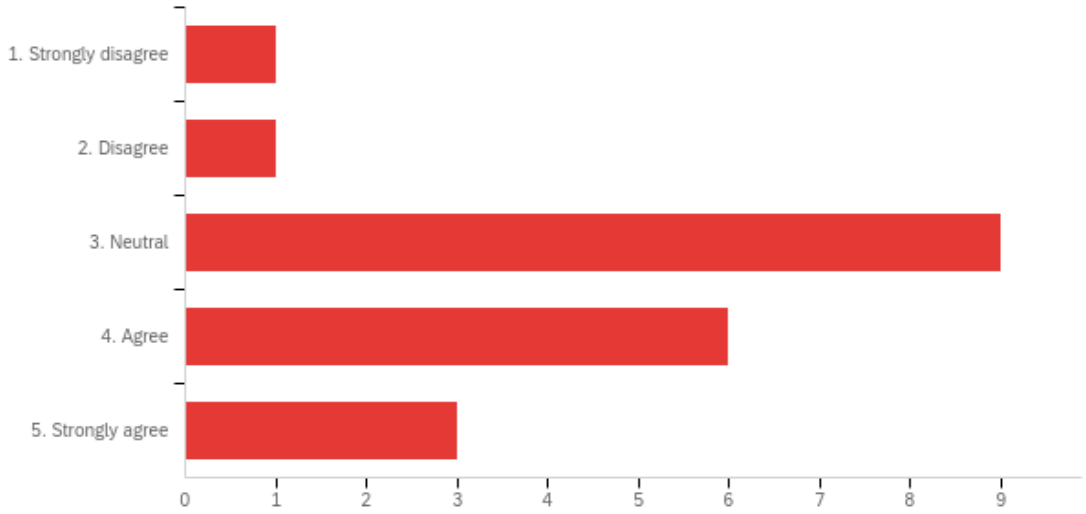
Code Blue Skills

The next five questions of the survey asked nurses to rate their confidence performing specific skills during a code blue. These included performing chest compressions and giving rescue breaths with the bag-valve mask, placing defibrillator pads on a patient, giving medications, and participating in the code until the code team arrived.

Two participants reported that they either strongly disagreed (5%, n=1) or disagreed (5%, n=1) with feeling confident starting and performing chest compressions/CPR (Figure 1). The majority of respondents were neutral (45%, n=9) about this skill. The remainder of nurses either agreed (30%, n=6) or strongly agreed (15%, n=3) that they were confident performing CPR.

Figure 1

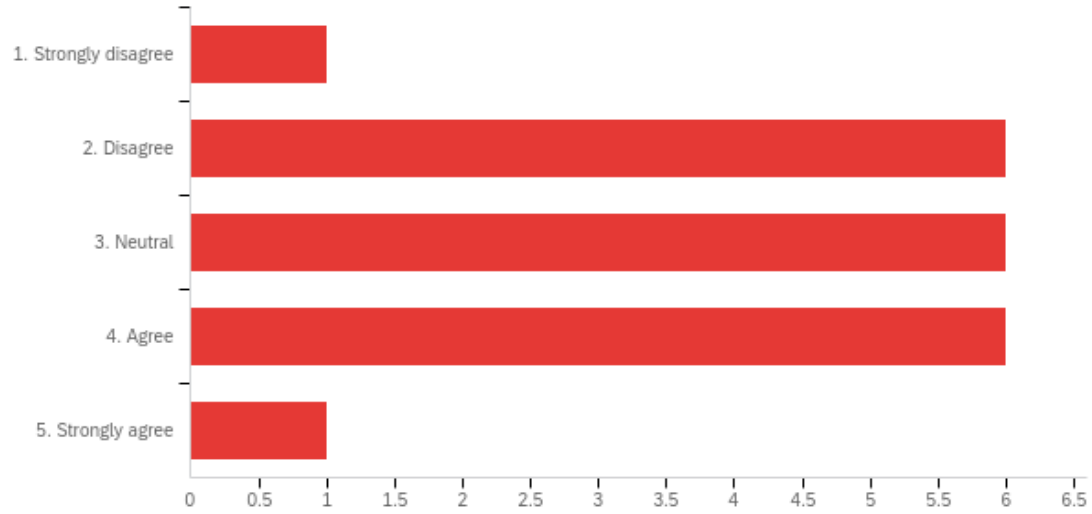
Confidence Starting and Performing Chest Compressions



When asked to rate their confidence giving rescue breaths with the bag-valve mask (BVM) one person strongly disagreed (5%) and six nurses disagreed (30%, n=6) (Figure 2). Six participants felt that they were neutral (30%) about this skill while seven either agreed (30%, n=6) or strongly agreed (5%, n=1) that they felt confident using the BVM to ventilate a patient.

Figure 2

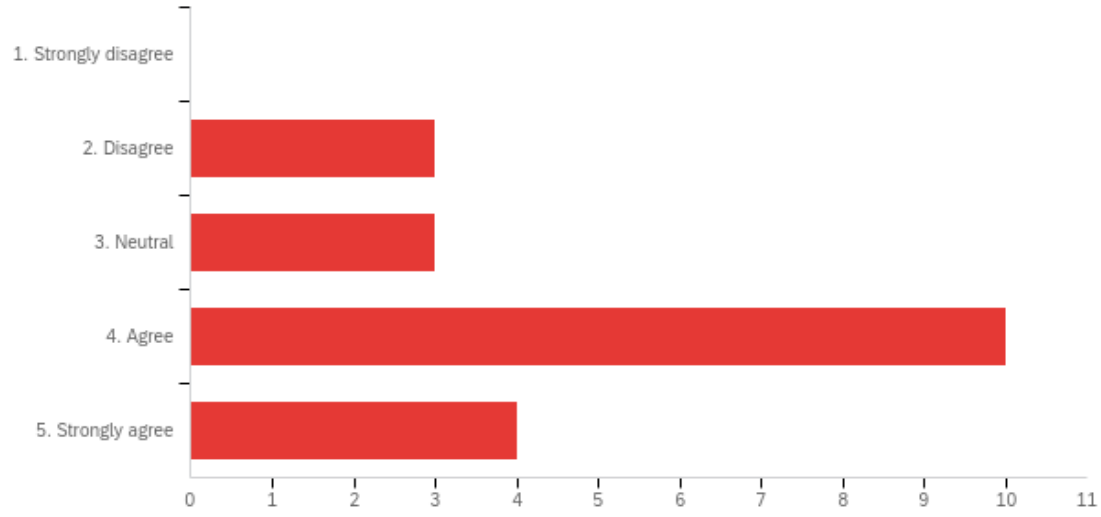
Confidence Giving Rescue Breaths and Using Bag-Valve Mask



The next skill addressed was confidence placing defibrillator pads on a patient (Figure 3). The majority of participants either agreed (50%, n=10) or strongly agreed (20%, n=4) that they felt confident doing this. Three participants disagreed (15%) and three participants were neutral (15%).

Figure 3

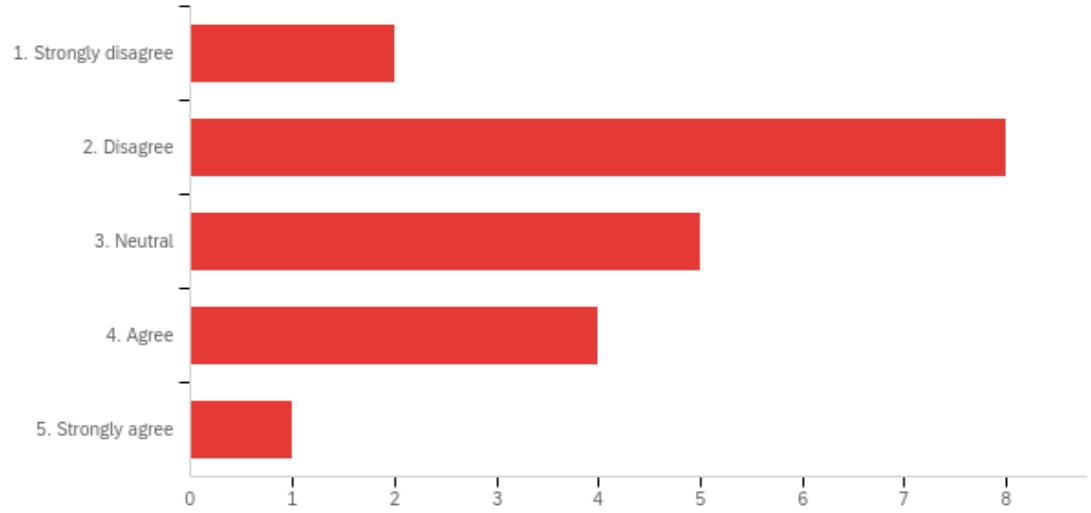
Confidence Placing Defibrillator Pads on Patient



Half of participants disagreed (40%, n=8) or strongly disagreed (10%, n=2) that they felt confident giving medications during a code (Figure 4). Five participants either agreed (20%, n=4) or strongly agreed (5%, n=1) that they felt confident giving medications and five participants were neutral (25%).

Figure 4

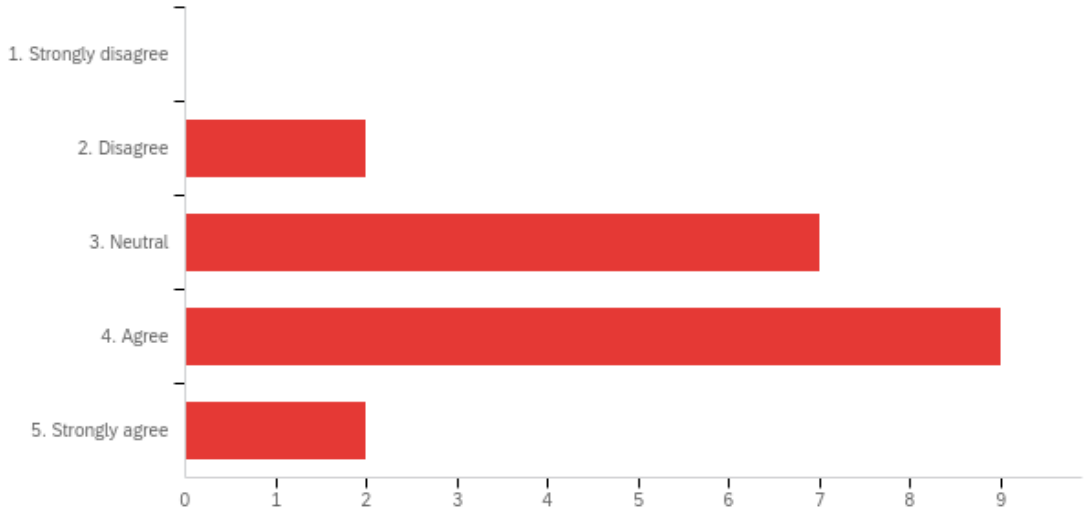
Confidence Giving Medications During a Code



Most participants were either neutral regarding their confidence (35%, n=7) or either agreed (45%, n=9) or strongly agreed (10%, n=2) that they felt confident participating in a code until the code team arrived (Figure 5). Only two participants disagreed (10%) and did not feel confident.

Figure 5

Confidence Participating in Code Until Code Team Arrives



Improving Confidence in Skills

The last thing that participants were asked was to identify factors that might improve their knowledge/confidence in a code. They had the option to select more than one response from a list of choices or to write in a free text option themselves. Some participants selected only one response and others selected multiple. One person skipped this question. No one used the free text box to write in his or her own response.

The choices that participants could select as factors that could improve their confidence in a code included the location of crash carts, their peer knowledge or experience, participation in mock codes, having ACLS certification, simulation, and the hospital offered code blue class. No one selected the location of crash carts. Four participants (20%) selected peer knowledge/experience, ten participants (50%) selected mock codes, and seven (35%) selected ACLS certification. Simulations were selected by eight (40%) of the participants and nine participants (45%) selected the hospital offered code blue class.

Summary and Conclusions

The sample of nurses participating in this quality improvement needs assessment was varied in their years of nursing experience, but the majority had been nurses for less than two years. Several nurses had more than fifteen years experience, and only two nurses had three to five years' experience. There were no participants with six to ten or eleven to fifteen years of experience. Seventy-five percent of participants had only BLS certification, and twenty-five percent also had ACLS certification. Of the five participants that had ACLS and BLS, three of them were the participants with greater than fifteen years of experience. One of them had three to five years of experience, and the other had less than two years of nursing experience. It is unclear if the nurses with ACLS and BLS had been nurses in other care areas prior to their current roles, or if they were float nurses that float to other departments. It is also unknown if any of the nurses had previously worked on other types of units. The nurses working on the general medical floors in this institution do not typically have ACLS certification. Nearly half of the nurses (45%) had participated in only one or two codes in the past year, and an equal number (45%) had not participated in any codes in the past year. Only 10% of nurses had participated in more than two codes in the prior year, which is very little code experience.

In general nurses felt confident recognizing medical emergencies and code blues. The majority of nurses reported that they felt like they could recognize a patient in cardiac or respiratory arrest (80%), recognize lethal cardiac rhythms such as asystole, ventricular tachycardia, ventricular fibrillation, and pulseless electrical activity (80%), and call for help and initiate a code once the emergency was recognized (95%). This is extremely important because time is of the essence during any cardiac arrest. The more

quickly that care can be rendered to the patient can directly impact whether or not the patient survives the event.

The questions that addressed confidence performing specific skills during a code blue had more varied responses. These questions explored confidence performing chest compressions, giving rescue breaths with the bag-valve mask (BVM), placing defibrillator pads on a patient, giving medications, and participating in the code until the code team arrived. Less than half of nurses felt confident performing CPR skills such as compressions or ventilation skills with the bag-valve mask. Only 45% and 35% of nurses felt confident performing CPR or ventilating a patient, respectively. This is concerning because these are basic life support skills taught during BLS class. The results of the survey highlight an area for further education or practice of skills and supports the evidence in the literature that skills taught in standard BLS courses every two years wane if they are not used often.

More participants (70%) felt confident placing defibrillator pads on a patient. This is important because early defibrillation is essential in cases of shockable rhythms like ventricular fibrillation and ventricular tachycardia. Medication administration during a code was a less confident area. Approximately half of participants (50%) did not feel confident or reported that they felt neutral (25%) about giving medications during a code. Only 25% of participants were confident performing this skill. This is less surprising because medication administration and preparation is a skill covered during ACLS training rather than BLS training. Medication administration is also a skill that is typically performed by critical care nurses or the code team once they have arrived. Lastly, more than half of participants (55 %) felt confident participating in a code until

the code team arrived.

At the end of the survey participants were asked to select factors that they believed might improve their knowledge or confidence participating in a code. Some participants selected one response to this question, while others selected multiple. Respondents selected mock codes (n=10), the hospital offered code blue class (n=9), simulations (n=8), ACLS certification (n=7), and peer knowledge/experience (n=4). It is unclear if participants had any experience taking the hospital code blue class or participating in the institution's mock code program.

The results of this quality improvement needs assessment highlight areas for further education. The scores reflect confidence recognizing and initiating code blues, but nurses' confidence performing specific skills and tasks was suboptimal. When results were analyzed individually, increased years experience as a nurse and ACLS certification correlated with higher confidence levels participating in different tasks during a code. Basic life support skills including chest compressions and ventilation were two areas that nurses did not feel confident performing. A concern is that current training and staff participation in codes may not occur frequently enough to maintain proficiency in their resuscitation skills. Medication administration was another area of low confidence, but as previously discussed it is often a task performed by a critical care nurse responding to the code. With many staffing shortages, this could possibly be an issue if there was a delay in a critical care nurse responding to a code. Many of the nurses felt that mock codes, code blue classes, simulations, and ACLS could improve their confidence participating in code blues. This indicates that further education, more frequent practice, as well as multimodal educational methods might be needed. These recommendations

align with the AHA recommendations for staff education in order to improve patient outcomes from in-hospital cardiac arrests (Cheng et al., 2018).

Limitations

Some of the limitations of the project include a low response rate and small sample size. Despite the availability of the survey, it is possible that the Covid-19 pandemic played a role in this low response rate. During the time frame that the surveys were available, both the institution census and acuity were high, and staffing on individual units in the hospital was low. Time constraints and burnout also may have been a factor and prevented nurses from participating in the survey. The survey took place on four medical-surgical units, so results may not be generalizable to other care areas. It is also possible that participants, especially those with less than two years of nursing experience, did not have any experience with the mock code program or the code blue classes because those had been suspended in this institution during the pandemic.

Recommendations and Implications for Advanced Nursing Practice

The quality improvement needs assessment has several implications for advanced practice nurses. Advanced practice nurses such as clinical nurse specialists or nurse educators can utilize the results of the needs assessment to direct education and support for staff nurses. As the literature demonstrates and the results of this study support, not all nurses working in the hospital are confident with their skill level participating in code blues. Offering more practice opportunities for skills, code blue classes, and mock codes on units are ways that APNs could support staff nurses to improve their confidence and skills during code blues. Utilizing multimodal educational methods and increasing the frequency of short trainings and refresher courses could be beneficial. Additionally, reevaluating existing hospital policies and offering ACLS more widely in different care areas could enhance nurses' knowledge and boost their confidence and skill levels. Debriefing after codes occur to obtain real time feedback from staff about areas where they feel they need further practice or education could also be helpful.

For advanced practice nurses who work in clinical settings, such as nurse practitioners, the results of this needs assessment have additional implications. Not only can these APNs assist with education as previously discussed, the results emphasize the importance of the APN being a good team leader if they are present during the code. Effective communication is essential and APNs can support staff nurses by using closed loop communication, clear delegation of roles and responsibilities of team members, and other mainstays of effective resuscitation. As the literature demonstrates, knowing and following AHA resuscitation and ACLS guidelines leads to better patient outcomes, so APNs should be familiar with these algorithms and protocols.

It is also important for advanced practice nurses in any setting to serve as role

models for nurses and other staff. As previously discussed, Benner's model of knowledge and skill acquisition can be applied to this quality improvement needs assessment. Not all nurses in all departments are going to be experts in the skills needed for effective resuscitation, and among non-critical care nurses this is even more likely. Understanding the experience and skill levels of the different nurses that may be part of a team is important. The APN can provide positive reinforcement to nurses during or after codes, as well as constructive criticism or feedback in areas that may need additional skill development. Debriefing and fostering an environment that supports asking questions can also be effective ways to support staff nurses.

In summary, in-hospital cardiac arrests are common and survival rates are poor. Very little research previously explored how non-critical care nurses feel participating in codes even though half of all in-hospital codes occur outside of critical care areas. As the literature suggested and this needs assessment also demonstrated, confidence levels of medical-surgical nurses and their resuscitation skills are low. Advanced practice nurses (APNs) are in a unique position that allows them to influence both the medical and nursing aspects of healthcare. In their varied roles APNs can provide education, support, and leadership to staff nurses in order to improve confidence, knowledge, and skills during code blues and hopefully lead to better patient outcomes.

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Appendix A

Survey

1. Years experience as a nurse:
    1. Less than 2 years
    2. 3-5 years
    3. 6-10 years
    4. 11-14 years
    5. >15 years

2. Which of the following CPR certification do you have?
    1. Basic Life Support (BLS) **only**
    2. Both Advanced Cardiac Life Support (ACLS) **and** BLS

3. How many code blues have you participated in this past year?
    1. None
    2. 1-2 codes
    3. 3-5 codes
    4. >5 codes

4. I feel confident recognizing a patient in cardiac or respiratory arrest.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

5. I feel confident that I can recognize lethal rhythms (asystole, ventricular tachycardia, ventricular fibrillation, and pulseless electrical activity).
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

6. I feel confident calling for help and initiating a code.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

7. I feel confident starting and performing CPR.
    1. Strongly disagree
    2. Disagree
    3. Neutral

4. Agree
5. Strongly agree

8. I feel confident providing rescue breaths and using the bag-valve mask to ventilate a patient.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

9. I feel confident placing the defibrillator pads on the patient.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

10. I feel confident giving medications during a code.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

11. I feel confident participating in a code until the code team arrives.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

12. Which of the following do you think would improve your knowledge/confidence in a code? Select all that apply.
    1. Location of crash carts
    2. Peer knowledge/experience
    3. Mock codes
    4. ACLS certification
    5. Simulations
    6. Hospital offered code blue class
    7. Other: _____

Appendix B

Hello all,

I am reaching out to you because I am a staff nurse in the ICU and I'm a nurse practitioner student at Rhode Island College. I am conducting a quality improvement needs assessment here at the Miriam Hospital to explore nurses' knowledge and confidence levels participating in code blues. I am asking for your participation by completing a 12-question survey that will only take 10 minutes or less. The survey is completely voluntary and anonymous and there is no incentive for participation and no penalty if you choose not to participate. There is no risk or benefit to you individually if you complete the survey. Informed consent will be implied when you read this informational letter and when you complete the survey. Survey results will be shared with unit managers and the hospital education department, with hopes that further education can be implemented based on survey results.

Please use the link below or scan the QR code to take the survey.

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_bd8M59Qk1m8mZ3o

Thank you all for answering and supporting my project! The survey will be available for the next four weeks, and your participation is greatly appreciated! Please reach out to me via email with any questions.

Thank you,

Katie

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Appendix C

Hello all,

Just a friendly reminder that I am conducting a quality improvement needs assessment here at the Miriam Hospital to explore nurses' knowledge and confidence levels participating in code blues. I am asking for your participation by completing a 12-question survey that will only take 10 minutes or less. The survey is completely voluntary and anonymous and there is no incentive for participation and no penalty if you choose not to participate. There is no risk or benefit to you individually if you complete the survey. Informed consent will be implied when you read this informational letter and when you complete the survey. Survey results will be shared with unit managers and the hospital education department, with hopes that further education can be implemented based on survey results.

Please use the link below or scan the QR code to take the survey.

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_bd8M59Qk1m8mZ3o

Thank you all for answering and supporting my project! The survey will be available for the next two (one) weeks, and your participation is greatly appreciated! Please reach out to me via email with any questions.

Thank you,

Katie

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