

Evaluation of Simulation-Based Training Program at One of The Academic Hospitals in Qatar: A Multi-Phase Design Study

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ABSTRACT

This Simulation-based training in nursing is crucial for enhancing clinical skills and improving patient outcomes, allowing nurses to practice in realistic scenarios and develop the competencies necessary during emergencies. In the Middle East, interest in simulation-based learning is growing, along with the implementation of programs like mock code simulations in responding to code blue emergencies. This study aims to evaluate the mock code simulation-based training program at an academic hospital in Qatar, identifying its key strengths and weaknesses, assessing nurses' understanding of the mock code as a training method, determining whether it effectively prepares them to respond to code blue scenarios, and suggesting areas for improvement in the program. This study is grounded in the National League of Nursing (NLN) Jeffries Simulation Theory and Patricia Benner's Novice to Expert Model. Through multi-phase mixed methods research which include a training examination (Phase 1), qualitative inquiry, (Phase 2) and an experts' consultations from nurse leaders/managers (Phase 3), this research was able to present a number of significant findings. First, the existing mock code simulation-based training program in the said academic hospital significantly enhances nurses' practical skills, team performance, and confidence in handling code blue situations. Training examination results also showed that the program effectively equips nurses with the necessary knowledge to manage code blue emergencies, as evidenced by the high scores achieved by most participants. Findings from the qualitative inquiry further showed that nurses view mock code simulations as highly beneficial in enhancing their efficiency and effectiveness in real emergencies. However, the mock code simulation program has several critical gaps. This research proposes enhancing the evaluation tools, improving communication during simulations, and increasing the frequency of training sessions to maintain high levels of preparedness and competency among nurses.

Keywords: *Simulation-Based Training, Mock Code Simulation, Nursing, Code Blue, Qatar, Academic Hospital.*

INTRODUCTION

Contemporary nursing education accentuates the importance of integrating theoretical, book-based knowledge with practical knowledge acquired from actual real-life scenarios (Kim, Park, & Shin, 2016). According to Dahlgren (2019), massive changes in the healthcare sector, characterized with increasing demands on improving the quality of nursing practice and enhancing patient safety, resulted in the need to improve the nursing education and learning process. Consequently, this led to the rise of the concept of

“simulation” in the healthcare setting, a term that is essentially described as a new technique, not a form of technology, that offers a better alternative in achieving improved patient care and safety (Gaba, 2004; Nestel, Kelly, Jolly, & Watson, 2017).

Given that nursing education may only be maximized through actual clinical experiences in a real-life practice environment, contemporary nursing educators advocated the use and application of simulation-based education (Cantrell, Franklin, Leighton, & Carlson, 2017). This paved the way for a greater demand on the integration of simulation-based

learning in nursing education which exposes students to situation-based learning experiences without the risk of compromising the safety and well-being of patients (Kim, et.al., 2016).

Aside from the advantage of providing an immersive and hands-on learning experience, many studies also showed that simulation-based education importantly addresses the complex challenge of reducing the gap between theoretical and practical knowledge (Haukedal, Reiersen, Hedeman, & Bjørk, 2018). As a new pedagogical approach that replaces and/or amplifies the real-life experiences of nurses in a guided, practical learning environment, it is able to bridge the gap between “theoretical knowledge” and “practical experiences” (Aebersold, 2018; Haukedal, Reiersen, Hedeman, & Bjørk, 2018). In other words, simulation-based education develops the skills, attitudes, and knowledge of nurses by means of exposing them to actual clinical scenarios which enable them to apply their theoretical knowledge into real-life experiences in a clinical setting (Lateef, 2010).

Interestingly, simulation-based education in the nursing context encompasses a wide variety of clinical activities that entail the use of patient simulators, which include medical devices, role-playing, and virtual environments that present realistic and life-like clinical scenarios (Koukourikos, et al., 2021). In nursing education, the authors Ryall, Judd, and Gordon (2016) described simulation-based education as the use of virtual technologies and standardized patients in the reproduction of actual clinical situations for the purpose of education. These may include processes such as the demonstration of a specific computer scenario or a nursing skill simulation (Pai, 2018).

Code blue scenarios, according to Ngo, et al. (2020), is a very critical and high-risk medical situation wherein every second counts in terms of saving patients' lives. It typically involves dealing with cases of pulmonary or cardiac arrest which can be extremely tense and nerve-racking for the medical team assigned to run the code. Given the high levels of pressure in dealing with these emergency cases, running mock code simulations is deemed important in helping improve the quality and the speed of the medical response made by the staff. This eventually benefits the patients as performing the mock code simulation training can be likened to building a muscle memory, wherein every member of the healthcare team is exposed to code blue scenarios, that mimic a “real life emergency case, and they are tested to do the actual drills and put their skills to the test (Prospect Medical, 2022).

Research studies provided evidences on the fact that hospitals with active mock code simulations

tend to have a higher survival rate for its cardiac arrest in-hospital patients as compared to hospitals that do not run mock code simulations (Kriz, 2020).

Since the researcher himself was able to see and experience firsthand the benefits of using mock code simulations, he intends to use that experience as leverage in conducting this research. Thus, the goal of this research is to assess or evaluate the existing mock code simulation-based training program that is currently being implemented in the chosen hospital, the Qatar-based hospital where he is working. Specifically, the evaluation is divided into three (3) phases which are as follows: • Phase 1: Training Examinations • Phase 2: Qualitative inquiry • Phase 3: Experts Consultations Each of these three phases is discussed in further detail in the methodology section. This study went through each of the abovementioned research phase in order to fully assess the effectiveness of the existing mock code simulation-based training program in the chosen hospital and determine the specific areas for enhancement on this given program.

Another problem that the researcher struggled with while doing the research was collecting and compiling research studies and scholarly sources that are relevant to the study. The process of obtaining all the journals, books and other resources used in this research took a very long time to complete and so is the act of writing the entire literature review section. Since the researcher was working full-time, he had to stick to a regular schedule of acquiring and compiling relevant sources while working on synthesizing all relevant information from the literatures. This, is in addition to the challenge of selecting the most relevant and the most updated literatures to include in the research paper.

Moreover, creating the appropriate research instruments for the study also posed an important challenge for the researcher. The researcher had to face the challenges of devising the interview forms used in Phases 2 to 3 to applying certain modifications to better fit the requirements of the study, prior to conducting the actual research.

Background of the Study

“Code blue” refers to the popular emergency code that is utilized by hospitals for the purpose of alerting all members of the emergency response team in dealing with cases of cardiorespiratory arrest (Monangi, Setlur, Ramanathan, Bhasin, & Dhar, 2018). As an emergency code that is used in providing a clear message of rapid response to critical, life-and-death situations, hospital staff including nurses, are expected to make the best effort of efficiently responding to patients under these emergency cases in the quickest and

most effective means possible (Hazra, et al., 2022). However, responding to code blue cases requires the deployment of well-trained and well-equipped healthcare professionals tasked to respond to each patient in the shortest amount of time, without creating chaos or stirring panic and disturbance in the normal operations of the hospital (Monangi, Setlur, Ramanathan, Bhasin, & Dhar, 2018).

Unfortunately, there are some hospitals wherein members of the healthcare team which include nurses, lack adequate preparation and confidence in handling code blue scenarios. This is where the need for incorporating simulation-based training becomes extremely essential and significant as it has the ability to drive the level of confidence, readiness and preparedness of nurses in dealing with emergency case situations (Nusser, 2021; Hazra, et al., 2022; Monangi, Setlur, Ramanathan, Bhasin, & Dhar, 2018).

The basic idea behind the significance of conducting simulation-based training in nursing may be attributed to the fact that it helps enhance and maximize the clinical skills of nurses which can help improve patient outcomes (Boulos, Hetherington, & Wheeler, 2007). By allowing nurses to acquire learning through actual clinical scenarios, they are better able to gain and improve appropriate skills and develop clinical competencies which are vital in making sound clinical decisions, especially during emergency situations wherein the lives of patients are at stake (Aebersold, Tschannen, & Bathish, 2012).

In the Middle East wherein the number of nursing professionals is rising exponentially, the authors Nashwan, Abujaber, Mohamed, Villar, and Al-Jabry (2020) emphasized the importance of investing in the training and knowledge of their healthcare staff. Apparently, there is an evident absence of a systematized and specialized type of training for nurses and other healthcare professionals in many Qatar-based institutions (Haque, Gilstrap, & Ghuloum, 2020).

In Qatar, one of the leading academic hospitals is at the forefront of its simulation-based educational training programs. The advanced simulation-based education and training program of this Qatar-based healthcare institution is designed to adapt to the international best practices in simulation learning. In addition, the hospital's newly initiated simulation programs are part of its innovation efforts in providing more excellent patient care and safety to all. One of the latest simulation-based programs that this particular hospital has introduced for the purpose of enhancing patient care is the mock code simulation program. It is essentially a code blue simulation wherein the nurses are being trained on how to properly respond to code blue

emergencies such as emergency cases related to cardiovascular and respiratory problems, in particular. The said hospital has provided specific details on the mock code simulation workflow and response process in its in-house manual which indicate how each of its nurses go through the whole simulation process (see Appendices section).

It is stated in the said hospital's website that holding mock code simulation programs for code blue emergencies is practical and beneficial for any large-scale hospital that handles various types of emergency cases. Over the years, the hospital has seen the benefits of diverting from the traditional methods of responding to emergency patients towards adopting new and more innovative methods in order to enhance patient care.

Hence, in line with the goal of improving patient response, the chosen hospital for this study has begun implementing its own mock code simulation-based program. In the said hospital, the mock code simulation program is held two to three times per month, at a random place and time. It is considered a real code intended for the different members of the healthcare team, particularly nurses, to be trained in efficiently and competently initiating care and responding to medical emergencies. In the chosen hospital's mock code simulation program, the design of the training program includes multiple different scenarios with organized debriefing sessions focusing on a healthcare practitioner's resuscitation and CPR skills. Also, the mock code simulation program includes the use of a high-fidelity mannequin and other medical instruments such as suction machines, oxygen, resuscitation carts, and defibrillators.

Despite the fact that many literatures prove the benefits of simulation-based programs such as mock code simulations on the efficiency of healthcare response from nurses and other members of the healthcare team, the patients' survival rate, and the hospital's standard of patient care as a whole, there is still a need to evaluate the effectiveness of these types of training programs to gauge their effectiveness and assess the areas in which they can still be enhanced or improved (Hazwani, et al., 2020a; Hazwani, et al., 2020b). In line with this, the aim and purpose of this study is to conduct an evaluation of the chosen hospital's existing mock code simulation-based training program. One of the objectives of this research is to identify the strengths and weaknesses of this particular simulation-based program. Another aim of this study is to assess and determine the level of comprehension of the nurses on the mock code simulation as a form of simulation-based training.

In addition, this research aims to assess the impact of the mock code simulation on the efficiency of healthcare response from nurses and other members of the healthcare team in medical emergency cases, that is, validating whether or not the mock code really gives them the edge to be fully equipped in responding to a code blue scenario in the unit. Overall, this study is aimed to determine the overall effectiveness of the mock code simulation program and propose the specific areas for enhancement in the said program.

MATERIALS & METHODS

In line with the main objective of this study which is to assess the chosen hospital's existing mock code simulation-based training program, identifying its specific strengths and weaknesses, determining the level of comprehension of the nurses on the mock code simulation as a form of simulation-based training, validating whether or not the mock code really gives nurses the edge to be fully equipped in responding to a code blue scenario in the unit, and proposing the specific areas for enhancement in the said program, this study will apply the multiphase, mixed methods research design. The mixed methods research refers to a research design wherein a researcher (or group of researchers) combines various research approaches that fall under quantitative and qualitative research (Schoonenboom & Johnson, 2017).

This study will be set in the clinical setting of the chosen hospital, one of the academic hospitals in Qatar that is at the forefront of simulation-based educational training programs in the Middle East. This study will specifically focus on assessing the said hospital's existing mock code simulation-based training program. In line with this research goal, this study's participants will comprise of nurses currently working and have undergone the actual mock code simulation training program in the said institution. The researcher will target to obtain three sets of research participants suited for each of the three (3) phases of the study:

- For Phase 1 (Training Examination), a total of 72 clinical nurses who have undergone mock code simulation from the various hospital units of the chosen hospital will be tasked to answer a training examination.
- For Phase 2 (Qualitative Inquiry), a total of 10 clinical nurses (the same as those who took the training examination) will undergo a face-to-face or via phone call interview with the researcher to answer open-ended questions related to mock code simulation.
- For Phase 3 (Experts' Consultation), a total of 10 nursing managers/ leaders from the chosen

hospital who have met the respondents' criteria will be invited by the researcher to participate in the experts' consultation process, which also involves a face-to-face interview with the researcher. The researcher will apply the Modified Single-Round Delphi to analyze the interview findings.

This study will ensure that the privacy, anonymity, and confidentiality of all the information shared by the study participants is assured from the time that the study is conducted up until the time that the study is approved and published. To the best of his ability, the researcher will ensure a very low risk of harm to all participants of the study by protecting and securing the most confidential information and data that they will share in line with the study. No individual will be coerced to participate in this study. A consent form will be given to each study participant prior to their participation and they shall be allowed to withdraw their participation at any point of time that they wish to do so.

The data gathering procedures for this study are divided into the following three (3) phases:

- Phase 1: Training Examination
- Phase 2: Qualitative Inquiry (Face-to-Face or Phone call Interview with Clinical Nurses)
- Phase 3: Experts' Consultation (Face-to-Face or Phone call Interview with Nursing Managers)

Statistical Treatment of Data

For the statement of the problem number 1. For this study to establish the demographic profile of nurses, statistical treatment of data of frequency count and percentage distribution will be employed. Frequencies and means with standard deviation will also be used. Percentage (P) will be used to compare the frequency of responses (f) to the total number of respondents (N). Below is the formula for frequency and percentage:

$$P = \frac{f}{N} \times 100$$

where:

f = the number of items the variable is repeated

N = total number of cases

100 = constant value

For the statement of the problem number 2. For this study to establish a separate detail regarding strengths and weaknesses of mock code simulation, rank order survey questions will be employed. The results table of the respondents will be placed each answer as first, second, third, and so forth. These numbers will be

presented as a percentage of all respondents who answered this question. This ranking could be a basis for program enhancement and possible intervention.

For the statement of the problem number 3. To assess and establish a concrete data regarding the level of comprehension of the respondents, a 20-item post-test multiple choice exam will be employed. To analyze and interpret the data, the following scale will be used with descriptive interpretation.

0 to 3 = low level of knowledge

4 to 7 = moderate level of knowledge

8 to 10 = high level of knowledge

For the statement of the problem numbers 4 and 5, which are all qualitative inquiries in the form of face-to-face interview, a qualitative framework method of Amedeo P. Giorgi content analysis was performed by the researcher in order to analyze, process and interpret the data.

Qualitative Framework of the Study

Georgian Method of Qualitative Data Analysis

Step	Description
Interview with Participant	The initial data was gathered through open ended questions and discourse and consisted of naive descriptions.
Sense of the Whole	To acquire a basic understanding of the complete remark, one reads the entire statement to have a general grasp. Once the understanding of the whole has been comprehended, the researcher returns to the beginning and reads the message again.
Discrimination of Meaning Units (Coding)	highlighting each time, a transition in meaning occurs with the specific goal of distinguishing "meaning units" from a psychological standpoint and with a focus on the phenomenon under investigation.
Transformation of Expressions into Psychological Language (Categorizing)	Following the delineation of meaning units, the researcher looks over all the meaning units that are still represented in the respondents' concrete language, comments on them, and comes up with the core of the experience for the participant. The researcher then converts each relevant unit into psychological science notation.
Synthesis of Transformed Meaning Units into a Consistent Statement of the Structure of the Experience (Theme generation)	The researcher generates a consistent statement about the structure of the participant's experience after using a creative variation on these altered meaning units.
Final Synthesis	Finally, the researcher combines all the assertions about each participant's experience into a single, consistent statement about the event's structure, which characterizes and captures the core of the event under investigation.

For the statement of the problem number 6. To determine the significant difference between the knowledge of the respondent on mock code simulation as a form of simulation-based education when they are grouped according to their demographic profile, several tests were performed. For data that is normally distributed, Independent Sample T Test was used for 2 variables and One-Way ANOVA was used for more than 2 variables. On the contrary, for data that is not normally distributed, Mann Whitney U test was used for 2 variables and Kruskal Wallis H test was used for more than 2 variables.

RESULT AND DISCUSSION

The Respondents' Demographic Profile

Age Distribution: The largest age group was 36-40 years old (33.33%, n=24), followed by equal groups of 26-30 and 31-35 years old (20.83% each, n=15 each). The remaining respondents were distributed across older age brackets from 41-55 years.

Gender: The majority were female (70.83%, n=51) compared to male nurses (29.17%, n=21), reflecting the traditionally female-dominated nature of the nursing profession.

Civil Status: Most respondents were married (68.06%, n=49), followed by single nurses (30.56%, n=22), and one separated nurse (1.39%).

Length of Service: A majority had 6-10 years of service (63.89%, n=46), while the remainder had 3-5 years of experience (36.11%, n=26).

Area of Assignment: The largest group worked in OPC (25%, n=18), followed by Women's Care Services (13.89%, n=10). The remaining nurses were equally distributed (8.33%, n=6 each) across OR, ED, Pediatric Medical, PICU, and other departments.

The findings align with existing research indicating that younger nurses tend to be more dynamic in the workplace, and that nursing remains a predominantly female profession. The data also suggests that most respondents are experienced professionals with established careers and family responsibilities.

Table 2.0 Significant Priorities Under Strengths of the Mock Code Simulation Program

Strengths	Mean	Rank
It improves CPR individual performance by adhering to AHA guidelines.	4.79	8 th
It improves resuscitation team performance and dynamics.	6.78	2 nd
It increases individual and team competencies in responding to code blue.	6.32	3 rd
It enhances individual and team communication through the use of SBAR.	4.78	9 th
It develops self-confidence and decisiveness.	4.97	7 th
It brings active participation during debriefing-an effective tool for addressing the performance gap.	3.53	10 th
It stimulates critical thinking and situational analysis.	5.47	6 th
It allows staff to learn and develop at an individual and team level to better prepare for emergencies.	6.15	4 th
It offers an opportunity for staff to learn and practice with their teams in their actual patient care environments and assess for any potential latent threats.	6.85	1 st
Simulation champions and/or facilitators exhibit enthusiasm to lead and treat participants with respect.	6.07	5 th

Table 2 highlights the primary strengths of the mock code simulation program for nurses, which include (1) providing opportunities for staff to practice in their actual patient care environments and assess potential threats, (2) improving resuscitation team performance and dynamics, (3) increasing individual and team competencies in responding to code blue situations, and (4) enhancing overall confidence and preparedness for real-life emergencies. These strengths support the program's effectiveness in fostering a positive, collaborative training environment and encouraging interprofessional teamwork and rapid emergency response.

Table 3.0 Significant Priorities Under Weaknesses of the Mock Code Simulation Program

P	Mean	Rank
Staff who participated in the mock code session need to update their BLS certificate.	2.67	10 th
Limited or inadequate time to practice.	6.11	5 th
Lack of familiarity with current defibrillator, and emergency drugs.	3.28	9 th
Lack of familiarity of identifying the crash cart contents.	3.58	8 th
Staff struggled with crash cart breaking locks and how to twist to break locks to select and get supplies.	4.60	7 th
Staff struggled with timely defibrillation and BLS algorithm.	5.76	6 th
Staff doing the compression has difficulty identifying ways to optimize care, such as ensuring a backboard and positioning self to maximize compression depth.	6.38	4 th
Lack of familiarity of identifying the nearest AED location.	6.57	3 rd
Lack of familiarity with the hospital's resuscitation program and code blue protocol and guidelines.	7.64	2 nd
Lack of familiarity on how to activate hospital code blue and unit alarm system.	7.78	1 st

Table 3 highlights the weaknesses of the mock code simulation program for nurse training. These weaknesses include a lack of familiarity with activating hospital code blue systems, lack of understanding of the chosen hospital's resuscitation program, and a lack of familiarity with identifying the nearest AED location. Other weaknesses of the mock code simulation program include staff experiencing difficulties optimizing care during compressions and having inadequate or limited time available for practice. Addressing these issues is crucial for enhancing the effectiveness of the training

program and ensuring nurses are well-prepared for real-life emergencies. Implementing targeted interventions and additional training sessions could help mitigate these weaknesses.

Table 4.0 Code Blue Training Examination Results

Total Points	Frequency	Percentage	Interpretation
1	1	1.4 %	Low Level Of Knowledge
5	3	4.2 %	Moderate Level Of Knowledge
6	4	5.6 %	Moderate Level Of Knowledge
7	13	18.1 %	Moderate Level Of Knowledge
8	12	16.7 %	High Level Of Knowledge
9	24	33.3 %	High Level Of Knowledge

The findings from the code blue training examination concerning mock code simulation also identified the topics that the nurses had a difficult time answering. One of the questions asked was Question #5: "During cardiac arrest, when is it appropriate to pause chest compressions for more than 10 seconds?" and the results showed that out of 20 respondents, 17 (85%) out of 20, were unable to answer this question correctly. The correct answer to this was Letter C ("Never. Pauses in chest compressions should never exceed 10 seconds").

Kruskal Wallis Test Table

5.0 Kruskal Wallis Test (Age)

Ranks			
	Age	N	Mean Rank
Total points	20 to 25	9	31.33
	26 to 30	6	42.75
	31 to 35	15	34.03
	36 to 40	24	35.85
	41 to 45	8	40.56
	46 to 50	6	33.92
	51 to 55	4	47.63
	Total	72	

A Kruskal-Wallis H test showed that there was no statistically significant difference in the knowledge of the nurses on mock code simulation as a form of simulation-based education when they are grouped according to Age, $\chi^2(6) = 3.008$, $p = 0.808$, with a mean rank total points of 31.33 for 20 to 25 years old, 42.75 for 26 to 30 years old, 34.03 for 31 to 35 years old, 35.85 for 36 to 40 years old, 40.56 for 41 to 45 years old, 33.92 for 46 to 50 years old, and 47.63 for 51 to 55 years old. These results indicate that any observed differences in

knowledge across the different age groups are not statistically significant. This means that age does not appear to have a meaningful impact on the nurses' knowledge of mock code simulation.

Ranks			
	Length of Service	N	Mean Rank
Total points	3 to 5 years	26	40.02
	6 to 10 years	46	34.51
	Total	72	

Test Statistics^{a,b}

	Total points
Chi-Square	1.220
Df	1
Asymp. Sig.	.269

a. Kruskal Wallis Test

b. Grouping Variable: Length of Service

As for the length of service, the findings from the Kruskal-Wallis H test suggest that there is no statistically significant difference in the nurses' knowledge regarding mock code simulation as a form of simulation-based education ($\chi^2(6) = 1.220$, $p = 0.269$). The mean rank total points are 40.02 for 3 to 5 years, and 34.51 for 6 to 10 years of service. These imply that the length of service does not have a meaningful impact on the nurses' knowledge of mock code simulation.

For this reason, many hospitals and healthcare organizations proactively include mock codes as part of the training and development processes for their nursing professionals. Given this, although not directly stated, there is a logical probability that longer tenure at an organization promoting mock code simulations increases the likelihood of nurses participating in such training and thus improving their knowledge.

Mann-Whitney U Test

Table 6.0 Mann-Whitney U Test (Sex)

Ranks				
	Sex	N	Mean Rank	Sum of Ranks
Total points	Male	21	37.55	788.50

	Female	51	36.07	1839.50
	Total	72		

Test Statistics^a

	Total points
Mann-Whitney U	513.500
Wilcoxon W	1839.500
Z	-.281
Asymp. Sig. (2-tailed)	.779

a. Grouping Variable: Sex

The table shows the Mann-Whitney U test performed where it was revealed that there is no significant difference in the nurses' knowledge regarding mock code simulation as a form of simulation-based education when they are grouped according to Sex, given that the Asymp. Sig. (2-tailed) is 0.779, p-value greater than 0.05. As for the Ranks, it indicates that the Female group has the highest total points score. These results show that any observed differences in knowledge between male and female nurses are not statistically significant, indicating that sex does not have a meaningful impact on the nurses' knowledge of mock code simulation.

One-Way ANOVA

Table 7.0 ANOVA (Area of Assignment)

Total points

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.553	10	2.655	1.022	.436
Within Groups	158.433	61	2.597		
Total	184.986	71			

One-Way ANOVA was performed to assess if there is a significant difference in the nurses' knowledge regarding mock code simulation as a form of simulation-based education when they are grouped according to Area of Assignment. Based on the results, the significance value is 0.436, suggesting that there is a lack of significant difference. Thus, there is no significant difference in the nurses' knowledge regarding mock code simulation as a form of simulation-based education within various Areas of Assignment.

Phase 2: Qualitative Inquiry (Clinical Nurses)**Theme 1: Systematic Process and Teamwork**

In the interview, the respondents were asked about their experiences in handling an actual code blue situation within their respective units /departments. Based on the combined responses of all ten respondents, majority of them shared mainly positive experiences in handling the said situation with emphasis on the value of effective team response and having a systematic process. Evidently, this shows that incorporating a systematic approach with a focus on effective team response is crucial in enhancing performance during code blue emergencies. Regular simulation-based trainings and drills are vital in reinforcing these practices, ensuring the readiness of nurses and improving patient outcomes.

Theme 2: The Benefits of Mock Code Simulations

Another common theme that emerged from the interview responses is the “benefits of mock code simulations”. When the nurses were asked about their experience with mock code simulations, majority of them acknowledged the usefulness and practical benefits of mock code simulations in healthcare settings. Overall, mock code simulations are seen as highly beneficial as they aid in enhancing the skills and preparedness of nurses in facing code blue situations in healthcare settings, which ultimately result to improved patient outcomes. Similarly, another respondent stated in the interviews that mock code simulations at the chosen hospital give nurses an edge as they make them more efficient and effective in code blue scenarios. This same respondent also highlighted the importance of staying calm, communicating well, following protocols, knowing their specific roles, and participating in debrief sessions for a more effective simulation.

Theme 3: Mock Code Simulation as an Edge

The third predominant theme that was obtained from the interviews conducted with the clinical nurse respondents emphasizes “mock code simulation as an edge”. This particular theme validates the assertion that mock code simulation gives nurses an edge and fully equips them to become more efficient and effective in responding to a code blue scenario.

Theme 4: Role Identification and Clarity

The fourth predominant theme that emerged from the interviews conducted with the clinical nurse respondents has to do with the importance of clearly identifying and clarifying roles within the healthcare team. This theme stemmed from the interview responses wherein the respondents were asked about the areas/

components of the mock code simulation program that need improvement and the areas that should be maintained. As evidently seen from the transcripts of interviews, role identification and role clarity served as a common theme specifically as an aspect of the mock code simulation program that needed improvement according to the respondents. They emphasized the importance of proper role assignment which is crucial in order for different members of the healthcare team to identify and understand their own responsibilities. As one respondent underscored, clarity of roles is essential in order to instill accountability among each team member.

Theme 5: Recommending the Chosen Hospital's Mock Code Simulation Program

The fifth theme that emerged from the interviews with the clinical nurses focuses on them personally recommending the mock code simulation program of the chosen hospital. To sum up, the positive recommendations from the clinical nurses who were interviewed in this study and the supporting literature both underscore the critical role that mock code simulations play in enhancing not only the skills of nursing practitioners but also the quality of patient care.

Phase 3: Experts' Consultations from Nurse Leaders/Managers (Modified Single Round Delphi)

To address the fifth statement of the problem in this study, the third phase of the study which focuses on the experts' consultations was conducted. This phase is intended to present the inputs or recommendations of nurse managers and leaders on how the mock code simulation training program in the chosen hospital can be enhanced or improved. To address this particular research aim and obtain the necessary information from the chosen respondents, a semistructured interview was conducted by the researcher. In Phase 3, the researcher applied the Modified Single-Round Delphi to analyze the interview findings. In addition, the Content Validity Index (CVI) was used to reflect the degree of agreement among raters and evaluate expert consensus. An I-CVI score of 1 was obtained, indicating full agreement among experts, signifying that all evaluators concurred that the content of the simulation-based training program is relevant and effective. Hence, there is strong agreement among experts regarding the ways to improve the existing mock code simulation program in the hospital.

Table 8.0 Profile Summary of the Clinical Nurse Leaders/ Nurse Managers

	Classification	Total Number of Participants
Age	31 to 35 years old	3
	36 to 40 years old	1
	46 to 50 years old	3
	51 to 55 years old	3
Sex	Male	2
	Female	8
Civil Status	Married	10
Length of Service	6 to 10 years	8
	16 to 20 years	1
	21 years and above	1
Area of Assignment	OR	1
	ED	2
	Pediatric-Medical	2
	PICU	2
	OPC	2
	Women's Care	1

The clinical nurse managers/ nurse leaders who participated in the study totaled 10 individuals, with ages ranging from 31 to 55 years old. Specifically, 3 were aged 31 to 35, another 3 were aged 46 to 50, and another 3 were within the 51 to 55 age range. The group consisted of 2 males and 8 females, all of whom were married. In terms of work experience, majority of the participants had around 6 to 10 years of service. Their areas of assignment varied across various hospital departments such as OR, ED, Pediatric-Medical, PICU, OPC, and Women's Care.

Theme 1: Successful Handling of Code Blue Cases

One common theme that emerged from the interviews conducted by the researcher among the nurse managers/ leaders is the "successful handling of code blue cases" within their respective units and departments. Majority of the interview respondents stated that they were able to successfully handle code blue situations despite the challenges. As identified from the analysis of the interview transcripts, most respondents claimed to have handled code blue situations confidently and competently. Many stated that they were able to effectively apply what they learned from trainings and protocols, leading to positive outcomes for patients. However, it was also evident from their responses that some difficulties were encountered, indicating the necessity of mock code simulations and refresher training sessions to fully enhance the team's performance.

Theme 2: Readiness and Preparedness of Clinical Nurses

Another theme that emerged from the interviews is with regard to the clinical nurses' readiness and preparedness. Based on the interview respondents, majority of the clinical nurses in their respective teams are ready and equipped with the necessary resources, skills, knowledge, and experience to handle and respond to a code blue scenario. Based on the interview responses from the nurse managers/ leaders, it is clear that most of them feel that the clinical nurses in their teams are ready and equipped with the necessary resources, skills, knowledge, and experience to handle and respond to a code blue scenario. However, there is also a recognition that some nurses may still benefit from additional training, such as monthly mock codes or refresher sessions, to ensure consistency and preparedness across the entire team.

Theme 3: The Use of Different Evaluation Tools to Assess the Success of Mock Code Simulations

The interview responses showed that there are different measures of success or evaluation tools being used to check if the mock code simulation was successful or not. These tools mainly include simulation checklists, debriefing sessions, and feedback from surveys, to name a few. As evidently seen from the interview responses, there are numerous tools that were used to evaluate whether or not a mock code simulation program was successful. Examples of these tools include a checklist specifically designed to assess various aspects of the mock code simulation, along with feedback surveys and structured debriefing sessions which are commonly used to gather insights and identify areas for improvement.

Theme 4: Improving Communication during Mock Code Simulations

Another common theme that emerged from the interviews with nurse managers/ leaders is the need to improve communication during mock code simulations. During the interview, the respondents were asked about the aspects or components of mock code simulation that they think should be improved and maintained. The interview findings revealed numerous and varying responses which included enhancing communication, role clarity and more participation of other teams as areas to improve and the delegation of roles, consistent simulation sessions and debriefing sessions as areas to maintain. Based on the interview transcripts, while the responses widely varied among the respondents, the need to improve or enhance communication during mock code simulations stood out as the top response from the interviewed nurse managers/ leaders.

Theme 5: The Regular and Consistent Conduct of Mock Code Simulations

The fifth and final theme that emerged from the interviews with the nurse managers/ leaders is the need for regular and consistent conduct of mock code simulations. The respondents were asked about their personal inputs and/or recommendations on how the mock code simulation training program at one of the academic hospitals in Qatar can be enhanced or improved and the need to regularly conduct mock code simulations stood out as the top response. As seen from the combined responses of the nurses managers/ leaders, many of them emphasized the need to provide consistent and on-going simulation mock code trainings while encouraging more active participation from the nurses and other members of the healthcare team.

Summary of Findings

1. The Demographic Profile of Participants

The demographic profile of the nurses showed that the largest age group is 36 to 40 years old, followed by equal proportions of nurses aged 26 to 30 and 31 to 35 years, with smaller percentages in older age brackets. The majority of the respondents were females and most of them were married. In terms of length of service, a significant portion has been in service for 6 to 10 years, followed by those with 3 to 5 years of service. Regarding their area of assignment, the highest percentage of nurses work in the Outpatient Clinics, followed by Women's Care Services, with equal distributions in the Operating Room, Emergency Department, Pediatric Medical, Pediatric Intensive Care Unit, and other areas.

2. The Significant Priorities under the Strengths and Weaknesses of the Mock Code Simulation Program

The mock code simulation program for nurses demonstrated significant strengths, such as providing opportunities for practice in actual patient care environments, improving resuscitation team performance, increasing individual and team competencies in responding to code blue situations, and enhancing overall confidence and preparedness. However, notable weaknesses included a lack of familiarity with activating hospital code blue systems, the chosen hospital's resuscitation program and protocols, identifying the nearest AED location, and challenges in optimizing care during compressions. Addressing these weaknesses is crucial for enhancing the program's effectiveness and ensuring that nurses are well-prepared for real-life emergencies.

3. The Results of the Code Blue Training Examination Concerning Mock Code Simulation as

a Form of Simulation-Based Training and Educational Method Given to Nurses

The code blue training examination results from the study indicated that a significant majority of participating nurses demonstrated a high level of knowledge regarding code blue emergencies and mock code simulations. Specifically, the results highlighted that over half of the nurses achieved the highest possible scores which indicate the effectiveness of the simulation-based training method employed. This also suggests that the mock code simulation program successfully equipped nurses with essential knowledge and skills for managing high-pressure emergency situations in clinical settings.

4. How the Nurses Assess Whether or Not Mock Code Simulation Gives them an Edge and Fully Equips them to become More Efficient and Effective in Responding to a Code Blue Scenario

The results of this qualitative inquiry which involved interviews with ten clinical nurses at the chosen hospital revealed five key themes: (1) the importance of a systematic process and effective teamwork during code blue situations, (2) the benefits of mock code simulations, (3) mock code simulation as a competitive edge, (4) the significance of role identification and clarity, and (5) the recommendations for the chosen hospital's mock code simulation program. The results highlighted the importance of an effective team response and the implementation of systematic processes. Most importantly, the respondents viewed simulations as a crucial advantage that gives nurses an edge and fully equips them to become more efficient and effective in responding to a code blue scenario. Nevertheless, clear role identification was identified as essential for efficient team performance, with suggestions for improvement in this area. Finally, all interviewed nurses strongly recommended the chosen hospital's mock code simulation program, citing its effectiveness in enhancing clinical skills, teamwork, and overall patient care.

5. The Inputs and Recommendations of Nurse Managers/Leader on How the Mock Code Simulation Training Program in the Chosen Hospital can be Enhanced or Improved

The findings from the experts' consultation process which involved interviews with ten nurse managers/leaders at the chosen hospital also identified five key themes. First was the emphasis on the fact that they were able to successfully handle code blue cases within their respective units and departments, with many managers reporting confidence and competence despite

some challenges. Secondly, the readiness and preparedness of clinical nurses were highlighted, noting that most nurses are well-equipped with the necessary skills and knowledge, although additional training could further ensure their preparedness. Third, the use of various evaluation tools such as checklists, feedback surveys, and debriefing sessions was recognized as essential for assessing the success of mock code simulations. Fourth, improving communication during simulations was identified as a critical area for enhancement, emphasizing the need for clear communication protocols and role clarity. Finally, the importance of regular and consistent mock code simulations was underscored, with recommendations for frequent and ongoing training sessions to maintain high levels of preparedness and competency among the healthcare team.

6. The Significant Difference Between the Respondent's Knowledge of Mock Code Simulation (When Grouped According to their Demographic Profile)

The findings suggested that there was no significant difference in the nurses' knowledge regarding mock code simulation as a form of simulation-based education when grouped according to their demographic profiles. Specifically, demographic factors such as age, sex, civil status, and length of service did not show statistically significant differences in the nurses' knowledge of mock code simulation. The study utilized appropriate statistical tests including Kruskal-Wallis H test for age, civil status, and length of service, Mann-Whitney U test for sex, and One-Way ANOVA for area of assignment to assess these differences. These findings further indicated that, overall, demographic variables did not appear to impact the nurses' knowledge of mock code simulation significantly.

Conclusions

The following are the conclusions drawn based on the key findings of the study:

1. Strengths and Weaknesses of the Mock Code Simulation Program: The program significantly enhances nurses' practical skills, team performance, and confidence in handling code blue situations. However, it has critical weaknesses such as unfamiliarity with activating code blue systems, knowledge of AED locations, and optimizing care during compressions. Addressing these weaknesses is vital to improve the program's overall effectiveness.

2. Effectiveness of Simulation-Based Training: The training examination results show that the mock code simulation program effectively equips nurses with the

knowledge needed to manage code blue emergencies, as evidenced by the high scores achieved by the majority of nurses.

3. Perception of Mock Code Simulations: Nurses view mock code simulations as providing a significant advantage, improving their efficiency and effectiveness in real emergencies. Key aspects include systematic processes, teamwork, practical benefits, and clear role identification. Nurses highly recommend continuing and improving the program.

4. Recommendations from Nurse Managers/Leaders: Managers emphasize the successful handling of code blue cases and the readiness of nurses but suggest enhancements in evaluation tools, communication during simulations, and regular training sessions. These improvements are crucial for maintaining high preparedness and competency levels.

5. Impact of Demographic Variables: Demographic factors such as age, sex, civil status, and length of service do not significantly affect nurses' knowledge of mock code simulations. This suggests that the training program's effectiveness is consistent across various demographic groups, indicating a uniform impact on the nurses' acquisition and enhancement of knowledge.

These results show that while the mock code simulation program at the chosen hospital is effective in training nurses and improving their response to emergencies, targeted improvements are necessary to address identified weaknesses and further enhance the program's efficacy.

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