The Impact of Basic Life Support Training on Nursing Students' Knowledge and Practice: A Non-Randomized Experimental Study

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ABSTRACT

Background: A heart attack is an abrupt stop to the heart's functioning because the heart is unable to pump blood adequately. An estimated 15-20% of deaths worldwide are attributed to heart attacks, a serious health issue, numerous studies shown that during cardiopulmonary resuscitation, a crucial component is Basic Life Support (BLS), the rate of cardiac arrest survival drops by 5–10% for every minute because of (BLS). Objective: The research aim was to assess the impact of BLS training on nursing students' knowledge and practice. Methods: A Quasi-experimental pre and post-test single group research study design was used at a public sector female college of nursing from February to May, 2024. The data was gathered from 66, Bachelor of Science in Nursing (BSN), 1st year students by means of, a self-structured and validated BLS questionnaire through a convenient sampling technique. All the female students other than 1st year (BSN) were excluded from the study. The participant's knowledge had assessed before and after the training of BLS. The data was analyzed by using SPSS Software version 16.0. Results: The mean ±S.D scores of BLS knowledge before training was 9.7±3.4 (C.I:8.9, 10.6). After BLS training the mean ±S.D scores statistically significantly has improved to 13.4 ± 4.2, (C.I: 12.4, 14.4), (<0.001). Conclusion: The research found that BLS training enhanced nursing students' knowledge and practice in BLS techniques. Regular practical BLS training is essential for nurses to become proficient in dealing cardiac emergencies and providing high quality patient care.

INTRODUCTION

A heart attack is an abrupt stop to the heart's functioning because the heart is unable to adequately pump blood (1). In order to preserve people's lives and prevent irreversible harm to important organs, heart attacks require immediate medical attention. Heart disease is the leading cause of death, according to the American Heart Association (AHA). In 2015, it was responsible for over 17.9 million deaths annually; by 2030, that number is expected to rise to over 23.6 million (2, 3). An estimated 15-20% of deaths worldwide are attributed to heart attacks, a serious health issue, Numerous studies shown that during cardiopulmonary resuscitation, a crucial component is Basic Life Support (BLS), the rate of cardiac arrest survival drops by 5–10% for every minute (4). Since the fact that nurses spend more time with patients than other medical professions (5, 6). Nurses' familiarity with and application of BLS techniques guarantee that patients survive for an adequate amount of time. BLS training and appropriate execution of the procedures allow nurses to efficiently perform CPR on patients, which is crucial in saving lives (7, 8). It has been shown that performing CPR can really twice or thrice a victim's chances of surviving a unexpected cardiac arrest (9). Thus, increasing survival rates and results depends on the effective application of BLS. Thus, it follows that health care professionals' familiarity with BLS is equally crucial. Nonetheless, health care providers' attitudes and levels of expertise differ throughout the world (10, 11). Although the need for BLS courses is still growing in wealthy nations, BLS training is not regularly provided in underdeveloped and developing nations (12). Research and improvements in care have focused on improving CPR through the use of early CPR with an emphasis on high-quality chest compressions, early defibrillation, basic and advanced life support, post-cardiac arrest care, and recovery (13). Recognizing circumstances such a heart attack, sudden cardiac arrest, foreign-body airway obstruction, or stroke and administering CPR and automated external defibrillation (defibrillator) are the components of BLS (14). The provision of modern skills and instruction in BLS performances is crucial for nursing students' professional growth and their ability to fulfill roles in practice and education (15). Health workers, especially all Registered Nurses including Nursing Interns and student nurses and should have training in BLS. A vital part of the healthcare system are nurses(16). Every hospital needs to provide adequate facilities for nurses to refresh their BLS knowledge, abilities, and training (17, 18). The rate of traumas and medical emergencies are at increase so Nurses must have updated and adequate knowledge regarding BLS (19). Following cardiac arrest, basic life support, or BLS, is essential for saving lives. Prompt identification of sudden cardiac arrest, emergency response system activation, early chest compressions and breaths, and rapid defibrillation with an automated external defibrillator are all essential components of BLS (20). The current study's main objective was to assess the practical abilities and knowledge of student nurses who had undergone BLS training.

METHODOLOGY

STUDY DESIGN

A Quasi-experimental pretest and post-test single group research study design was used. The research has been done in a female public sector nursing college from February to May 2024. The objective of this research was to assess the impact of BLS training on nursing students' knowledge and practice.

SAMPLE SIZE AND STUDY PARTICIPANTS

The method of convenient sampling was used to choose study participants. In order to calculate the sample size, G* Power version 3.1.9 was utilized. A prior study (11) was taken into

consideration, and utilizing a value of 0.05 with 95% power, the minimal determined sample size was 63. As availability of the students and considering the possibility of dropout the sample size was increased by adding 20% attritions. The calculated sample size was 77. The study has been conducted at a public sector school of nursing, all the study subjects were female. All the participants enrolled in first year of Bachelors of Science in Nursing were included in the study while all the students of others discipline in nursing were excluded from the research.

ETHICAL CONSIDERATION

Approval to perform the research were obtained from the ethical committee. The management of the nursing school gave institutional permission. The students were given an explanation by the researchers regarding the objective and methodology of the current study. In print informed consent was provided to the study participants. The surveys have to be filled out and returned by the participants. Their privacy was assured. Tool permission had been taken from the author who used this tool in a private nursing school on same population.

DATA COLLECTION PROCEDURE

A self-designed structured questionnaire was established based on a review of literature and opinion by expert researchers. It is composed of 3 main domains (Students Information, Adult Basic Life Support Knowledge and practical BLS Observation Worksheet).

STUDY TOOL VALIDATION

To assess the content validity index (CVI) three well subject expert reviewed the study questionnaire producing a CVI of 0.89. The tool's ease of use and practicality were demonstrated by the pilot research and modifications were made according to the feedback. Internal consistency was evaluated by using cronbach's alpha resulting 0.88 for the study tool. Three evaluation forms were employed to gather information.

STUDENTS INFORMATION

Questionings concerning age, gender, marital status, first aid training received before beginning nursing school, and firsthand experience with basic life support procedures are all included.

ADULT BASIC LIFE SUPPORT KNOWLEDGE QUESTIONNAIRE

35 questions on BLS knowledge and practice, main and secondary patient/injured evaluation, calling the medical facility, scene-related precautions, critical healthcare professionals, and criteria for completing early response intermediations were included in this form. Ten true/false questions and five multiple-choice items made up the BLS Knowledge tool.

One point was awarded for a correct response, and zero for a wrong response. There was a minimum score of 0 and a maximum score of 35 on the questionnaire. Better understanding of fundamental life support techniques was reflected by higher knowledge questionnaire scores.

BLS OBSERVATION WORKSHEET

There were 14 steps on this checklist that dealt with standard life support procedures. The researcher completed the checklist, which includes three Likert-type response categories. The administrator marks basic life support practice stages as "sufficient," "partially sufficient," or "insufficient." One point is awarded for a "sufficient" response, two for a "partially sufficient" response, and three for an "insufficient" response. There is a minimum of 14 and a maximum of 42 points. Lower scores signify superior knowledge of fundamental life support techniques.

PROCEDURE

The study objective was explained to the study participants. The study sample consisted of first-year female students who fulfilled the inclusion criteria. The study sample comprised 66

nursing students in total. Every participant provided a written, informed consent.

To deliver training that is more effective, all the 66 study subjects were divided into two groups and both academic as well as skills sessions were given by the same instructor in order to prevent bias. The determined sample size was 77 as attrition 20% were added and dropout rate was considered and 11 out of 77 students had not been able to attend training.

PRE-TEST ASSESSMENT

A questionnaire on adult basic life support knowledge was given to the students to complete.

PRE-OBSERVATION

Prior to entering the BLS program, each student was required to perform each step of basic life support in the correct order. Using an adult BLS observation checklist, the trainer evaluated the students' practical skills as they demonstrated each phase of basic life support practice on a model.

TRAINING

The researchers created the BLS curriculum. Teaching in BLS comprised both theoretical and practical elements.

A. THEORETICAL TRAINING

The 120-minute academic physical activity session was completed. In the first section, lectures and discussions were the mode of instruction. There were three categories created from the student sample.

B. PRACTICAL TRAINING

Practical instruction in BLS was covered in the physical activity second session. The trainer ran through each stage of BLS procedures within the framework of the hands-on training program.

Following that, each student was required to carry out each step of BLS in the correct order. The hands-on instruction was repeated until the trainees were proficient in all phases of basic life support.

C. POSTTEST REFLECTION

All the 66 respondents of the research were requested to fill the questionnaire after the training program, complete the adult BLS knowledge questionnaire a second time. The adult BLS knowledge questionnaire was finished no later than two weeks, and no later than four weeks, following the training.

POST OBSERVATION

Once the physical activity period was over, every participant was required to practice all BLS skills on a model and execute each step appropriately. Using an adult BLS observation checklist, instructor evaluated the students' practice skills as they demonstrated each phase of BLS on a manikin.

STATISTICAL ANALYSIS

Statistical analysis were carried out by using SPSS (Statistical package of social science) version 16.0 Software pre and post-test assessment score were compared by using paired t test.

RESULTS

Table 1: Baseline Characteristics of Participants

Table 1 Display the demographic characteristics of the study respondents 47 (71.2) participants belonged to 1st semester, 19 (28.8) participants belonged to 2nd semester of BS nursing, 63 (95.5) aged between 20 to 30 years and 3(4.5) aged between 30 to 40 years. 5(7.6) of the participants were married and 61(92.4) of the participants were unmarried 37 (56.1) already known about

CPR, 49 (74.2) source of knowledge regarding CPR was educational sessions.6 (9.1) of the participants were already been trained on CPR.

TABLE 1: BASELINE CHARACTERISTICS OF PARTICIPANTS (N=66)

Characteristics	n (%)
Study Semester	
1st	47 (71.2)
2nd	19 (28.8)
Age	
20-30 year	63 (95.5)
31-40 year	3 (4.5)
Marital Status	
Married	5 (7.6)
Single	61 (92.4)
Do you know something about CPR?	
No	37 (56.1)
Yes	29 (43.9)
What is your Source of CPR?	
Educational Sessions	49 (74.2)
I don't know anything	9 (13.6)
Internet	4 (6.1)
Scientific Books	4 (6.1)
Have you already been trained on CPR	
No	60 (90.9)
Yes	6 (9.1)
If YES, when was your last training completed?	
NO	60 (90.9)
Since month	2 (3.0)
Since year	4 (6.1)
Do you want to learn Basics of Cardiopulmonary Resuscitation?	
No	7 (10.6)
Yes	59 (89.4)
What challenges you face while performing CPR	
Improper skills	22 (33.3)
Insufficient knowledge	29 (43.9)

Lack of resources	14 (21.2)
Uncooperative health care team	1 (1.5)

Do you think you can apply heart and lung resuscitation in emergency situations?

No	17 (25.8)
Yes	49 (74.2)

Table 2 showed comparison of mean knowledge scores before and after BLS Training. The mean ±S.D scores of BLS knowledge before training was 9.7±3.4 (C.I:8.9, 10.6).After BLS training the mean ±S.D scores statistically significantly has improved to 13.4 ± 4.2, (C.I: 12.4, 14.4), (<0.001).

TABLE 2: COMPARISON OF MEAN KNOWLEDGE SCORES BEFORE AND AFTER BLS TRAINING

	Mean ± S.D.	95% C.I	t-stat (p-value)
Before	9.7 ± 3.4	(8.9, 10.6)	-6.119 (<0.001)
After	13.4 ± 4.2	(12.4, 14.4)	

Table 3 demonstrated intra group knowledge scores comparison by applying Paired t-test before and after BLS training. Independent T-test applied for comparison of intergroup mean score knowledge. No statistically significance observed after training.

TABLE 3: COMPARISON OF MEAN SCORES WITHIN & BETWEEN BASELINE CHARACTERISTICS

	Before Mean ± SD	After Mean ± SD	t-stat & p-value*
Study Semester			
1st	9.9 ± 3.4	13.8 ± 4.3	t= -5.618, **p <0.001**
2nd	9.2 ± 3.4	12.5 ± 3.8	t= -2.612, **p= 0.01**
t-stat & p-value**	t= 0.79, p=0.43	t=1.185, p= 0.24	
Age			
20-30 year	9.8 ± 3.4	13.4 ± 4.3	t= -5.727, **p <0.001**
31-40 year	7.7 ± 3.2	14.3 ± 1.2	t= -2.857, p= 0.10
t-stat & p-value**	t= 1.086, p= 0.28	t= -0.385, p= 0.70	
Marital Status			

Married	7.2 ± 2.4	14.2 ± 1.9	t= -3.976, **p= 0.01**
Single	9.9 ± 3.4	13.4 ± 4.3	t= -5.453, **p <0.001**
t-stat & p-value**	t= -1.774, p= 0.08	t= 0.432, p= 0.66	

Have you already been trained on CPR

No	9.8 ± 3.5	13.2± 4.3	t= -.5.224, **p <0.001**
Yes	8.7 ± 2.0	16.0 ± 1.4	t= -6.573, **p <0.001**
t-stat & p-value**	t= 1.171, p= 0.24	t= -1.086, p= 0.28	

* *Paired t-test*
** *Independent t-test*

DISCUSSION

Nursing students' fundamental professional knowledge and abilities are influenced by a variety of elements, including theoretical instruction given to them in nursing school, including clinical observations, laboratory work, hands-on training, and individual experiences. Furthermore, using the most recent teaching techniques and grounding instruction in techniques based on evidence are essential to the success of nursing profession. The purpose of the current study was to assess how BLS training affected nursing students' knowledge and practical abilities. Students' knowledge were assessed by using knowledge form, while skills were examined by using observation form. According to the current study, before the training, the first-year students lacked enough BLS knowledge and practice skills. Given that the sample size consisted solely of first-year students, it was anticipated that the students would lack sufficient BLS knowledge and experience. Researches involving BS nursing students are becoming more and more common. Numerous studies have shown that BS nursing students have inadequate standard of BLS-related familiarity and skills (21). The current study's ability to highlight nursing education is one of its distinctive features. The AHA 2017 edition of CPR recommendations served as the basis for the new knowledge constructed in this study (22). To enhance training efficacy, the sample was split up into smaller groups. According to the research that is currently available, nursing students' comprehension and proficiency of BLS procedures significantly increased after the educational intervention(23). In the present study, students received both theoretical and practical training following primary observations and before the test assessment; theoretical knowledge assessment were done again. (post-test) at least two weeks and up to four weeks after theoretical training; Adult BLS Knowledge scores before and after training showed a substantial difference.. In the literature it is reported that training delivered to small group showed extra constructive effects on the BS nursing learners knowledge (24). According to other studies, nursing students' skills in BLS practice improved after completing BLS training (25). The BLS practice evaluation results from pre and posttest adult BLS training were compared in this study. Knowledge and practical competence scores were greater following basic life support training than they were before (26). Following theoretical instruction, a cardiopulmonary resuscitation model was used to show the students

the BLS procedures. Following that, the students were instructed to practice the cardiopulmonary resuscitation model's BLS stages sequentially. Similarly a study suggest that for efficient team trainings without requiring more training time, training techniques that create mutual psychological models of group fellows could be taken into consideration (27). The married participants in this study significantly higher scored than single. Dissimilarly in a study no association were found among demographic characteristics of the respondent (28). Although the students' percentage values for accurate responses on the knowledge questionnaire were quite high, the results show that there is still room for improvement in some areas of knowledge. It was shown that, in comparison to pre-training scores, post-training evaluation scores increased five times.

GLOBAL IMPLICATION AND RELEVANCE BEYOND PAKISTAN

Although the effectiveness of BLS training among nursing students in Pakistan is the main focus of this study, the conclusions have wider ramifications that go beyond the Pakistani setting. BLS is an internationally recognized intervention that is utilized in a variety of contexts, including as areas impacted by public health emergencies, natural disasters, and conflicts. Since the BLS model, on which this study is based, is based on ideas that can be modified to fit different cultural and medical contexts, the results are applicable in comparable settings.

CONCLUSION

According to our examination of the data, nursing students who received BLS training had much higher levels of CPR knowledge, which improved their abilities and disposition. BLS training has the ability to lessen the demand on specialist healthcare services and encourage a culture of prevention in emergency medicine. We can increase healthcare personnel' ability to handle emergencies more skillfully by supporting the inclusion of BLS in national policy and working with health authorities to expand training initiatives. Incorporating BLS into school curricula may also help younger generations become more resilient and prepared. These results underline the need for more investigation into the variables linked to the success of BLS training sessions and a deeper comprehension of how the variables under study differ among demographic data. The development of a more capable and resilient healthcare staff that can meet the increasing needs of emergency healthcare can ultimately be greatly aided by funding BLS training.

STRENGTH AND LIMITATIONS

The results have greater external validity because the study was carried out in a real-world environment. The BLS training increased significantly the students' knowledge and skills. The fact that the study was only carried out at one university may have limited how broadly the results may be applied. When analyzing the results, it is important to take into account the low response rate in both the pre-test and post-test (despite frequent reminders). Survey (this extra time was permitted to meet students' workload for assignments and end-of-semester exams), which may have caused the amount of BLS knowledge gained during this time to decline. Our thorough examination of the literature failed to find a validated instrument for evaluating healthcare professionals' or undergraduate students' BLS knowledge. To create a national method to evaluate BLS practice in accordance with the ARC principles, more study is required. The lack of pertinent studies evaluating the impact of participants' first language on BLS knowledge was discovered throughout the literature analysis, indicating a potential subject for further investigation. Investigating teaching strategies not covered in our study or literature

review is a worthwhile endeavor to improve our comprehension of other successful BLS teaching strategies.

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