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Evaluation of Basic Life Support Training Program Provided for Nurses in A University Hospital

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ABSTRACT

Aims: This study was conducted to assess the efficiency of the basic life support (BLS) training program provided for nurses in a university hospital. To evaluate the efficiency of the BLS training program provided for nurses in a university hospital. Methods: In this a quasi-experimental study, a total of 404 nurses who received BLS training were enrolled. The study was performed in two stages. In stage one, the participant nurses were given a pre-test that consisted of 25 questions, four points each, before the training on the first day of the 2-day BLS training. The post-test was conducted in addition to practical exams on manikins to determine nurses' practice skills on BLS. Results: There was a statistically significant difference between the nurses with previous BLS training and the difference between their pre- and post-test results ($p<0.05$), and high statistically significant difference was found between the nurses with previous advanced life support (ALS) training and the difference between their pre- and post-test results ($p<0.001$). Conclusion: Nurses should receive BLS training in hospitals and the training should be repeated on a regular basis. The BLS training that the nurses received in this study was effective and increased their knowledge level on BLS.

Keywords: Basic life support, basic life support training, nursing educating, nurses

INTRODUCTION

Heart or lung failure unexpectedly puts the lives of many people at risk in the world. According to the data from the World Health Organization (WHO), 17.5 million people worldwide lose their lives because of cardiovascular diseases, specifically, cardiac arrest every year [1].

Basic life support (BLS) is one of the most fundamental components of emergency medical interventions and is defined as "ensuring an open airway and supporting circulation without any equipment in cases of cardiac or respiratory arrest until providing advanced life support." In other words, BLS is maintaining an open airway and providing artificial respiration and blood circulation using only simple airway management equipment (bag mask or face protective masks). The aim of basic life support is to maintain a distribution of oxygen-rich blood through survival organs, especially the brain and heart, through a temporary artificial circulation until normal cardiac activity and breathing are restored [1-3]. The history of basic life support goes back many years. The first studies on the standardization of BLS practices started in America in 1974, and studies on BLS standardization and updates were continued and developed by the European Resuscitation Council (ERC), founded in 1989, which also updated and published guidelines on BLS and ALS practices every five years [4].

Sudden cardiopulmonary arrests in adults outside of a hospital setting occur due to cardiac causes whereas cardiopulmonary arrests in hospitalized patients are usually caused by the underlying disease. It was reported that of the patients who experienced cardiopulmonary arrest in a hospital, approximately 84% had progressively different clinical findings in the last eight hours, and that morbidity and mortality could increase within hospital mostly due to quick diagnosis and flaws in therapeutic approaches. For this reason, the primary approach in preventing cardiopulmonary arrests within a hospital setting is believed to be recognizing the patients that are under risk beforehand and taking care of preparations for their treatment and their early transfer into intensive care unit. The knowledge and skill levels regarding cardiopulmonary resuscitation (CPR) of a healthcare personnel who discovers a patient with a progressive

acute condition or cardiopulmonary arrest are the most important criteria in terms of providing a fast and accurate intervention [5-7].

Basic life support training includes exercises on recognizing cardiopulmonary arrest, acute myocardial infarction, seizure, and foreign body airway obstruction, performing CPR, and using an automated external defibrillator (AED) [3].

The most important factor in the success of basic life support is time management. It is of vital importance to diagnose and start treatment in a timely fashion. In an organism, brain tissues, can only tolerate not receiving oxygen for a few minutes. This time can be longer or shorter depending on the patient's health condition during cardiac arrest. For instance, cerebral damage would occur within a shorter time if the patient had been in a hypoxemic condition previously. If the patient was in a hypothermic condition, the occurrence of cerebral damage would be delayed [4].

Cardiopulmonary arrest is defined as the time when breathing and/or circulation stops suddenly and unexpectedly for some reason. Clinically, an individual shows signs of blackout, absent pulse, and apnoea during the arrest. Circulatory failure that lasts for three or four minutes could cause irreversible cerebral damage. This duration could be shorter if the individual's hypoxemia developed earlier than noticed. Delay in performing basic life support could result in a lower probability of a successful result after BLS [4,8]. On the other hand, there is no evidence to prove that the medications used in ALS reduce mortality and morbidity, whereas immediate and efficient BLS practices after cardiac arrest are reported to reduce mortality and morbidity [9-11].

Nurses are the first people to see cases of cardiac arrest in the clinical setting. Therefore, they should be the first to initiate and perform BLS without losing time. Kavalcı, et al., and Özdoğan, et al. pointed out that it was considered amongst the duties of all healthcare team members to possess BLS knowledge and skills [8,10]. Çelik, et al. stated the nurses (58.1%) working in an emergency department believed themselves to be incompetent about BLS in their study [12]. Thus, nurses especially should be involved in BLS training programs and these training programs should be repeated at certain intervals and updated in line with up-to-date guidelines including the steps of BLS. Additionally, it is equally important to assess the efficiency of the BLS training provided for nurses.

From this viewpoint, this study was conducted to evaluate the efficiency of BLS training provided for the nurses in a university hospital.

METHODS

Purpose and Research Questions

The study was conducted in order to determine whether BLS training for the nurses in Istanbul Medical Faculty Hospital had helped increase the nurses' level of knowledge on BLS.

To evaluate the effects of basic life support education in nurses who work in a university hospital. The research questions were as follows:

• Are there differences between the socio-demographic features and pre- and post-test results of nurses who received basic life support training?

• Are there differences between the nurses' previous BLS and ALS training and results of the pre- and post-test differences?

• Based on the pre- and post-test results, is the BLS training for nurses' effective?

Research Design and Sample

Quasi-experimental with pre-test-post-test design, our study was conducted in one of the largest university hospitals in Istanbul between May 2011 and December 2012. The population of this study consisted of a total of 1146 nurses who work at this hospital, with an inpatient bed capacity of 1043 beds; the sample comprised 404 nurses who received BLS training.

The BLS training provided for the nurses in our hospital takes place in the charge and under the coordination of the BLS committee, which is connected to the Directorate of Nursing Services. The members of the Basic Life Support committee consist of a total of 20 nurses who work in the emergency and intensive care units of the hospital and have acquired BLS instructor certification. The training programs began with the committee members' training and

continued as all the nurses working in our hospital were requested to join at certain intervals. The first one-year trial of BLS training was assessed with the participation of 404 nurses in all 20 training programs.

Basic Life Support Training is a two-day training program, which is supported by regular in-service training and should be completed within no more than three years. Should the nurses that participate in this program receive inadequate results (70 points or lower) in the theory and practice exams of BLS training, they are expected to retake the training. Nurses who succeed in the theory and practice exams are given a BLS certificate of participation, which is valid for three years.

The bi-monthly BLS training programs included 20-25 nurses as per its format. The training hall was arranged in a U-shape. Equipment such as computers, projectors, and blackboards were used during the theory part of the training, and manikins (full-size adult, child, and infant manikins with indicator-less chest compression and respiration, half-size compression manikins with pulse and respiration indicators) were for practical training and assessment. Notes of every topic within the training's content were put together in the BLS course booklet and were given to the participant nurses at the beginning of the training. The aims and objectives, contents of the training (Table 1), compulsory attendance, manner of training assessment, and the score required to successfully complete the training were explained. Immediately afterwards, a multiple-choice pre-test with 25 questions (4 points per correct answer) that was prepared by the instructors was administered to evaluate adult and child BLS knowledge. The second day of the training involved the post-test and practical exam in the afternoon. The nurses were accepted for the practical exam one by one after the instructors quickly evaluated the post-test results. Tables were prepared with manikins associated with adult BLS, adult airway obstruction, paediatric BLS, and paediatric airway obstruction for the practical exam. Specialist instructors were seated at these tables as supervisors for the practice exam. In the practical exam, the nurses took turns visiting all the tables and were asked to demonstrate all the steps of adult BLS, adult airway obstruction, paediatric BLS, and paediatric airway obstruction, and the instructors completed checklists regarding these steps. The mean performance scores obtained by the nurses in each practical test was considered their general practical exam score. The average of the post-test result and practical exam result was the final grade.

Table 1 Basic life support theoretical training program

Education Subject	Education Time
Adult Basic Life Support	1 hour 15 minutes
Automatic External Defibrillator	30 minutes
Adult Airway Obstruction	30 minutes
Preparation for Advanced Life Support (Medicines and Supplies)	45 minutes
Paediatric Basic Life Support	1 hour
Paediatric Airway Obstruction	30 minutes

Ethical Considerations

Essential written permission was obtained from the organization's Ethics Committee (Number: 2011/686-540, 01 April 2011) and Deanery Management Board as well as written consent from the nurses who volunteered to participate in the study while receiving their BLS training.

Data Analysis

The data obtained in the study were computerized and analyzed. Normality tests were performed using Shapiro-Wilk tests and one-sample Kolmogorov-Smirnov and histograms. The descriptive values were demonstrated as medium standard deviation (SD), median min., max., frequency, and percentage. Comparisons of two normally distributed groups were accomplished using t-test for independent groups and the Mann-Whitney U test for the remainder. Three or more groups were compared using the Kruskal-Wallis one-way analysis of variance. Multiple (paired) comparisons were performed using Bonferroni-corrected Mann-Whitney U test ($p<0.05$ was considered the limit of significance for 5-group comparisons). Contrasting before and after training, paired t-tests were conducted to demonstrate the efficiency of the training. The relationship between age and the efficiency of training was analyzed using Pearson's correlation test.

Limitations of Research

The limitations of our research included the facts that only nurses received BLS training, the assessment of the training activities involved the one-year training programs, and the efficiency assessment tool was only used immediately after the training.

RESULTS

Demographic characteristics and their relationship to BLS and ALS

The socio-demographic characteristics of the nurses who were enrolled into this study are shown in Table 2. We discovered that there was no statistically significant relationship between the nurses' age groups and the difference between their pre- and post-test results ($p>0.05$); and there was no statistically significant difference between other socio-demographic characteristics and the difference between their pre- and post-test results ($p>0.05$) (Table 2).

Table 2 Summary of demographics (n=404)

Characteristics		n (%)	p
Age groups (years)	Less than 30 years	213 (52.72)	0.093*
	30-40 year	90 (22.28)	
	40 years and up	101 (25.00)	
Gender	Male	10 (2.48)	-
	Female	394 (97.52)	
Educational Background	Vocational School of Health	40 (9.90)	0.295**
	Undergraduate School	104 (25.74)	
	University	224 (55.45)	
	Master's or PhD	33 (8.17)	
Working Place	Emergency	62 (15.35)	0.062**
	Intensive Care Unit	97 (24.01)	
	Surgical Clinics	64 (15.84)	
	Internal Clinics	50 (12.38)	
	Other Clinics	125 (30.94)	
	Outpatient Clinics	3 (0.74)	
	Surgery Room	3 (0.74)	
Work Experience Time	Less than 1 year	91 (22.52)	0.267**
	1-5 years	113 (27.97)	
	5-10 years	37 (9.16)	
	More than 10	163 (40.35)	
*Pearson's correlation ** Kruskal-Wallis test			

After analyzing the nurses' work experience in emergency or intensive care units, it was observed that 53.96% (n=218) had emergency or intensive care unit experience, and most 25.99% (n=105) had work experience of 1-5 years according to the distribution of their working years (Table 3).

When the nurses' history with BLS and ALS training and the difference between their pre- and post-test results were compared, there was a statistically significant difference between nurses had previously undergone BLS training and the difference between their pre- and post-test results ($p<0.05$), and a statistically significant difference between nurses who had previously undergone ALS training and the difference between their pre- and post-test results ($p<0.001$) (Table 3).

Table 3 Work experience and education of BLS and ALS (n=404)

Experience and education of BLS and ALS of the Nurses	Status of experience and education	n (%)	p
Work experience in intensive care or emergency unit	Yes	218 (53.96)	0.259*
	No	186 (46.04)	
	Less than 1 year	52 (12.87)	
Working time in intensive care or emergency unit	1-5 year	105 (25.99)	0.132**
	5-10 year	38 (9.41)	
	More than 10 years	22 (5.45)	
	Not answer	187 (46.29)	
Education obtained about Basic Life Support	Yes	193 (47.77)	0.000*
	No	211 (52.23)	
Education obtained about Advanced Life Support	Yes	71 (17.57)	0.010*
	No	333 (82.43)	
*t-test **Kruskal-Wallis test $p<0.001$ $p<0.05$			

The relationship between pre- and post-test results

The pre-and post-test results of the nurses were evaluated and a statistically significant difference was found between the mean pre- and post-test scores (Table 4).

Table 4 Results of pre- and post-test scores (n=404)

Test	X	SS	SD	t	p
PRE-TEST	47.88	13.63	403	-44.43	0.000*
POST-TEST	81.74	10.1	-	-	-

DISCUSSION

Described as "the chain of survival" in cardiopulmonary resuscitation practices, every circle consisting of early intervention, early basic life support, early defibrillation and advanced basic life support is considered to improve survival. Basic life support is one of the critical circles in the chain of survival. Studies show it doubles or triples the chance of a cardiac arrest victim's survival when the person to witness the arrest is able to initiate basic life support [13,14].

Healthcare services require teamwork. Nurses are an inseparable and irreplaceable part and significant members of this team, and they are the first to be in the position to initiate BLS with fast and effective interventions such as cardiopulmonary resuscitation. Furthermore, using their autonomy to take on the team leadership duty with other multidisciplinary health care team members, especially during BLS practice, is currently considered amongst the modern nursing responsibilities. Other modern roles of a nurse during basic life support include active participation in the decision-making process for BLS during cardiac arrest, using an AED during ALS, and having knowledge of medications that should be administered and their use [15]. Therefore, BLS training programs should inevitably be provided primarily for nurses. Accordingly, BLS training programs should be organized for nurses in hospitals and the training programs' effectiveness should be monitored, otherwise it would be difficult to determine whether nurses obtain sufficient information and skill. Basic life support training programs should be organized in accordance with up-to-date guidelines and include practice skills alongside theoretical knowledge. A study in the literature evaluated the current BLS knowledge of nurses, emergency medical technicians, radiology technicians, medical laboratory technicians, medical secretaries, and paramedics, and reported that the participants rarely answered the questions correctly, had not kept themselves up to date with the latest BLS information, and confused the revisions in universal BLS guidelines with their former knowledge [1,16].

In our study, BLS training was proven to be effective due to the finding of the statistically significant difference between the pre-test and post-test results.

Analyzing the results of the BLS training course by Eryılmaz, et al. for emergency physicians in Ankara, it could be observed that the attendees became more successful after completing the training [17]. In a similar study, it was reported that physicians who worked in the emergency department and family health services significantly improved their level of knowledge during and after their BLS training [10].

There are similar studies in the literature that are in line with the results of our study and demonstrated statistically significant differences between pre- and post-test results when assessing the efficiency of BLS training programs of different healthcare professionals [3,6,10,18-21]. Accordingly, the reason the success rate of participants was higher in post-tests than in pre-tests could be associated with the fact that the efficiency of the training programs was assessed immediately after training, without allowing time for participants to forget the information on BLS.

Having more professional experience and one or more previous BLS experiences affect nurses positively in terms of feeling competent on applying BLS [22]. In our study, when we compared nurses' previous BLS and ALS experiences, whether they received BLS and/or ALS training, with the difference between their pre-test and post-test results, we discovered a statistically significant difference between their previous BLS training and the difference between their pre-test and post-test results.

In the study by Ulupınar and Özdilek, it was reported the first occupational group to discover an arrest case in the clinic where the participants were working was the nurses (77.4%) and it was also the nurses who had been initiating intervention (67.8%) for these patients [22]. This finding is an important result that draws attention to the significance

of our subject of research and proves the consequences of nurses' knowledge and skills regarding BLS. Studies show it doubles or triples the chance of a cardiopulmonary arrest victim's survival when the person to witness the arrest is able to initiate BLS [13,14]. Therefore, it is of utmost importance that nurses possess the skills required for the practice of BLS. We observed that the BLS training program was efficient for the nurses in our study.

Having a key role within healthcare team and the first notice of arrests, nurses should be trained about BLS firstly in their schools where they receive their education, then the healthcare organizations where they work through orientation training for when they start working and in-service training programs. However, these training programs should repeatedly take place at certain intervals and be updated in accordance with guidelines.

CONCLUSION

Consequently, we found that the BLS training provided for the nurses in our study was effective. Nurses tend to see cases of cardiac arrest in hospitals earlier, compared with other healthcare team members; therefore, it is crucial for them to have sufficient knowledge and skill regarding BLS. Basic life support is a skill that is fundamentally based on practice. Nurses must improve this skill with training programs and fulfil their roles effectively during the implementation of BLS. Additionally, BLS training programs should be repeated at regular intervals and knowledge and skills must be kept up-to-date and remembered. Furthermore, a focus group can be put through a theory and a practice test regularly in order to determine whether BLS training programs are efficient.

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