

Cardiac center at Ha'il cardiac enhancement program for emergency cardiac care: a quasi-experimental study



Original article

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Abstract: Objective: To assess the effectiveness of the created program in enhancing the knowledge of emergency room (ER) nurses in the emergency management of cardiovascular diseases (CVD).

Methods: This study used a quasi-experimental design with a one-group pretest-posttest research design to identify the knowledge and skills of emergency department (ED) nurses in managing CVD. There were 16 participants in this study. The mean, standard deviation (SD), and *t*-test were used to analyze the data.

Results: Before the participants undergo the program, they have a mean (SD) score of 17.63 (5.19). After the completion of the didactic part of the program, they garnered a mean (SD) score of 19.94 (5.22). Moreover, after completion of the practicum part of the program, the mean (SD) score was 21.94 (5.04). Comparing the scores before the program and after finishing the didactic part of the program, the *t*-test scored ($t(15) = -3.87, P = 0.001$). Further, comparing the scores before the program and after finishing the didactic and practicum parts of the program, the *t*-test scored ($t(15) = -5.57, P = 0.001$).

Conclusions: Based on the study's results, the researchers conclude that the respondents had acceptable knowledge regarding the emergency management of CVD before the program. However, the Cardiac Enhancement Program for Emergency Cardiac Care boosted their knowledge. Also, the program is effective in enhancing the participants' knowledge of the emergency management of CVD.

Keywords: cardiovascular disease • cardiovascular nursing • emergency management • enhancement program • Quasi-experimental

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1. Introduction

The Cardiac Enhancement Program for Emergency Cardiac Care is a response of the Ha'il Health Cluster to the problem that the Kingdom is facing. The program hopes to enhance the knowledge of nurses on the frontlines of giving emergency care to patients with cardiovascular diseases (CVD). As the science of cardiac nursing emerged, expectations of care increased among the public, patients, and healthcare professionals. Consequently, considering the challenges around CVD care and management and the burden of keeping up with the healthcare needs of Saudi Arabia's young and growing population, such care is considered a priority.

One of the major causes of death globally is CVD, which accounts for 60% of worldwide deaths. According to the World Health Organization (WHO), there are an estimated 35 million deaths per year.¹ CVDs are particularly prevalent among people between 45 and up, accounting for 7%–10% of all adult hospital admissions. CVDs are a group of disorders of the heart and blood vessels and include coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other conditions. More than 4 out of 5 CVD deaths are due to heart attacks and strokes, and one-third of these deaths occur prematurely in people under 70 years of age.

According to the WHO and Ministry of Health (MOH) Statistical Yearbook, CVDs were the cause of 42% of the Kingdom's non-communicable disease deaths in 2010.^{2,3} With regard to the CVD patients at MOH hospitals, recent reports show that there is a slight improvement in the mortality rate of CVD at MOH hospitals over the period from 2008 to 2010. According to the latest Statistical Yearbook for 1431H, the mortality rate declined from 17.99% to 16.39% and then 16.74% in 2008, 2009, and 2010, respectively.³

Coronary artery disease (CAD) continues to be the world's leading cause of morbidity and mortality. When it comes to CAD management and therapy, nurses are highly effective. Growing evidence-based nursing has been found to be successful in reducing CAD.⁴ For nurses to successfully integrate CVD risk assessment and communication as a regular practice, appropriate training and ongoing feedback from higher healthcare professionals are crucial.⁵

Cardiovascular emergencies are one of the most common and serious emergencies presented to the emergency department (ED). They are detrimental in the sense that the signs and symptoms are seen in a huge spectrum of diseases, where some differentials are so benign that they do not require any further investigation. This study focuses on edifying the knowledge

and skills primarily of ED nurses in order to prevent death cases related to CVD. This study also focuses on enhancing nurses' knowledge and skills related to emergency management of cardiovascular patients as well as prevention by describing the spectrum of cardiac diseases that will provide for immediate medical care and maximum chance of survival to patients with cardiac emergencies by improving the nurse's outcome that has a high impact on patient's lifestyle with low-cost which aligned with Saudi Arabia Vision 2030 "Offering a fulfilling and healthy life." Hence, this study was conducted.

This research aims to assess the effectiveness of the created program in enhancing the knowledge of emergency staff nurses in the emergency management of CVD. This study will specifically answer the following questions:

1. What is the level of knowledge of the emergency staff nurses in the treatment of CVD:
 - a. Before undergoing the program;
 - b. After undergoing the didactic part of the program; and
 - c. After undergoing the didactic and practicum part of the program?
2. Is the formulated program effective in enhancing the level of knowledge of emergency staff nurses in the emergency management of CVD?
3. What is the satisfaction rate of the program?
4. Is there a significant difference between the satisfaction rate of the didactic and practicum part of the program?

The program has no significant effect in enhancing the level of knowledge of emergency staff nurses in the emergency management of CVD.

2. Methods

2.1. Research design

The study uses a quasi-experimental one-group pretest-posttest research design to identify the knowledge and skills in the management of CVD of the nurses working in the ED.

2.2. Procedure

2.2.1. Conception of the program

The Director of Nursing at the Cardiac Center Ha'il (CCH) had the concept for a continuing professional development project that would enhance the role of nurses in the emergency management of CVD. The

Cardiac Initiative Program Committee was established before the launch of the program. The Vice President for Nursing (Ha'il Health Cluster), Head of Academic Affairs and Training Department (AATD), AATD Supervisors, Director of Nursing at CCH, Program Coordinator for CCH, Continuing Nursing Education Department (CNE) Supervisor for CCH, and Clinical Instructor are all members of the committee. A meeting was convened prior to the commencement of the program to highlight concept consideration, brainstorming, and discussions. Before finalizing the program, the committee had several deliberations. Finally, it was determined that the ED staff nurses from the city and peripheral hospitals affiliated with the Ha'il Health Cluster would take part in the initiative.

The Director of Nursing at CCH developed a cardiac initiative program, which consists of 2 didactic days and 8 practicum days, and proposed it to the AATD in Nursing Executive Administration-Ha'il Health Cluster. Moreover, the program's curriculum, which includes the concepts, scenarios, workshop, and on-site practicum, was also designed by the Program Coordinator, CCH's CNE Supervisor, and Clinical Instructor. Additionally, the Head of AATD and Supervisors checked and reviewed the training program's content. Lastly, the Vice President of the Nursing-Ha'il Health Cluster approved the training curriculum.

2.2.2. Description of the program

The program, which includes both theoretical and practical skills, was facilitated by the Cardiac Center at Ha'il with the assistance of the Ha'il Health Cluster. Topics covered on the first day of didactic parts include the cardiovascular system, pulmonary and systemic circulation of the heart, cardiovascular assessment, pathophysiology of the cardiovascular, interpretation of laboratory and diagnostic findings, medical and nursing management of CAD, ischemic heart disease, acute coronary syndrome, heart failure, pulmonary edema, dilated cardiomyopathy. Meanwhile, ECG leads and placement, basic Electrocardiogram (ECG) and interpretation, medical and nursing management for arrhythmias (atrial & ventricular), antidysrhythmic medications & inotropes, antithrombotic medications (antiplatelets, anticoagulants, and thrombolytics), vasodilators, blood viscosity reducing agents and antihyperlipidemic medications, nursing responsibilities during the administration of cardiac medications were discussed in second day of didactic part. In addition, the workshop, pretest, and posttest were also carried out during these 2 d.

Participants were divided into 4 groups and rotated in 4 areas within the Cardiac Center at Ha'il particularly the Coronary Care Unit (CCU), Cardiac Ward

(CW), Day Catheterization Unit (DCU), and Cardiac Outpatient Department (OPD). Participants were in an 8-h morning shift during their clinical practicum for 8 d and were exposed to cases recognizing critical ECG changes including arrhythmias (atrial & ventricular), medical & nursing management of patients with myocardial infarction and with arrhythmia, administration & nursing responsibility during thrombolytic therapy. In the CW, cases are the medical and nursing management of patients with pulmonary edema, ischemic heart disease, acute coronary syndrome, and heart failure. Furthermore, the expected case in DCU was basic cardiac monitoring while OPD were completing 12 lead ECG, stress test, assisting in holter monitoring & echocardiography.

The 10-d course was divided between didactic instruction for the first 2 d and clinical practicum for the remaining 8 d. The program was started on 13 February 2023, up to 24 February 2023. Over the course of the 8 d, participants spent 2 d in each location under the supervision of their preceptors. Each participant received a thorough and precise evaluation at the end of his or her time in a particular area.

2.2.3. Tools for data collection

A questionnaire was used to collect data from participants as a primary source of data. The questionnaire can determine the level of participants' knowledge. It is composed of two parts. While Part I covers the profile of the participants, Part II covers the measures to assess the knowledge of the participants.

2.2.4. Construction

A set of multiple-choice questions was based on the topic covered during the course program, specifically during the 2 d of didactics. The pre-test contains the same 30 questions as the post-test to assess the program's effectiveness, comprises all of the topics covered in both the didactic and practicum sections, emphasizing common ECG arrhythmias and their management during emergencies.⁶⁻¹⁹

2.2.5. Tool validation

Each of the 5 experts—the Deputy Director of Nursing, the Head Nurse, and Supervisor of the CCU, and the Head Nurse and Supervisor of the ED—was provided with a questionnaire to determine the instrument's face validity and a tool to assess its content validity. The face validity scored 4.35, which indicates that the face validity is highly valid. Further, Item-Content Validity Index (I-CVI) and Scale-Content Validity Index (S-CVI) scored

0.96 and 0.80 respectively, which also indicates that the tool is highly valid. Furthermore, one of the variables was omitted because it did not pass the needed score.

2.2.6. Reliability tool

After accomplishing the necessary changes in the tool, the researchers proceeded to the pilot test. Thirty staff nurses from several city hospitals were subjected to the reliability test as part of the Ha'il Health Cluster. Twenty six of them are female staff nurses while the remaining 4 are males. In addition, 14 staff nurses who participated in the pilot study were in the age group of 26–35 years old, while the 18–25 years old age group and 36–46 years old age group had 8 staff nurses respectively. Cronbach's alpha scored 0.86, which indicates that the tool is highly reliable.

2.3. Implementation of the program

The 10-d program for 16 emergency room (ER) nurses includes didactics as well as clinical practicum. The first 2 d were the didactic period, held in King Salman Specialist Auditorium and facilitated by the Health Cluster AATD Supervisor, the CCH Continuing Education Department, and the CCH Preceptors. A constructive teaching style and positive environment are encouraged within the program to enhance trainees' learning experiences and improve their retention of information. The program's teaching and learning methodology includes interactive lectures and discussions, computer-assisted interactive instructional programs, group discussions of case studies, quizzes, and case scenario presentations. A pretest before the start of the didactic period and a posttest after the end of the 2 d' didactic period were conducted.

Meanwhile, the remaining 8 d of the program were allotted to clinical practicum. Trainees were divided into 4 groups and rotated for 2 d in 4 departments of the CCH, particularly the CCU, CW, Day Catheterization Unit, and Cardiac OPD. Each area has a designated Preceptor and a set of clinical practicum evaluations and performance evaluations are given to each trainee. The Health Cluster Academic Affairs and Training Department Supervisor, CCH Nursing Director, and Nursing Education Department constantly monitored the trainees' performance. Finally, the last day also featured the program's final exam, which consisted of 30 multiple-choice questions.

2.3.1. Participants of the study

Given that this initiative is in its pilot phase, the researchers have devised a plan to first involve nurses

located in the vicinity of Ha'il City who lack prior training in emergency cardiac care. The selection criteria for these nurses will not be influenced by factors such as age, job experience, or gender. Nurses who are not allocated to the ER and who are not employed in government institutions have been excluded from this study.

The researchers commence by doing power analysis to determine the appropriate sample size, employing a study group vs population model. The statistical parameters considered in this study were the known population proportion of ER nurses, which was set at 20%. The study group, representing the sample, was determined to be 60% of the total population. The significance level, denoted as alpha, was set at 0.01, indicating a low probability of Type I error. The power of the study, representing the ability to detect a true effect, was set at 95%. Finally, the initial final number of participants in the study was determined to be 21. The participants of this study consisted of nurses employed in EDs at city hospitals within the Ha'il Health Cluster. Each hospital selected 1–3 participants, based on their particular hospital's criteria, from a total of 8 city hospitals.

Upon careful examination of the pretest's normality and homogeneity, it was observed that there were 5 respondents who obtained exceptionally high scores. Consequently, these individuals were deemed ineligible for inclusion in the study. Therefore, a minimization approach was employed by the researchers to adjust the power to 90%. As a result, the final sample size consisted of 16 respondents.

2.3.2. Setting of the study

The research was conducted in CCH, Ha'il Region, Kingdom of Saudi Arabia, and focuses on an area where usual nursing cardiac procedures were observed. Clinical areas include the CCU, CW, DCU, and Cardiac OPD.

2.3.3. Ethics and human subject protection

This study was granted ethical approval by the Ha'il Health Cluster Institutional Review Board with approval number KACS, KSA: H-08-L-074. All ethical considerations under the Declaration of Helsinki were followed. Confidentiality and anonymity of participants were guaranteed. All potential risks were identified for the participants. An explanatory statement was attached to each questionnaire to identify the purpose of the study. As well, participants' rights were explained as they have the right to withdraw from a study at any time.

2.4. Tools for data analysis

The data was collected through Google Forms and was arranged using Microsoft Excel. The data was processed using Statistical Packages for Social Science (SPSS) version 25 (IBM Corporation, Armonk, New York, United States).

To answer problem number 1, mean and standard deviation (SD) was used. Below is the description of the mean score: 1.00–6.00: Very Poor; 6.01–12.00: Poor; 12.01–18.00: Satisfactory; 18.01–24.00: Very Satisfactory; 24.01–30.00: Excellent.

To answer problem numbers 2 and 4, a paired *t*-test was utilized. Further, to check the effect size Cohen's *d* was applied.

To answer question number 3, mean and SD will be used. Below is the description of the mean score.

0.00–1.00: Poor; 1.01–2.00: Satisfactory; 2.01–3.00: Very Satisfactory; 3.01–4.00: Excellent.

3. Results

Table 1 shows the mean test scores of the respondents. Before the participants undergo the program they have a mean (SD) score of 17.63 (5.19), which means they have a satisfactory level of knowledge. After the completion of the didactic part of the program, they garnered a mean (SD) score of 19.94 (5.22) which means they have a very satisfactory level of knowledge. Moreover, after completion of the practicum part of the program, the mean (SD) scored 21.94 (5.04), which indicates that they have a very satisfactory level of knowledge.

Type of test	Mean	±SD
Pre-didactic	17.63	5.19
Post didactic	19.94	5.22
Post didactic and practicum	21.94	5.04

Note: SD, standard deviation.

Table 1. The mean test scores of the subject during the study (N = 16).

Type of comparison	<i>t</i> -score	df	<i>P</i> -value	Effect size
Pre-didactic				
Post didactic	–3.87	15	0.001	0.44
Pre-didactic				
Post didactic and practicum	–5.57	15	<0.001	0.84
Post didactic				
Post didactic and practicum	–1.80	15	0.09	Not applicable

Table 2. The comparison of test scores of the participant during the study (N = 16).

Table 2 shows the comparison between the test scores of the participants during the program. To examine the effectiveness of the program a Paired *t*-test was performed at 0.01 alpha level.

Comparing the scores before the program and after finishing the didactic part of the program, *t*-test scored ($t(15) = -3.87$, $P = 0.001$); therefore, the null hypothesis was rejected. It means that there is a significant improvement in the level of knowledge of the respondents. Further Cohen's *d* revealed a score of 0.44, which indicates that there is a small improvement after undergoing the didactic program.

Further, comparing the scores before the program and after finishing the didactic and practicum part of the program, the *t*-test scored ($t(15) = -5.57$, $P = < 0.001$), this means that there is a significant improvement in the level of knowledge of the respondents. Which indicates that there is a large improvement after undergoing the whole program.

Furthermore, comparing the scores after completing the didactic and after finishing the didactic and practicum part of the program, the *t*-test scored ($t(15) = -1.80$, $P = 0.09$), this means that the level of knowledge of the participants is relatively the same after completing the didactic part only and completing the whole program.

Table 3 displays the satisfaction rate of the participants. It shows that throughout the program the participants rated the program excellent with mean SD scores for day 1, day 2, total didactic and practicum ($M = 3.61$, $SD = 0.55$), ($M = 3.68$, $SD = 0.68$), ($M = 3.65$, $SD = 0.39$), ($M = 3.84$, $SD = 0.36$) respectively.

Table 4 shows the satisfaction rate of the program. A paired *t*-test showed that there is no significant difference between the two components of the program with a *t*-test score of $t(15) = -1.40$, $P = 0.18$.

Component	Mean	SD
Didactic day 1	3.61	0.55
Didactic day 2	3.68	0.68
Total didactic	3.65	0.39
Practicum	3.84	0.36

Note: SD, standard deviation.

Table 3. The satisfaction rate of the program by the participants (N = 16).

Type of comparison	<i>t</i> -score	df	<i>P</i> -value
Didactic			
Practicum	–1.40	15	0.18

Table 4. Difference between the satisfaction rate of the program (N = 16).

4. Discussion

Educational programs are essential to increase first responder knowledge in the management of CVD. This is to provide structured and targeted training on the field's latest developments and best practices. According to Hayman et al.,¹⁸ 12 million nurses form the largest healthcare discipline managing CVD risk factors and chronic disease globally. The American Heart Association (AHA) and the WHO recognize the key role that nurses and other team members play in supporting the goal to reduce death and disability from CVD by 25% in 2025.¹⁹

The program was facilitated by the Cardiac Center at Ha'il with the aid of Ha'il Health Cluster which is a unique program that comprises both theoretical and practical skills. The curriculum program included training and evaluation at the conclusion for 16 emergency staff nurses working in city hospitals under the Ha'il Health Cluster. This study adopted a quasi-experimental one-group pretest-posttest research design to determine the knowledge and skills of the nurses working in the ED in the management of cardiovascular illness.

The program can be considered successful because of its incorporation of certain essential components. These components include well-defined learning objectives, a thoughtfully designed curriculum, captivating content, knowledgeable instructors or facilitators, comprehensive assessment and feedback mechanisms, and seamless integration of technology. Together, these factors contribute to the creation of a vibrant and efficient learning environment. One minor issue encountered during the implementation phase was the prompt initiation of the program. Nevertheless, this challenge had been foreseen, allowing for a seamless adjustment. Regarding the implementation, the program was implemented properly from beginning to end.

With respect to data collection and analysis, the data were collected electronically to minimize human error and enhance precision. Moreover, before the data analysis proper, the data was checked and verified by 3 members of the research team to eliminate errors in scoring; this measure is also applied to avoid potential bias.

Regarding question number 1, there is a progression in the level of knowledge of the participants. The comprehension of knowledge utilization in routine nursing practice holds significance in enhancing educational preparation and healthcare quality. The utilization of knowledge is intricately linked to an individual's capacity to actively engage with and evaluate specific circumstances, as well as their proficiency in integrating experiential insights within their preexisting framework of knowledge. Nurses have the opportunity to enhance

their clinical knowledge through the active pursuit of up-to-date research results and the adoption of best practices. This phenomenon enhances individuals' self-assurance in delivering healthcare services and enables them to more effectively acclimate to unusual situations and obstacles.²⁰

Regarding question number 2, the result shows in Table 2 that there is a significant improvement in the level of knowledge of staff nurses working in the ED. Hence, the null hypothesis was rejected. The finding is similar to the study of Kavita et al.⁵ The current study revealed that, compared to the beginning of the program, nurses have very satisfactory performance after receiving adequate lectures and guided clinical practice which is needed in dealing with patients with CVD.²¹ Moreover, nursing enhancement programs ought to incorporate instructional methods of superior quality that are grounded in the most reliable and current scientific data, to enhance the overall quality of learning and the overall experience of students, which is the intention of this study.

With respect to questions number 3 and 4, evaluating the satisfaction of an educational program is also important to determine its effectiveness and make necessary changes to improve it. As seen in Table 3, the participants rated the didactic and practicum as excellent, and as seen in Table 4, the two parts of the program have the same rating. Feedback from participants will provide valuable insight into the strengths and weaknesses of the program and help us continue to meet the needs of emergency response nurses and the patients they serve.²²

4.1. Limitations of the study

The study is concurrent with the initial implementation of the program. The researchers are aware that the number of participants is small. However, using the power analysis it was thoroughly discussed that the participants number is enough to make an analysis. With this predicament, the researchers strongly recommend conducting a wider study involving a larger number of participants to validate the results of this study and could add additional statistics like regression to predict the effectiveness of the program.

4.2. Clinical significance

The nobility of this study is the creation of a tailored-fit program for nurses in the ER that enhances their knowledge in taking care of patients with emergency cardiac care. Further, this study has proven that the Cardiac Center at Ha'il Cardiac Enhancement Program for Emergency Cardiac Care is a meticulously organized and flexible endeavor that caters to distinct learning

requirements, offers a variety of learning opportunities, and encourages ongoing progress. This program provides participants with the requisite information and skills essential for both personal and professional development, ensuring their continued competitiveness and relevance in taking care of patients with cardiac problems. The program could be shared with other nurses that need the same program, and it is available upon a reasonable request to the corresponding author.

Furthermore, it is imperative to augment the knowledge of nurses who are responsible for the care of patients with cardiac ailments in order to ensure the delivery of care that is safe, efficient, and centered around the needs of the patient. The implementation of this intervention yields advantages not only for individual patients but also for the general enhancement of health-care provision in cardiac units, leading to improved outcomes for patients diagnosed with heart problems. Moreover, the researchers tend to endorse the findings of this study to policy makers in the Ha'il Region for consideration of implementing the program in regular basis.

5. Conclusions

In light of the results of the study, the researchers conclude that, before the program, the respondents had

acceptable knowledge regarding the emergency management of CVD. However, the Cardiac Enhancement Program for Emergency Cardiac Care boosted their knowledge. Also, the program is effective in enhancing the knowledge of the participants in the emergency management of CVD. Lastly, by participating in cardiac initiative programs, emergency nurses can update and improve their knowledge and skills in managing CVD, which may lead to better outcomes and patient satisfaction.

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Ethical approval

This study was granted ethical approval by the Ha'il Health Cluster Institutional Review Board with approval number KACS, KSA: H-08-L-074.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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