Vol. 2 No. 3 (2025)
ONLINE ISSN :3007-309X
PRINT ISSN :3007-3081
Journal of Medical & Health Sciences Review

REVITALIZING RESPONSE: ENHANCING NURSE AND INTERPROFESSIONAL FIRST RESPONDER CONFIDENCE THROUGH CODEPREP UNIT-BASED DRILLS

Tariq Rahim[1], Waheed Ullah[2], Rafi Ullah[3]

[1]MSN Scholar Aga Khan University, Email: trahim33@gmail.com
[2]Assistant Professor, The Quaid-e-Azam Institute of Nursing and Health Sciences Swabi
Email: waheedullah23aku@gmail.com
[3]Assistant professor, Askari Institute of Higher education, Email: Rafii7062@gmail.com

ARTICLE INFO:

Keywords:
CodePRep Program, Cardiopulmonary Resuscitation (CPR), Basic Life Support (BLS) Rapid Response, In-Hospital Cardiac Arrest (IHCA), Pit Crew Simulation Training

Corresponding Author:
Tariq Rahim,
MSN Scholar Aga Khan University,
Email: trahim33@gmail.com

Article History:
Published on 27 August 2025

ABSTRACT

In hospital cardiac arrest (IHCA)is responsible for over 290,000 individual lives each year, this underscores the essential requirement for enhancing response technique. Importantly, the time-sensitive aspect of IHCA interventions is highlighted by the standard of care, which includes early detection, a request for help, the beginning of cardiopulmonary resuscitation (CPR), and quick defibrillation. The empowering of healthcare personnel with basic life support (BLS) abilities becomes a life-saving difference when it comes to treating patient deterioration, which is why Interprofessional collaboration is so important in this context.

This study investigates the reluctance that is frequently seen among first responders working in hospitals, regardless of their level of expertise, to begin cardiopulmonary resuscitation and defibrillation. The study recognizes the substantial impact of self-efficacy in cardiopulmonary resuscitation (CPR) on response times, the effectiveness of CPR, and the capacity to rescue lives. Using a pit-crew approach, the CodePRep programme, which debuted at the same time as the programme administer through American Heart Association (AHA), emerges as an effort for continuous quality improvement.

The CodePRep method prioritizes the formation of Basic Life Support (BLS) Rapid Reaction Teams (RRTs) supervised by CodePRep coaches in order to increase self-efficacy, improve the quality of cardiopulmonary resuscitation (CPR), and aid in early defibrillation. The minutes leading up to the arrival of a code team are of the utmost importance, and this focus will help enhance emergency response methods in general. These keywords shed light on innovative approaches to improve the consequences of intra-hospital cardiac event.

CodePRep, Basic Life Support Coach, Mock Code, Simulation, Cardiopulmonary Resuscitation, Code Blue, Nursing Simulation, In-Situ Mock Code, Nurse Self-Efficacy, Failure to Rescue, Cardiac Arrest, in-Hospital AED, and Pit Crew Style Drills are some of the Keywords used in this article.

INTRODUCTION

Cardiovascular disease causes the deaths of around 17 million persons annually worldwide. The proportion of mortality in Pakistan caused by heart-related illnesses increased from around 19% in 2016 to 29% at now. (WHO)

Based on the latest statistics from the World Health Organization (WHO), the number of deaths caused by coronary heart disease in Pakistan in 2020 was 240,720, which accounted for 16.49% of all fatalities. Pakistan is positioned at the 30th level globally, with a mortality rate of 193.56 per 100,000 individuals. (WHO)

Approximately 15% of worldwide deaths are attributed to sudden cardiac death. Most of these fatalities are concentrated in poor and medium income countries (LMICs). More than 50% of cardiac arrests in high income nations take place outside of hospitals, and these incidents, known as out-of-hospital cardiac arrests (OHCA), are a major factor in the development of contemporary pre-hospital emergency medical services (EMS).[3] The enhancement of emergency treatment has resulted in substantial advancements in survival rates, ranging from 0% to as high as 40% in certain contexts. [4,5]

The burden ascertained using the capture-recapture approach in Karachi, Pakistan, was comparatively greater in comparison to the estimations from high-income countries (HICs). An observational research conducted at 10 locations in North America revealed that the occurrence of non-traumatic, EMS-assessed out-of-hospital cardiac arrest (OHCA) varied from 71.8 per 100,000 individuals in Ottawa to a maximum of 159 per 100,000 individuals in Dallas. Eighteen A different systematic analysis calculated that emergency medical services (EMS) responded to out-of-hospital cardiac arrest (OHCA) at rates varying from 24 cases per 100,000 person years in Bohemian to 186 cases per 100,000 person years in New York. Among the high-income countries (HICs) in East Asia, the rates of out-of-hospital cardiac arrest (OHCA) were found to be lower compared to other high-income settings, with a rate of 52.5 per 100,000 person years. [6]

Cardiac arrest that occurs within a hospital setting (IHCA) is a significant global cause of mortality. However, there is a scarcity of data about the epidemiology of IHCA. One The majority of instances (50%-60%) are attributed to cardiac-related reasons, such as heart failure, arrhythmia, or myocardial infarction, with respiratory insufficiency being the second most common cause. The survival rates following an in-hospital cardiac arrest (IHCA) occurrence range from 0% to 42% worldwide. Three Several significant patient-related factors include age, gender, first presentation, and underlying diseases. On the other hand, key healthcare-related factors consist of the reaction time of the emergency team, location of the incident, and the duration and technique of resuscitation.[1-7]

Research has indicated that patients with a shockable rhythm have a significantly better likelihood of surviving until they are discharged from the hospital, with a survival rate that is 2 to 3 times greater compared to those with a non-shockable beat.[8,9]

In emergency situation fruitful achievement of a life support course does not assure participant will remember and apply the content. After two weeks of completion acquired knowledge of Basic Life Support (BLS) content weakens as soon as not applied[10-19]

The search was limited to English, peer-reviewed, full-text, and research publications. Through the implementation of this practice adjustment, nurses and interdisciplinary practitioners will have the chance to enhance their skills, enhance their confidence, and ultimately increase the number of lives saved.

The American Heart Association requires that certificates for Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and

Pediatric Advanced Life Support (PALS) be updated every two years. Research undertaken by the American Heart Association (AHA) in 2015 revealed that competency in Basic Life Support (BLS) may decrease after a mere three months after first training. The optimal timeframe for renewal is currently unspecified for the AHA (2015) updates. Nurses who are competent in BLS/ACLS/PALS should undergo training more frequently than every two years in order to potentially mitigate the decline in life-saving knowledge and skills [20]. A pedagogical approach that prioritizes rapid, frequent, and repetitive exercises is substantiated by a substantial corpus of evidence [20].

A Worsening of the CPR Capabilities of the Population

The study focuses on the urgent requirement to uphold and enhance fundamental life support (BLS) abilities among healthcare workers, considering the unchanging domestic survival rates for in-hospital sudden cardiac arrest (SCA) during 2012 and 2013. There has been doubt over the yearly AHA guideline for BLS recertification because skills deteriorate quickly over time. To tackle this problem, healthcare organizations have introduced required refresher training.[21,22]

The research highlights the decline in CPR awareness and skills within a short period of time after training, emphasizing the importance of regular practice sessions. The studies given in the text demonstrate a clear correlation between The efficacy of cardiopulmonary resuscitation (CPR) and the probability of survival. Additionally, it has been noted that different rates of skill acquisition occur following conventional training sessions. Simulation training, low-dose high-frequency sessions, and automated systems with personalized feedback are suggested as useful methods to improve CPR performance and maintain skill proficiency.[23,24]

The primary objective of the AHA's resuscitation quality improvement (RQI) programme is to target crucial aspects, such as enhancing the proficiency of healthcare workers in doing high-quality CPR, guaranteeing the efficacy of initial CPR training, providing refresher courses to maintain skill retention, and promoting regular practice sessions. Nevertheless, the study highlights a deficiency in existing research about the execution of CPR by healthcare workers (HCWs) who act as initial responders in non-hospital settings.[25,26]

The two-year observational research evaluates the efficacy of an organization's yearly CPR training programme on the performance of healthcare workers in basic life support (BLS) techniques. The study is guided by two research objectives. The first question investigates whether the yearly CPR course enhances the performance of healthcare workers (HCWs) in basic life support (BLS). The second question explores if there are differences in performance ratings among instructors who use different observational methods. The study employs a high-fidelity human patient simulator to conduct realistic simulations, and the evaluation of performance is done by direct observation or video review.[27,28]

The study's findings and observations give useful insights into the difficulties of preserving BLS skills among healthcare personnel and emphasize the significance of continuous training and evaluation. The focus on simulation technologies and other observational methods provides a basis for increasing CPR training programmes and eventually improving patient outcomes during sudden cardiac arrest incidents in healthcare environments.[29-34]

To improve results, it is crucial to urgencies the instruction and preparation of medical staff members who handle incidents of in-hospital cardiac arrest (IHCA). However, preparing for such situations is difficult due to

their rare frequency and the dynamic nature of the people involved in reacting. Conventional classroom training approaches have frequently been insufficient, resulting in healthcare personnel feeling ill-equipped and causing departures from established resuscitation recommendations.[35-42]

This study sought to determine if, over time, in a single university hospital, a hospital-wide campaign featuring simulated "mock codes" would improve objective measures of group-level performance in cardiac resuscitation abilities. The main objective was to improve the chest compression fraction, while also aiming to decrease the amount of time needed to administer the initial dosage of adrenaline and perform the first defibrillation. The hypothesis posited that the adoption of a continuous programme of simulated emergency scenarios would provide a significant increase of more than 10% in each of these fundamental measurements during the first three years of the program's initiation.[43-46]

Cardiac arrest occurring within a hospital setting with the automated external defibrillators use (AED).

Although there have been improvements in life support techniques, the survival rates for inpatient cardiac arrest have stagnated at 15%.[46] indicated that the delay in defibrillation from the commencement of ventricular fibrillation (VF) could contribute to this low incidence. Mancini stressed the significance of implementing in-hospital initiatives that involve non-critical care nurses, providing them with both training and suitable equipment, in order to acknowledge the potential influence of early defibrillation. Mancini's team conducted a research which showed that non-critical care nurses, following their participation in a BLS AED training, maintained the requisite abilities for utilizing an automated external defibrillator (AED). The study's goal was to improve non-critical care workers' capacity to respond quickly in emergency situations, hence improving survival rates by reducing the time between the occurrence of a shockable heart rhythm and the administration of the first defibrillation.[47]

The author of the study Performed an extensive investigation on instances of cardiac arrest that occur within hospitals, with a particular focus on highlighting the need of promptly administering defibrillation. The inclusion of semi-automated external defibrillators (SAEDs) in basic life support (BLS) training for nurses was discovered to have a substantial impact on increasing survival rates. The study examined clinical factors that impact survival and emphasized the efficacy of nurses' SAED education in enhancing results.[48]

The author of the study Examined alterations in cardiopulmonary resuscitation (CPR) protocols and the availability of automated external defibrillators (AEDs) for nurses in Australian medical facilities. As a result of a directive issued by the Department of Health mandating CPR and defibrillation training for nurses, there was a significant rise in the number of hospitals equipped with automated external defibrillators (AEDs) and nurses authorized to perform defibrillation. The authors emphatically advocated for AED training for nurses and asked institutions to provide prompt availability of defibrillation in order to improve survival rates.[49]

The author of the study Investigated the obstacles faced by nurses and respiratory therapists while utilizing AEDs in the context of cardiac arrest that occurs inside a hospital setting. The significance of these experts as primary responders was highlighted, along with the factors that affect their willingness to utilize AEDs. Participants acknowledged the significance of administering defibrillation within a timeframe of two to five minutes to ensure optimal efficacy. Although several participants expressed reservations regarding autonomous decision-making, they

unanimously acknowledged the crucial need of receiving more training and acquiring comprehensive understanding of hospital regulations. According to Andrews et al., the effective execution of a programme for early defibrillation in a hospital setting necessitates the backing of healthcare personnel, administrators, and continuous instruction in the use of external defibrillators that are automated (AEDs).[50]

These studies highlight the crucial need of promptly administering Defibrillation to increase the chances of survival in cardiac arrest situations that occur within a medical facility. It is crucial to train professionals who are not specialized in critical care, including automated external defibrillators (AEDs) in basic life support (BLS) programmes, and ensure that defibrillation is easily accessible in order to improve outcomes in these critical situations. The research cited are supported by the following citations: [46-50]

Evidence gathered before hospitalization

Out-of-hospital cardiac arrest (OHCA) impacts almost twice as many individuals as in-hospital cardiac arrest (IHCA), affecting nearly 400,000 people. The survival rates for OHCA range from 9% to 15% [51]. The discipline of prehospital medicine is essential in cardiovascular life support since it prioritizes a highly organized and role-conscious method to CPR drill. More specifically, the defibrillator is charged at compression number 180 and compressions are carried out in sets of 200. This makes it possible to evaluate the patient's pulse and rhythm and, if needed, shock them on compression number 200. This complies with the 2015 guidelines established by the American Heart Association (AHA), which call for doing 200 continuous chest compressions for up to three cycles in cases of out-of-hospital cardiac arrest (OHCA), in addition to shocks and passive oxygen insufflation.

Based on prehospital research, strongly support the idea of minimizing pauses in CPR. They propose a hands-on defibrillation strategy where rescuers smoothly transition from compressions to defibrillation without the usual "clearing" stage. suggest a method called team-focused cardiopulmonary resuscitation (TFCPR) or "pit-crew" CPR. This approach prioritizes uninterrupted compressions of high quality and early defibrillation, while giving less importance to advanced interventions.[52]

Hopkins et al. (2016) looked at how team training affected the survival rates of patients suffering from out-of-hospital cardiac arrest (OHCA). The study focused on how EMS personnel could administer high-quality CPR with little disruptions. Their study included a before-and-after design, incorporating interventions to enhance the quality of CPR, simpler algorithms for drug administration, and training for EMS crews. The implementation, based on the principles of pit-crew style, yielded positive results: a notable rise in survival until release from the hospital (50% compared to 37%) and enhanced neurological outcomes (46% against 26%). The adoption of a well-coordinated pit crew approach to resuscitation, influenced by Formula One pit crews, has shown enhanced patient outcomes. This indicates that there may be valuable insights for hospital multidisciplinary teams working together with their prehospital counterparts.

Comparison of the decline in performance and the inability to save

The core measure of failure to rescue (FTR), which was recognized by the National Quality Forum (NQF) (2012), has become an increasingly important emphasis in the evaluation of nursing services in acute care hospitals. According to the definition Provided by the Healthcare Research and Quality Agency (AHRQ) (2010), FTR incorporates several variables that might lead to a decline in health or mortality. This

definition goes beyond medical issues and also includes the responses of healthcare personnel to emergency situations. When it comes to detecting and managing FTR, especially in high-acuity postsurgical patients, this crucial metric frequently relies on nurses, who are positioned as the initial point of contact[53,54]

According to Kane et al. (2007), the implications of FTR have a major impact on hospital quality measures, with nurse staffing appearing as a crucial element that influences patient outcomes. According to Aiken et al.'s research from 2002 and 2011, a low patient-to-nurse ratio has been linked to improved patient outcomes, increased work satisfaction, and an overall improvement in the quality of treatment. On the other hand, that correlation between larger patient assignments per nurse and increased death rates and FTR occurrences is significant. Furthermore, according to Aiken et al. (2003), researchers have shown a correlation between the educational preparedness of nurses, it involves having a nursing bachelor's degree and a drop in the inpatient mortality rate. The certification of specialty nurses plays a major role in enhancing patient outcomes. This research emphasizes how important nursing education and training are in preventing traumatic injury - related consequences.[55]

The importance of high-fidelity simulation in nursing staff training is brought to light in the essay, which acknowledges the crucial role that education plays in modern society. simulation exercises offer a secure setting in which individuals may practice their responses to uncommon and crucial occurrences. These exercises also encourage cooperation, collaboration, and enhanced clinical judgement. The case study that was provided indicates the effective deployment of a simulation exercise in a surgical oncology unit, which resulted in improved detection of patients who were acutely decompensating and, as a consequence, a reduction in the number of instances of FTR [56.]

It has been demonstrated that one effective method for lowering the number of FTR incidents is to use simulation exercises that are specifically designed to meet the requirements of nursing units. Hospitals have the ability to improve their capability to rescue patients from critical events by addressing crucial aspects such as nurse staffing, education, and multidisciplinary teamwork. This will eventually result in improved patient outcomes and an increase in the quality of care that is offered.

"Empowering healthcare professionals through the enhancement of self-efficacy, simulation training, and interdisciplinary collaboration in emergency response."

At CodePRep, the extensive training is designed to reduce the fear and anxiety that often come with emergency circumstances, while also promoting a strong feeling of assurance among healthcare personnel. The conviction in one's capacity to perform specified activities under given conditions is known as self-efficacy. Choosing learning methods that prioritize mastery experiences is crucial for improving self-efficacy, especially in the context of CPR. [57]
Researchers and educators agree that the current practice of waiting two years to update BLS, ACLS, and PALS skills in regular classroom settings is considered excessively long. Several healthcare organizations are transitioning from traditional instructor-led workshops to online training for medical professionals.

Mock code training is one of the most often requested forms of teaching by nurses and healthcare workers. Empirical data suggests

that regular, unit-specific simulations greatly improve cognitive and psychomotor abilities. Abundant research provides strong evidence for the effectiveness of simulation in enhancing self-assurance and reducing anxiety during medical emergencies. It is imperative for the healthcare community as a whole to enhance our capacity in identifying initial indications of patient deterioration. The efficiency of advanced warning systems depends on the quality of the data they receive. Identifying outward signs of patient deterioration is a collective obligation of all healthcare team members. Patients display several indicators of deterioration hours prior to an emergency, underscoring the importance of visual acuity training as the initial measure in promoting ongoing communication among different fields. Collaboration, utilizing a range of viewpoints, and communicating effectively are essential in the care of critically sick patients to prevent any nurse from experiencing isolation.

The pit-crew style collaborative training, which is highly effective in prehospital cardiovascular resuscitation, functions as a model. Early defibrillation, which was first performed by emergency medical workers in 1979, continues to be a crucial intervention for attaining a stable heart rhythm. It is natural to combine the best practices of prehospital responders with those of in-hospital responders. Ensuring that in-patient workers have access to equipment and training for early defibrillation is crucial, since each minute is of great importance. Refusing authorization to utilize AEDs fundamentally implies that relying solely on CPR is satisfactory until further assistance is obtained.

"Enhancing the Efficiency of Resuscitation Training Intervals to Maintain Proficiency in Nurses and Interprofessional First Responders."

The current discourse over the frequency of basic resuscitation skill training for nurses and Interprofessional (IP) first responders is very intricate. Experts acknowledge that the current standards propose re-certification every two years, a timescale that is potentially inadequate. The American Heart Association, in their 2015 emergency cardiovascular care amendments, recognized the insufficiency of a two-year timeframe but did not indicate a more appropriate duration. The unsatisfactory performance in CPR by IPs and nurses is frequently caused by insufficient retention without regular refresher training[58,59]

Authors highly emphasize the importance of regularly participating in a monthly CPR drill to maintain and retain skills. Psychomotor skills exhibit a more rapid decline compared to cognitive comprehension, underscoring the necessity for consistent practice. Surprisingly, over a short span of two weeks after completing a life support course, the acquired knowledge starts to diminish. Research conducted has demonstrated that traditional classroom-based training for hospital first responders to cardiac arrest is insufficient in equipping personnel with lasting knowledge and abilities. Ensuring the competence of nurses and IP first responders necessitates regular, top-notch cardiopulmonary resuscitation (CPR) instruction[60,61].

The authors highlight the need for more study to ascertain the most advantageous period for administering maintenance and BLS refresher training. During the intensive CodePRep programme, participants are actively involved for one week straight, with suggested sessions occurring every six weeks. During the study, triads engaged in a singular session, with each individual assuming the roles of rescuer one, two, and three. The session ended with a real-time debriefing.

Theoretical Structure and Plan

CodePRep provided participants with the opportunity to immediately observe the impact of Bandura's self-efficacy theory through resuscitation exercises and visual acuity assessments. Observing the

performance of fellow team members during exercises may serve as a source of inspiration and provide good role models for the participants. CodePRep promoted a feeling of inclusivity, effective communication, and teamwork among the members of the unit by providing verbal support. Modelling diminishes fear and has the potential to completely eliminate it when engagement results in mastery. Hospital first responders may experience significant mental strain due to crises. Through the exercise of patience, those who are highly anxious can attain achievement. CodePRep training encouraged a methodical, well-coordinated, and proactive response.

Measurement and control of variables using specialized devices and equipment.

Three self-efficacy assessments were used in this study: The Basic Resuscitation Self-Efficacy Scale (BRS-SES), the Resuscitation Self-Efficacy Scale (RSES), and Bandura's Generalized Self-Efficacy Scale (GSES). Bandura's General Self-Efficacy Scale (GSES) assesses an individual's level of confidence in their capacity to effectively handle and accomplish a new or difficult task. The 10 survey questions do not explicitly pertain to cardiac arrest; rather, they focus on routine occurrences in daily life. Consistent with Bandura's perspective, a study conducted revealed a significant correlation between individuals' self-efficacy beliefs and their levels of confidence. The researchers created the RSES, a specialized self-efficacy assessment designed specifically for resuscitation. Several of the seventeen survey questions pertain to advanced skills that are not included in CodePRep training. The Hernandez-Padilla, Suthers, Fernandez-Molina, and Granero-Molina - question BRS-SES was chosen due to its alignment with CodePRep and its comprehensive coverage of resuscitation principles.

Results

Detailed Account of the Methods and Procedures

The project commencement was authorized by the host of (Codeprep) and IRB (Institutional Review Board) on September 27, 2023, during a period when CodePRep was the only educational activity allowed within the hospital premises. In light of the current uncertainty, leadership emphasized the significance of personnel practicing their code blue reaction in order to improve their skills. Participants were strongly urged to evaluate all instances of chest discomfort and shortness of breath, including both patients without symptoms and those with symptoms.

After receiving instruction and securing final permission from both the Ayub Medical College Abbottabad Institutional Review Board (IRB) and the site hospital's IRB, the health systems Institutional Review Committee determined that the specified procedure did not qualify as human subject research. However, it was classified as a project focused on enhancing performance and quality, which meant that it did not require evaluation or supervision from the Institutional Evaluation Board (IRB).

In order to optimize the process of gathering data, the information obtained from BRS-SES replies was employed to generate a thorough codebook. Significantly, a query pertaining to rescue respiration (mouth to mouth or mouth to pocket mask) was deliberately omitted from the survey due to its perceived irrelevance in the hospital environment, even prior to the emergence of COVID-19. The codebook was rigorously compiled, encompassing the precise description and categorization of each variable, as well as the allocation of numerical values to replies for a set of 15 pre/post questions. The CodePRep codebook underwent meticulous editing and finalization, including valuable insights from the 100 responders.

The data collected, particularly those recognized, were manually inputted into an Excel spreadsheet using a double-key entry method. Afterward, the data was imported into IBM SPSS 27 for analysis. The examination of categorical variables entailed the utilization of descriptive statistics, including measures such as the mean, standard deviation, range of scores, skewness, and kurtosis.

The sample's demographic features included participant codes, gender, age, greatest level of education, and profession. The study found that nurses accounted for the majority of the professional group, with 70 out of 100 participants. Certified Nursing Assistants (CNAs) made up 26% of the group, while doctors comprised just 4%.

The experiment began smoothly after obtaining approval from the host hospital's NRC (National Research Council) and IRB (Institutional Review Board), and then receiving authorization from the Ayub Medical College Abbottabad IRB. The Institutional Review Committee granted an exemption for the project, acknowledging it as a performance/quality improvement endeavor and therefore eliminating the need for further monitoring. The data was carefully prepared and analyzed, leading to a thorough comprehension of the participant demographics and their reactions to the CodePRep programme.

Enhanced Self-Efficacy in Resuscitation

The concise and repetitive in-situ simulations proved to be highly effective in improving the Basic Life Support (BLS) abilities and self-confidence of healthcare personnel. Saqe-Rockoff et al. (2019) highlighted the beneficial effects of on-site, simplified simulations on the adherence to resuscitation guidelines and self-confidence, emphasizing the significance of repeated experiences in developing assurance and proficiency in critical patient care. Shrestha et al. (2020) provided more evidence to support the educational effectiveness of in-situ simulation-based training for resuscitation abilities.

An analysis using the Wilcoxon Signed Rank Test shown a significant improvement in Basic Life Support self-efficacy following participation in the CodePRep training programme. The results of the BRS-SES survey, conducted before and after the adoption of CodePRep, emphasize the importance of frequent, practical, on-site exercises for BLS first responders to enhance their knowledge and emergency abilities. The highly favorable outcomes seen with a minimum of one session of CodePRep exercises for a single period of work strongly support the idea of implementing the training on a broader scope. Enhancement in performance was seen for all items (Q1-Q15, refer to Table A, Table B), indicating improved self-confidence in safety assessment, state of consciousness evaluation, requesting assistance, commencing CPR, and correctly employing defibrillation.

Table A

Test Statistics[a]

	Q1Post - Q1Pre	Q2Post - Q2Pre	Q3Post - Q3Pre	Q4Post - Q4Pre	Q5Post - Q5Pre
Z	-6.411[b]	-7.081[b]	-7.512[b]	-3.803[b]	-5.600[b]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000

Test Statistics[a]

	Q6Post - Q6Pre	Q7Post - Q7Pre	Q8Post - Q8Pre	Q9Post - Q9Pre	Q10Post - Q10Pre
Z	-6.752[b]	-5.545[b]	-6.486[b]	-6.825[b]	-4.448[b]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000

Test Statistics[a]

	Q11Post -	Q12Post -	Q13Post -	Q14Post -	Q15Post -

	Q11Pre	Q12Pre	Q13Pre	Q14Pre	Q15Pre
Z	-2.752[b]	-4.376[b]	-5.142[b]	-4.259[b]	-3.827[b]
Asymp. Sig. (2-tailed)	.006	.000	.000	.000	.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Table B
Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Q1Pre	100	5.00	8.00	10.00
Q2Pre	100	5.00	8.00	9.00
Q3Pre	99	6.00	7.00	9.00
Q4Pre	100	7.00	9.00	10.00
Q5Pre	100	5.00	8.00	10.00
Q6Pre	100	6.00	8.00	9.00
Q7Pre	100	6.00	9.00	9.75
Q8Pre	100	6.00	8.00	9.00
Q9Pre	100	5.00	7.00	9.00
Q10Pre	100	5.00	8.00	10.00
Q11Pre	100	7.00	8.00	9.75
Q12Pre	100	6.00	8.00	10.00
Q13Pre	100	6.00	8.00	10.00
Q14Pre	100	5.00	7.50	9.00
Q15Pre	100	5.25	8.00	10.00
Q1Post	100	9.00	10.00	10.00
Q2Post	100	9.00	10.00	10.00
Q3Post	100	10.00	10.00	10.00
Q4Post	100	9.00	10.00	10.00
Q5Post	100	9.00	10.00	10.00
Q6Post	100	9.00	10.00	10.00
Q7Post	100	9.00	10.00	10.00
Q8Post	100	9.00	10.00	10.00
Q9Post	100	9.00	10.00	10.00
Q10Post	100	8.00	9.00	10.00
Q11Post	100	7.00	9.00	10.00
Q12Post	100	8.00	9.00	10.00
Q13Post	100	9.00	10.00	10.00
Q14Post	100	8.00	9.00	10.00
Q15Post	100	7.00	9.00	10.00

Essential Safety Gear Self-efficacy

The increased availability of enhanced Automated External Defibrillators (AEDs) in public areas has broadened the potential for untrained persons to swiftly address cardiac arrests that occur outside of medical facilities. In contrast, healthcare systems need to promptly address in-hospital cardiac arrests (IHCA) by managing immediate issues as they arise. The steps that must be taken in a medical institution in order to preserve a patient's life include recognizing a medical emergency as soon as possible, calling for help, initiating cardiopulmonary resuscitation (CPR), and performing early defibrillation. As per the latest revisions from ILCOR 2020 and the American Heart Association (AHA), AEDs may accurately identify shockable arrhythmias. However, they necessitate a temporary interruption in CPR for rhythm analysis.

The time it takes to establish the patient's rhythm without having to touch them can be shortened when manual defibrillation is carried out by rapid response teams or professionals with advanced cardiac life support (ACLS) training (Adult Basic and Advanced Life Support, 2020). According to Castan et al. (2017), prompt defibrillation is critical and needs to be given no later than two minutes following detection. However, there is variation in the amount of time that passes between a call for help and the rapid response team's (RRT) arrival. This is referred to as reaction times. Several studies have

indicated a mean response time ranging from 4.3 to 4.0 minutes (Huschak et al., 2016). Regrettably, there have been instances of delays in the administration of defibrillation. A research conducted in 2019 by Vaillancourt et al. revealed a significant ten-minute delay before to the initiation of defibrillation.

It is not considered the norm in healthcare to acknowledge an issue, request assistance, commence cardiopulmonary resuscitation (CPR), and thereafter await the arrival of the rapid response team for defibrillation. Healthcare professionals who have received training in Basic Life Support (BLS), such as nurses and respiratory therapists, are frequently prohibited from utilizing either the AED/analyze feature on a manual defibrillator or an Automated External Defibrillator (AED). This restriction leads to delays and reduces the chances of survival for individuals experiencing cardiac arrest (Andrews et al., 2016). Existing literature indicates that the implementation of educational efforts, such as providing AED training with the assistance of physicians and hospital management, can effectively solve this deficiency. A study by Vaillancourt et al. (2019) found that the implementation of a medical directive permitting registered nurses and respiratory therapists to use automated external defibrillators (AEDs) significantly improved the outcomes for in-hospital cardiac arrest (IHCA).

The participants in the BRS-SES reported a considerable increase in their self-efficacy regarding the use of AEDs, as seen by their pre-post self-efficacy outcomes. Participants demonstrated enhanced proficiency in multiple facets of AED utilization, encompassing promptly activating the device, accurately adhering to auditory instructions, correctly affixing the pads, ensuring an unobstructed environment during rhythm analysis, and administering a swift and secure electrical discharge while concurrently monitoring visually and issuing verbal directives. The CodePRep emergency equipment drill training significantly enhanced participants' self-efficacy. Enabling Basic Life Support (BLS) teams to promptly and reliably execute crucial life-saving techniques is crucial for enhancing outcomes in cases of cardiac arrest.

Figure A-E presents the results of the BRS-SES participants' self-reported pre-post self-efficacy of AED usage, which clearly showed improvement. When asked, "In an emergency situation, I am confident that I can always," the mean pre-post statistics**,** Turn on the AED and begin using it as soon as it is available (pre: M = 7.31, post: M = 9.26); pay attention to and follow the voice prompts from the AED in the correct order without becoming confused or distracted (pre: M = 7.54, post: M = 8.93); make sure the victim is not in contact with anything while the rhythm is being analyzed (pre: M = 7.56, post: M = 8.38); and administer a quick and safe shock while maintaining visual check and verbal commands (pre: M = 7.79, post: M = 9.14). After taking part in the CodePRep emergency equipment drill training, participants' self-efficacy increased dramatically. It is essential to give BLS workers the power and capacity to carry out critical life-saving procedures confidently and quickly.

Theoretical Structure and Plan

Bandura's (1977) Social Cognitive Theory is used as the basis for evaluating the self-efficacy results of nurses and other professionals after CodePRep resuscitation training in this study aimed at improving performance. Self-efficacy, in the context of cardiac arrest, pertains to a healthcare provider's assurance and proficiency in acquiring, starting, and accurately executing crucial resuscitation techniques, as well as effectively guiding others in practicing similar abilities (Mendhi et al., 2020). According to Bandura (1982), individuals need to develop

self-efficacy and proficiency in a certain activity in order to respond effectively in specific circumstances. Perceived competence has a crucial role in determining the level of participation in a certain activity.

The CodePRep research demonstrated the presence of the four components of Bandura's Social Cognitive Theory: mastery of performance, vicarious learning, social persuasion, and emotional control. This may be observed in Figure F. Participants are provided with learning opportunities and exposure to in-situ resuscitation scenarios through hands-on unit-based exercises, which help them achieve mastery of performance. The location provided an opportunity for participants to witness their team members engaging in practice within their accustomed surroundings, so facilitating vicarious learning. Social influence was crucial in motivating both Certified Nursing Assistants (CNAs) and doctors to participate in drill sessions, promoting communication among rescuers and active engagement during real-time debriefings. Effectively managing anxiety during practice sessions is essential, since heightened anxiety might hinder resuscitation efforts. Enhanced self-confidence, as proposed by Bandura (1982), can effectively diminish learner apprehension and facilitate the acquisition of skills, hence preventing individuals from completely evading training scenarios.

Based on the gathered data, all participants demonstrated enhanced self-confidence in basic resuscitation skills. This was evident in their improved ability to recognize cardiac arrest, seek assistance, perform effective chest compressions, handle emergency equipment, and make critical decisions such as analyzing and administering shocks when necessary. This is consistent with Bandura's notion that individuals have the ability to regulate their physiological and emotional states in times of crisis, resulting in the cultivation of self-efficacy and enhancements in behaviour or performance (Bandura, 1982). The study's findings demonstrate that the CodePRep training paradigm effectively improves the self-efficacy of healthcare personnel in their ability to respond to in-hospital cardiac arrests.

Implications for the Nursing Profession

The American Heart Association (AHA) observed a worrisome surge of 38% (292,000) in adult in-hospital cardiac arrests in 2019, highlighting a substantial public health issue in U.S. hospitals (Cardiac arrest Among Hospitalized Patients May Be Underestimated, 2019). The study suggests the adoption of an early warning system and the enhancement in order to lower the frequency of such accidents, healthcare personnel in a hospital environment should get basic and advanced life support training. Medical surgery and other in-patient units, although they have fewer chances to be involved in cardiac arrest incidents compared to critical care departments, are acknowledged as vital environments for teaching all healthcare personnel to recognize indications of worsening and react efficiently.

CodePRep® is a unique programme that follows a pit-crew type approach within hospitals. It is specifically intended to complement Basic, Advanced, and Pediatric Life Support Courses. The programme, led by CodePRep Coaches, provides team training in real-life conditions, using emergency equipment in short, repetitive drills conducted roughly every six weeks. The 2020 AHA educational updates acknowledged the possible influence of including a CPR coach into team training on performance and advocated for more study in this domain (Resuscitation Education Science, 2020). The CodePRep performance improvement initiative provides significant data for this developing research field, establishing communities of responders who are trained to accurately identify indicators of deterioration.

Numerous healthcare settings, including acute and non-acute care hospitals, outpatient

clinics, ambulatory care centers, assisted living facilities, and academic institutions preparing future professionals, can use CodePRep. The participants encompass a wide spectrum of healthcare professions, including registered nurses, advanced practice registered nurses, doctors, physician assistants, technicians, chemists, residents/interns, pre-professional students, and non-clinical workers. The programme has a substantial capacity to have a beneficial influence in many environments, enabling individuals to respond with confidence in the event of a cardiac arrest.

The program's capacity to comprehensively conform with the suggestions of Mahramus et al. (2016) in standardizing cardiac arrest training interventions is evident. The versatility of CodePRep is shown in its capacity to be used in many contexts, regardless of whether there are Automated External Defibrillators (AEDs) accessible or not. Although in-hospital cardiac arrests often have delays of around nine minutes before defibrillation (Andrews et al., 2018), teams that practice CodePRep routinely show the ability to deliver shocks within a minute and a half.

Code Prep's objective is to create assurance in those confronted with the severe circumstance of cardiac arrest, acknowledging its potential occurrence at any given moment. The programme surpasses conventional employment classifications, highlighting that anyone possessing compassion have the capacity to be eligible as life-saving responders. The significant influence of CodePRep on response times and preparation indicates a revolutionary method for dealing with in-hospital cardiac arrests and improving public trust in healthcare institutions.

Suggestions

The American Heart Association (AHA) acknowledged in 2020 the need for more research on the effective fusion of mastery learning and repetitive practice in resuscitation training. The implementation data obtained by CodePRep significantly helps to the ongoing development of this knowledge base. The CodePRep programme utilizes unit-based, concise, intentional, interactive practice sessions that serve as both a stress-free team-building activity and a very effective method for enhancing participants' confidence in resuscitation skills. Significantly, the progress made in managing emergency equipment and utilizing Automated External Defibrillators (AEDs) was exceptionally noteworthy. This highlights the need of nursing and hospital leadership engaging in open discussions on rules and medical directives that enable BLS-trained workers to utilize AEDs.

Initially conceived as an Interprofessional endeavor, including nurses, Certified Nursing Assistants (CNAs), and a select few physicians, forthcoming initiatives might potentially gain advantages by allowing more flexibility in terms of time limitations to gather data from a wider array of experts. Rhodes et al. (2016) have highlighted that multidisciplinary simulation sessions can provide excellent opportunities for critical thinking, team identification, and communication. An in-depth analysis of disparities in day and night shift involvement and demographics might yield more profound conclusions. Although the study did not assess the efficacy of visual acuity instruction, the color-coded triage system that was created to identify people at risk provides a potential avenue for further investigation.

The Institute for Healthcare Improvement (2020) stresses the significance of creating customized procedures that align with the culture, patients, and personnel of organizations to promptly identify patients who are at risk. Conducting future studies to explore the obstacles in applying the acuity measure and examining its effects would be worthwhile topics of research. Prehospital medicine provides valuable insights by

stressing the need of early defibrillation, high-quality chest compressions, and a simplified and standardized approach to cardiopulmonary resuscitation (CPR). CodePRep techniques may benefit from the application of "pit crew" models in resuscitation training, since this approach has been well examined in pre-hospital emergency teams. More insightful studies might contrast the application of in-hospital cardiac arrest (IHCA) simulation with recognized pre-hospital methods. To improve the success of the programme, it would be beneficial for pre-hospital emergency medical staff to collaborate with communities and share their experience. This might entail engaging emergency medical technicians and paramedics as coaches for the CodePRep programme, considering their frequent encounters with cardiac arrests.

DISCUSSION

This study was initiated as a vital effort to improve the performance of nurses and other healthcare personnel in cardiac arrest scenarios by boosting their perceived self-efficacy. The conventional semiannual classroom training model, as emphasized by Clarke et al. (2018), was inadequate in equipping first responders with the necessary expertise and abilities required in crucial situations. To address this issue, the CodePRep train-the-trainer programme was introduced, together with staff training and unit-based practice sessions, to bridge this deficiency.

The use of Code Prep's practical, on-site, simplified Interprofessional cardiac arrest simulations greatly enhanced the staff's confidence in their abilities. The study's findings revealed immediate enhancements in Basic Life Support (BLS) proficiency and prioritization after drill sessions. The CodePRep exercises, which are meant to be time-efficient (lasting 2-6 minutes) and cost-effective, had a negligible effect on staffing while significantly improving resuscitation confidence. The programme afforded healthcare personnel the chance to assess their expertise, acquaint themselves with the code cart, and feel empowered to respond effectively in emergency situations.

A rapid evaluation included into everyday nurse communication, had a role in fostering a culture within CodePRep that consistently enhances the capacity to recognize high-risk patients and react efficiently. The programme highlighted the need of being familiar with AEDs and having the necessary skills to operate defibrillators. It stressed the necessity of healthcare organizations having policies that permit the use of AEDs, along with providing training to ensure proficiency.

The study prioritized the necessity of high-quality compressions as the core component of CPR, despite the lack of complete CPR ratings. Nevertheless, every individual involved was provided with immediate feedback regarding their performance, and team members were actively encouraged to mentor one another in order to achieve ongoing development. The sessions ended with open conversations regarding achievements and areas that need refinement, promoting a constructive and cooperative learning atmosphere. Several teams enthusiastically seized the chance to practice drills again, creating an enjoyable and stimulating environment that transformed the prevailing mindset from fear and failure to courage and a proactive attitude. The study demonstrates how new methodologies such as CodePRep may lead to beneficial changes in healthcare procedures and attitudes.

Advantages

The endorsement of the health system's Nursing manager, and lead hospital educator was crucial in affirming the need of adopting CodePRep throughout the whole hospital. The fervor and enthusiasm of the primary instructor and recently hired mentors greatly augmented the project's impetus. The lead coach efficiently oversaw the organization of

rotations and staff education across all involved departments, ensuring a thorough and successful implementation.

The selection of the BRS-SES method to assess the proficiency of nursing students in handling an unconscious/non-breathing patient was a deliberate decision that perfectly matched Code Prep instructional goals. The tool's original intention for nursing students was validated by the alignment of Basic Life Support (BLS) concepts between this group and working professionals, thereby justifying its relevance for both. This study diverges from the typical emphasis on resuscitation measures, such as reaction times and the commencement of CPR or defibrillation, by giving priority to the assessment of self-efficacy. The fundamental assumption is that confidence plays a crucial role, and favorable results will therefore ensue.

The study conducted by Wenlock et al. (2020) and Ramzy et al. (2020) showed that low-fidelity, in-situ simulated cardiac arrest situations have a beneficial effect on staff preparation, particularly when dealing with patients suspected of having COVID-19. Subjects in these research had a notable boost in self-assurance when it came to dealing with medical emergencies after participating in simulated situations. The University of California Davis simulation center significantly contributed to healthcare professionals' sense of being well-informed, confident, and secure during challenging times by offering in-situ COVID-19 simulations (UC Davis Simulation Centre Provides COVID-19 Trainings for Health Care Providers, 2020). These studies emphasize the importance and efficiency of simulation-based training programmes in developing confidence and preparedness among healthcare practitioners.

Constraints

CodePRep is a versatile and adaptable programme specifically intended to meet the needs of various healthcare settings, effectively integrating into daily practice. Participants worked along with the lead educator to actively participate in practical exercises, enabling them to get acquainted with the alternative code blue response standards that were put in place to ensure their safety. During debriefings, staff members were given an opportunity to voice their ethical concerns regarding possible delays in reacting to the arrest of patients, which were caused by the need to put on extra safety precautions. The workouts unexpectedly brought amusement and lightheartedness to teams who were facing the unfathomable difficulties of their occupation.

Nevertheless, there were logistical obstacles that arose, such as a six-month wait between staff training and the implementation of the drill. This delay was caused by a lack of personnel and the heavy workload of caring for patients. Notwithstanding the initial decrease in momentum, the leadership made a deliberate choice to introduce CodePRep in particular units and inpatient departments where it was considered essential. The head coach assumed the important task of recruiting, gaining consent, administering the drills, and supervising the distribution and collecting of pre- and post-survey data.

All of the staff members were supposed to take on rescuer roles during the event that was supposed to take place over the course of a week in each of the units. On the other hand, the real result went in a different direction than this initial vision. It was only possible for the day shift and night shift units to plan one day for drills, and these drills were carried out on a random schedule whenever the head coach and participants who were interested were available.

Notwithstanding these obstacles, the outcomes of the CodePRep performance enhancement initiative showcase its capacity for duplication in any healthcare environment. The study highlights the necessity of training programmes that can adjust and respond to

the challenges of healthcare delivery, while placing significant emphasis on actively involving and providing assistance to healthcare workers.

Findings and Impact on the Nursing Field

In October 2020, the American Heart Association (AHA) identified a deficiency in our comprehension of the optimal functioning of hospitals' quick response systems and teams. The CodePRep idea is a workable solution that emphasizes the critical role that Basic Life Support (BLS) providers play in Rapid Response Teams (RRTs) in preventing In-Hospital Cardiac Arrest (IHCA). A number of factors are necessary for in-hospital cardiac arrest (IHCA) victims to have a successful outcome, including the organization's support, the availability of highly skilled Basic Life Support Rapid Response Teams (BLS RRTs), early emergency detection, CPR, and prompt defibrillation.

Nurses and Infection Prevention (IP) teams have vital responsibilities in ensuring an efficient response to In-Hospital Cardiac Arrest (IHCA). Based on many studies, CodePRep simulation drills have given learners the capacity to do things themselves, improving their confidence and independence via practical experience (Saqe-Rockoff et al., 2019). Excellent performance in cardiac arrest scenarios is demonstrated by hospitals that allow bedside nurses to practice at the pinnacle of their education and training, underscoring the importance of their participation in rapid response and resuscitation teams (Guetterman et al., 2019).

Consistent instruction on Automated External Defibrillators (AEDs) can greatly aid in achieving the suggested 2-minute timeframe from identification to administering a shock for in-hospital cardiac arrest (IHCA) in Basic Life Support (BLS) teams (Castan et al., 2017). Nurses working in medical-surgical units, similar to the individuals involved in this experiment, have demonstrated a strong interest in engaging in mock code simulations to improve their abilities and enhance their self-assurance (Williams et al., 2016). The identification and prioritization of patients at risk rely on a cooperative mindset, efficient exchange of information, and a sense of assurance within the community, where the input and expertise of each member are highly regarded.

Regular simulated emergency scenarios are crucial in addressing the urgent requirement for medical-surgical nurses to competently execute their duties during cardiac arrests (Williams et al., 2016). Even if the survival rates for in-hospital cardiac arrest (IHCA) remain extremely low, this issue may be addressed and resolved. The notable increase in self-reported BLS self-efficacy following CodePRep highlights the crucial role of regular, practical BLS training for nurses and infection prevention specialists, which might possibly result in the preservation of numerous lives. The aforementioned research studies (AHA, 2020; Saqe-Rockoff et al., 2019; Guetterman et al., 2019; Castan et al., 2017; Williams et al., 2016) emphasize the importance of continuous training and support for healthcare workers in their critical duties of saving lives.

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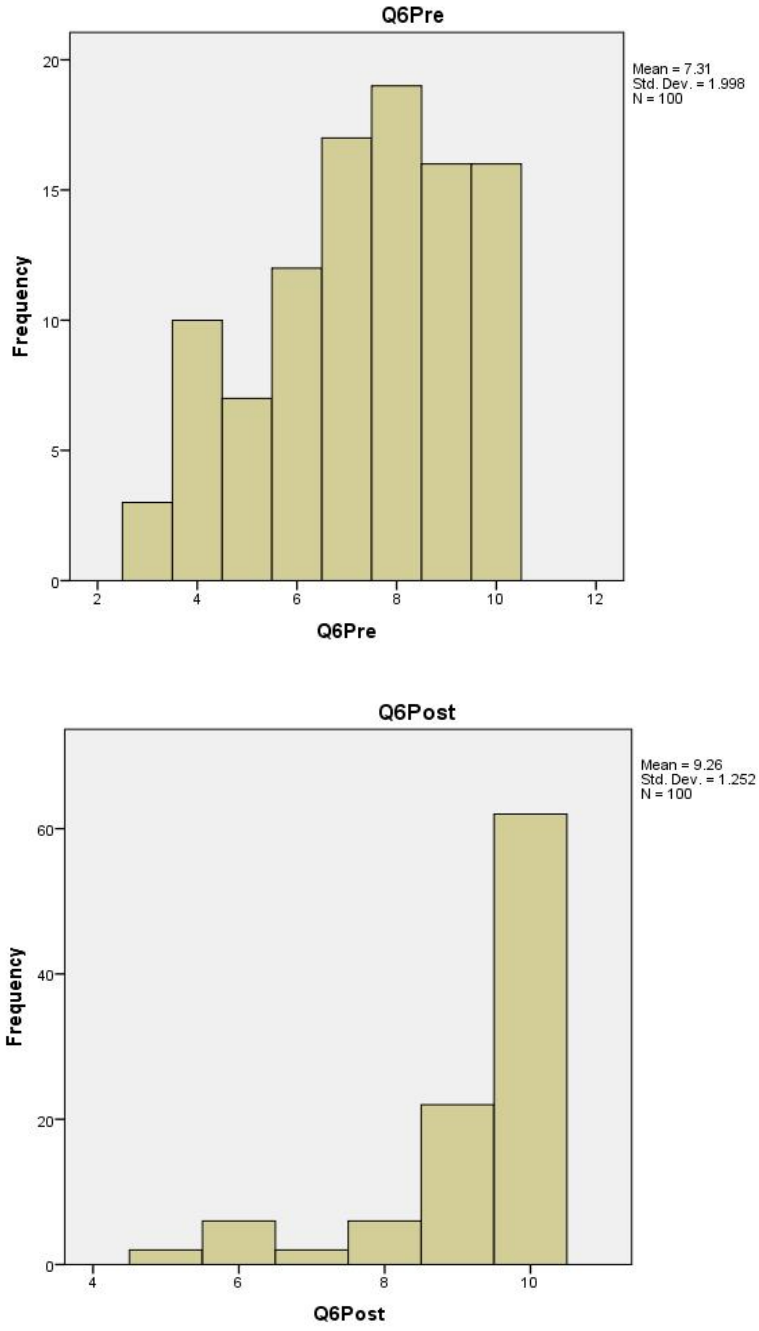
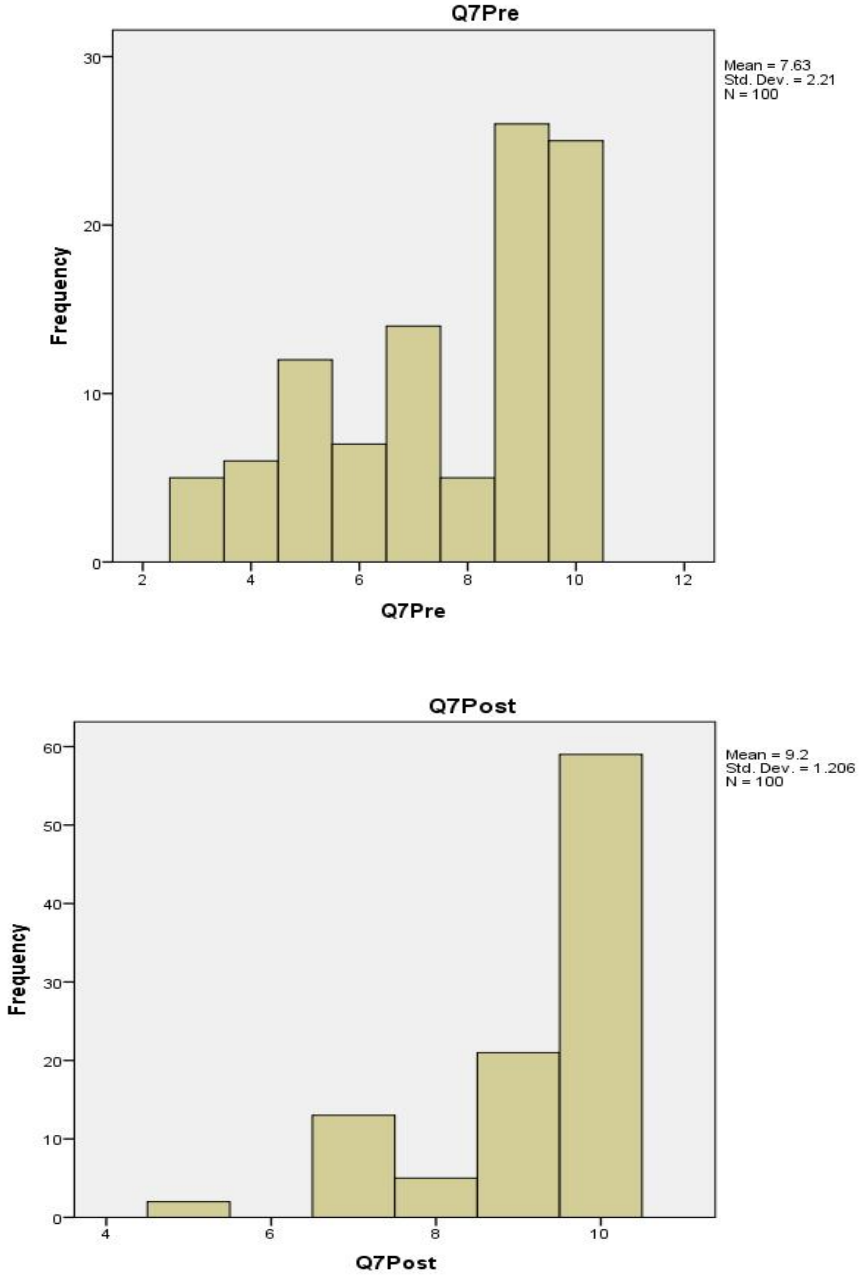
Figures
Figure A



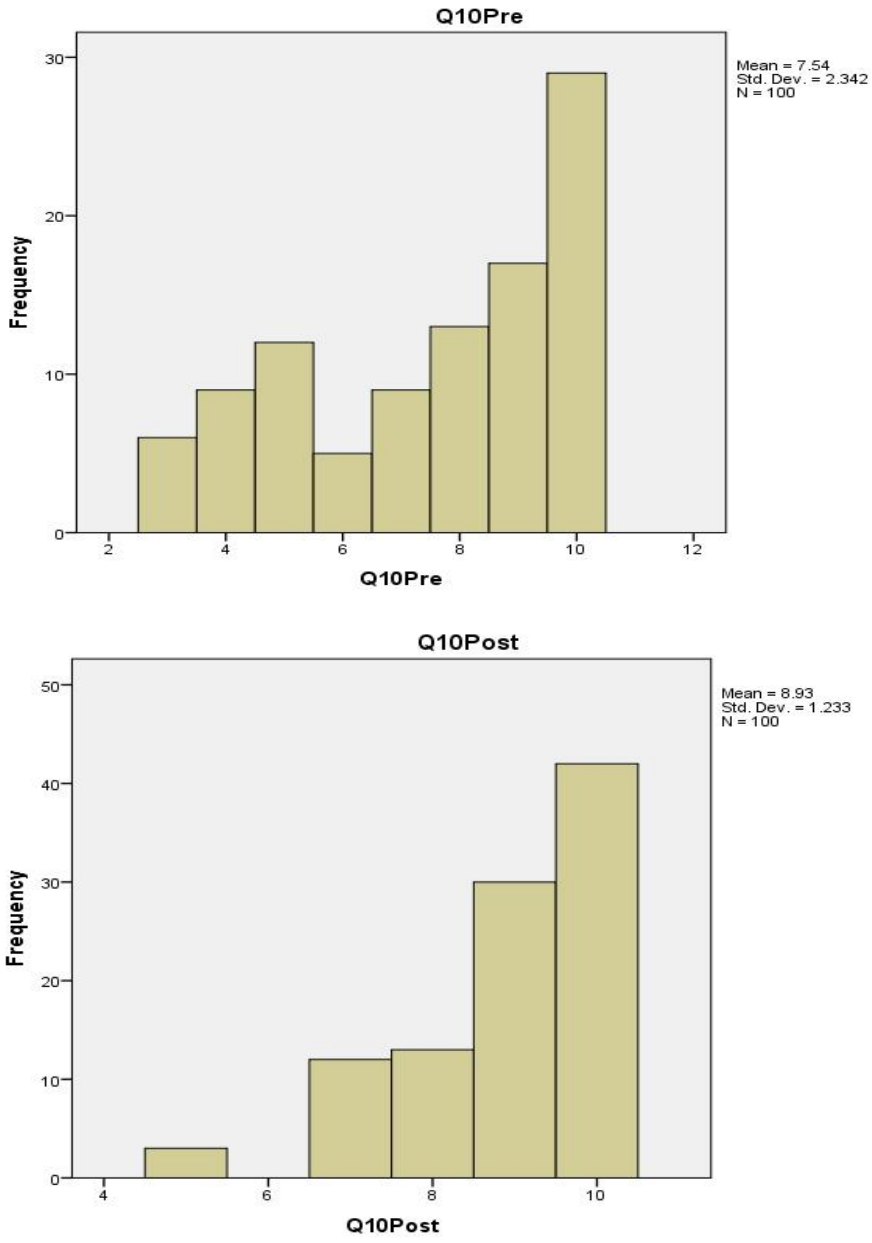
(Figure A) Switch on the AED/defibrillator and start using it as soon as it is available.

Figure B



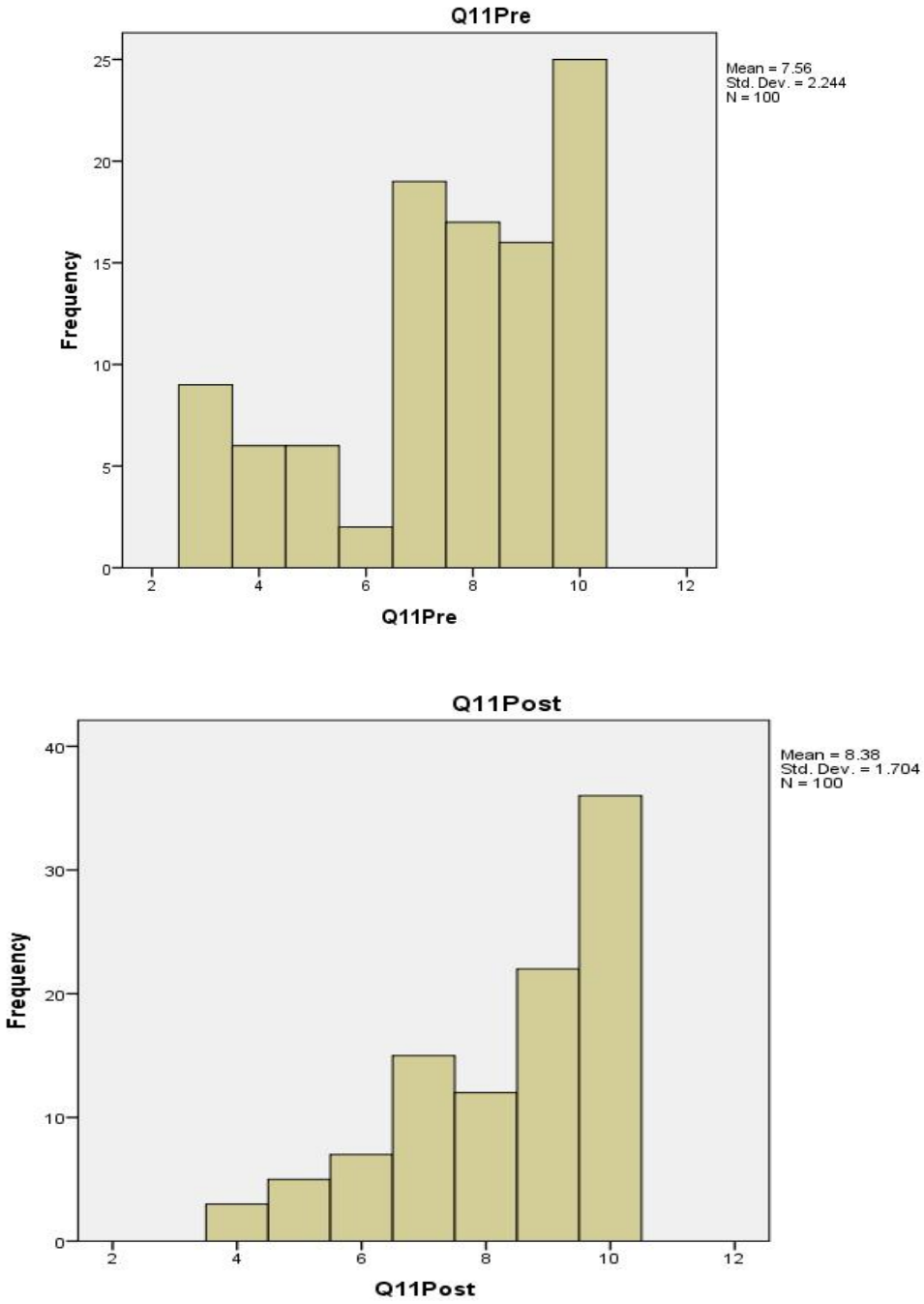
(Figure B) attach the AED pads in the correct positions considering possible contraindications.

Figure C



(Figure C) follow the AED voice prompts correctly

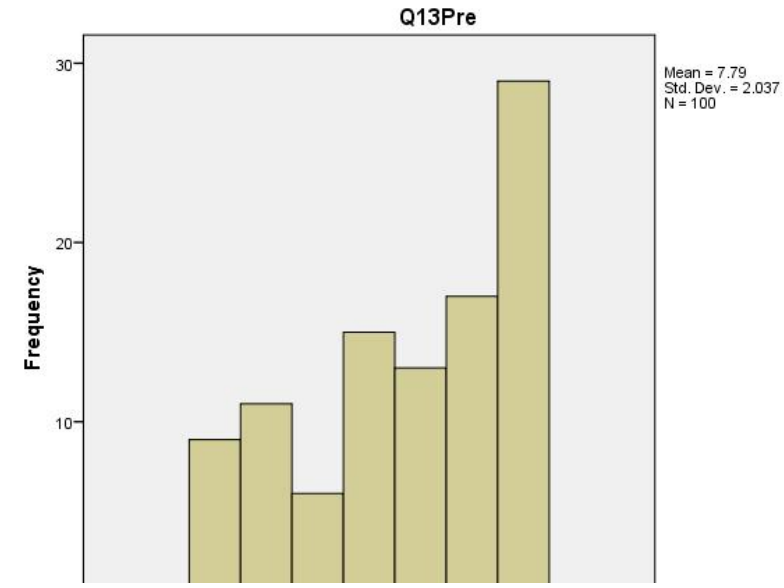
Figure D

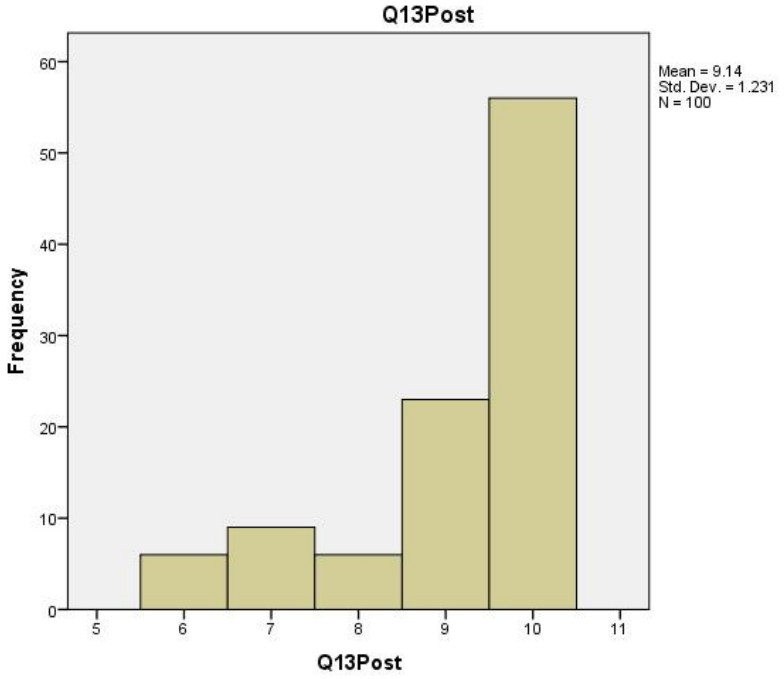


(Figure D) Press the ANALYZE button, ensuring nobody touches the victim while the rhythm is analyzed.

Figure E

(Figure E)





CLEAR the patient and press the SHOCK button when charged and ready.