Evaluation of Cardiopulmonary Resuscitation (CPR) Practice of Nurses at a Tertiary Hospital

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ABSTRACT

Nurses are usually the members of the health team who first reach the patients with cardiopulmonary arrest. The theoretical and practical training of the nurses on basic life support (BLS) is important.

The study was designed to assess the cardiopulmonary resuscitation (CPR) knowledge and practice of the all nurses who attended BLS course in a tertiary care hospital. The participants were asked to respond to the questions about CPR training information, CPR experiences, and self-confidence in this area before the training. After the questionnaire the participants' CPR performances on the model were evaluated and the steps are repeated after training.

A total of 287 nurses had the training course and all of them were recruited in the study. 11.8% of the participants did not receive any practical training. Only 43.2% of them performed effective CPR. Previous practical training did not show any difference for effective CPR (41.9% versus 52.9% p = 0.222). Those with CPR experience carried out significantly more effective CPR (49.3% versus 27.5% p = 0.001). The ones with real-life CPR experience reported significantly more self-confidence (91.3% versus 66.3%, p<0001). After the training, the rate of effective CPR and self-confidence reported by the participants were significantly increased (p <0.001).

Only 43.2% of the participant was able to perform effective CPR. CPR experience in real life was the most important factor for successful CPR rates.

Key Words: Resuscitation, CPR, Nurses, Tertiary Hospital

Introduction

Survival after cardiopulmonary arrest is directly related to a rapid and effective cardiopulmonary resuscitation (CPR) (1). To this end, the current studies aim to provide rapid intervention by offering basic life support training to those in society who are not interested in health. Basic life support (BLS) includes intervention after cardiopulmonary arrest without additional special tools or medication. The mixed steps in the medical response lead people witnessing a cardiac arrest to have low self-confidence and thus to delay the necessary intervention. In addition, CPR cannot be carried out effectively due to these mixed steps along with inadequate theoretical and practical training (2).

Having revised its 2018 guidelines in accordance with previous recommendations, American Heart Association (AHA) simplified the process by eliminating complex intervention steps that delay interventions to patients with cardiopulmonary arrest and reduce the self-reliance of saviours. For this purpose, the look-listen-feel steps were eliminated, and mouth-to-mouth breathing is put on the back burner for the first intervention, prioritizing effective chest compression (2, 3).

Hospitals are the most frequent sites of cardiopulmonary arrest. Besides, nurses are usually the members of the health team who first reach the patients with cardiopulmonary arrest before the physicians. Thus, it is important that the theoretical and practical training of the nurses on basic life support is complete (4).

Though the pertaining literature cites some studies evaluating the theoretical training of health workers, the number of such studies in which the application skills of the staff who report that they have received training beforehand is limited. Therefore, the study was designed to assess the effects of CPR knowledge and practice of the nurses working in a tertiary hospital, to identify the factors that could affect success, and to investigate the effects of theoretical-practical training on CPR practice.

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Table 1. The main characteristics of the participants, the results of pre- and post-training evaluation (CPR: cardiopulmonary resuscitation)

	Pre-training	Post-training	p
Female Gender % (n)	95.5% (274)		
Working years median (min-max)	8 (1-30)		
Department % (n)			
Intensive Care	24.7% (71)		
Emergency	8% (23)		
Other units	67.3% (193)		
Theoretical Training Background	100%		
Practical Training % (n)			
0	11.8% (34)		
1	19.5% (56)		
≥2	68.6% (197)		
CPR overall % (n)			
Successful	43.2% (124)	99% (284)	<0.001
Unsuccessful	56.8% (163)	1% (3)	
Compression spot % (n)			
Successful	73.2% (210)	100% (287)	<0.001
Unsuccessful	26.8% (77)	-	
Compression depth % (n)			
Successful	64.8% (186)	99.3% (285)	<0.001
Unsuccessful	35.2% (101)	0.7% (2)	
Compression rate % (n)			
Successful	58.5% (168)	99.7% (286)	<0.001
Unsuccessful	41.5% (119)	0.3% (1)	
Compression rhythm % (n)			
Successful	66.2% (190)	99.3% (285)	<0.001
Unsuccessful	33.8% (97)	0.7% (2)	
Self-confidence in CPR % (n)	84.3% (242)	96.2% (276)	<0.001

Materials and Methods

BLS training was given as a mandatory one-hour theoretical and one-hour practical training within the scope of occupational health safety trainings in a tertiary hospital. These trainings were given in groups during one year by one trainer at various time periods, All the nurses working in the hospital should participated in the trainings. The study conducted between 1 September 2014 and 30 June 2015. The selection of the sample population has not been made, and the entire target population was planned to include in the study. During study period 450 nurses were working in the study hospital. However 287 of them had the training education during the study period and all of the participants accepted to join the study. The main reason for not to participating the training was having CPR course before the

current study. After the participants were asked to respond to the questions such as CPR training information, real life CPR experiences, and self-confidence in this area before the training, their CPR practices on the model were evaluated by a single instructor as adequate or inadequate in terms of location, speed, depth, and rhythm. Following 60 minutes of theoretical training, the participants were given practical training on the model and at the end of the course, the application skills were rated by the same trainer similar to the evaluation before the course. Self-confidence of the participants were evaluated with single question in questionnaire (Do you have self-confidence about your CPR skills)

The approval of the ethics committee for the research was received in written form from the regional ethics committee in the location where the study was conducted, and written consent was

Table 2: Evaluation of variables affecting successful CPR (CPR: cardiopulmonary resuscitation, ICU: intensive care unit)

	Successful CPR (%)	p
Practical Training		
Yes	41.9%	0.222
No	52.9%	
CPR experience		
Yes	49.3%	0.001
No	27.5%	
Department		
Emergency and ICU	57.4%	0.001
Other units	36.3%	
Working years		
1 year	46.7%	0.675
2-5 years	42.6%	
6-9 years	35%	
≥10 years	45.5%	

obtained from the participants who agreed to participate in the study.

Statistics: The categorical data obtained were expressed as per cent (n), and the numerical data as mean (± standard deviation) or median (min-max) according to normal distribution. While comparisons of basal pre-training variables were made using X2 or Fisher's exact test according to the categorical data, T-test or Mann Whitney-U test was used for numerical measurements. Self-confidence and effective CPR comparisons in pre- and post-training were assessed using McNemar test. All statistical calculations were performed using the SPSS 25.0 (IBM Corp. Armonk, NY, USA) packet program, and p value <0.05 was considered statistically significant at 95% confidence interval.

Results

Theoretical and practical training conducted in groups for specific periods between 1 September 2014 and 30 June 2015. A total of 287 nurses had the training course and all of them were recruited in the study. 95.5% (274) of the study group were female and the median occupational experience was 8 years (1-30). The proportion of participants with 10 years of professional experience was 42.9% while 10.5% had 1 year experience. 32.8% of the participants were working in intensive care units (ICU) and emergency departments, whereas others were in wards or outpatient clinics within various units of the hospital. (Table 1)

All of the participants had the theoretical education before, but 11.8% of them did not receive any practical training. Further, 17.6% of the nurses who did not receive any practical training had a career life of 10 years and over, and 38.2% of them had 2-5 years of experience. In terms of the number of trainings received, it was observed that 77.9% of them had two or more practical training. 72.1% of the participants were observed to have CPR experience in real life. When asked about their self-confidence in CPR, 84.3% stated they would be able to perform effective CPR.

When the participants' CPR performances on the model were evaluated in terms of location, depth, speed and rhythm of chest compressions before the theoretical and practical training, it was found that only 43.2% of the participants had sufficient and good level of all the steps that could be evaluated as effective CPR.

When the subgroups were analysed in relation to effective CPR, the success rate was not statistically significant, though higher for those who did not receive practical training (41.9% versus 52.9% p = 0.222). When the participants who had practical experience were compared as having single training experience and two or more training experiences, the latter group was observed to perform more effective CPR as regards number, though this did not reveal statistical significance (43.7% versus 35.7% p = 0.288). When the participants with and without CPR experience in real life were compared, it was revealed that those with CPR experience carried out significantly more effective CPR (49.3% versus 27.5% p = 0.001). When those with practical training and experience were compared to those with neither of them, the latter group were found to be proportionately less successful (47.7% versus 35.7% p = 0.390). (Table 2)

When the effect of the working department on effective CPR was investigated, it was observed that the nurses in intensive care and emergency department performed significantly more effective CPR (57.4% versus 36.3% p=0.001). Expectedly, the real-life experience of the nurses in this group was greater (90.4% versus 63.2% p<0.001). There was no difference between the two groups in terms of practical training (the rate of the participants with no training in the intensive care and emergency department was 16%, while it was 9.8% in other departments, p=0.133).

In order to investigate the impact of working years on effective CPR, the participants were divided into 4 groups as≤1 year, 1-5 years, 6-9 years, 10 years and more, and there was no difference in terms of effective CPR between the groups (p=0.675)

When asked about their self-confidence in CPR before the training, the participants stated that 84.3% of them had self-confidence. The working department, working years, practical training experience, and the CPR experience in real life were compared in order to evaluate the possible reasons for self-confidence. There was no significant difference between the ICU + the emergency department workers and the other units (p=0.548). Although it did not show statistical significance, self-confidence increased as the number of working years increased in the first 10 years (1st year: 80%, 2-5 years: 84%, 6-9 years: 90%, p=0.697). While there was no statistically significant difference in self-confidence between participants who did or did not receive practical training before (85.8% for those with training and 75.3% for those without training, p=0.65), the ones with real-life CPR experience reported significantly more self-confidence (91.3% versus 66.3%, p<0001). Successful CPR rates of the self-confident participants on the model were 46,6%. This rate was 35.6% for those lacking self-confidence, but this difference was not statistically significant (p=0.259).

After the theoretical and practical training, the participants were evaluated on the model by the same instructor again, and the rate of effective CPR at all levels and self-confidence in effective CPR was 99% (p<0.001) and 96,2% (p<0.001), respectively.

Discussion

The importance of rapid intervention and effective CPR in death and permanent sequelae for patients with cardiopulmonary arrest is well-known. In the European Resuscitation Guidelines, having BLS skills is defined as a task for all of the healthcare personnel working in hospitals and other risky areas. BLS training and effective CPR capabilities are considered crucial for nurses, who are often the first health personnel to reach out patients with cardiopulmonary arrest. All the nurses whom had BLS course in a tertiary hospital were evaluated in the current study, and only 43.2% were observed to have performed effective CPR.

The proportion of nurses who have sufficient theoretical knowledge in studies abroad varies between 50-60% (5-7). On the other hand, the theoretical knowledge of BLS turns to be lower in studies conducted in our country in accordance with the present study. In the questionnaire study by Kara et al. evaluating BLS knowledge, the score of 6 or higher was accepted as sufficient knowledge level, and the mean score of the study population was found to be 4.84±2.04 (8). Besides BLS knowledge, Bukiran et al. have also added advanced life support knowledge and have shown that only 15.6% of the participants have sufficient knowledge level (9). The research in the existing literature mainly consists of questionnaire studies involving BLS theoretical knowledge, and most of them were carried out prior to the 2010 AHA BLS update. The present study is important in evaluating the CPR practice on the model in terms of only chest compression approach in the 2010 update.

It is stated that one of the most recommended methods for increasing the BLS knowledge of nurses is the renewal of the theoretical and practical training at regular intervals. Even though there is no consensus about whether this period should be 6 months or 1 year, the only consensus is theoretical knowledge decreases over time (10, 11). In a recent study pointed that compression skills scores had been decreased at the 3-month follow-up session (12). In an another recent study stated that short-duration, distributed CPR training on a manikin with real-time visual feedback was effective in improving CPR performance, with monthly training more effective than training every 3, 6, or 12 months (13). In the current study, when the participants are evaluated by the number of practical training received, those with two or more trainings achieve highly successful CPR, despite the lack of statistical significance (p=0.288).

Sufficient practical training in addition to theoretical training should be provided for effective BLS. A study on paramedic students

revealed that the number of models in the training program could affect the success of BLS (14). It was observed that 11.8% of the participants in the current study had not received any practical training. 44.1% of the patients in this group were nurses in the first year of their professional life. While this ratio revealed the inadequacy of BLS training in the nursing schools, 17.6% of those with no training consisted of the participants who had spent 10 years in their professional lives. This situation points to the shortcomings in post-graduate education.

Apart from the number and frequency of practical trainings given earlier, another important factor in effective CPR is the real-life CPR experience. In the studies by Bukiran and Brião et al., it is revealed that the nurses working in ICU and emergency departments had more knowledge about BLS, which is probably related to the fact that their real-life CPR experiences are higher (7, 9). The present study clearly reveals this relation. The participants were asked about their CPR experience, and those with real-life experience turned out to have significantly more CPR success. Expectedly, the real-life experience was more evident in the emergency department and ICU workers (p <0.001), and the effective CPR rates were higher (p=0.001). Although emergency department and ICU staff had more CPR experience and performed significantly more effective CPR, the effective CPR rate in this group of participants was only 57.4%.

When cardiopulmonary arrest is encountered, one of the most important factors in rapid intervention can be specified as self-confidence. When the participants were asked whether they were self-confident in their intervention with cardiopulmonary arrest, 84.3% of them indicated that they could perform it self-confidently, while this self-confidence was significantly higher in emergency department and ICU nurses and those with real-life experience. No effect of the existence of practical training or the working years upon self-confidence was observed.

At the end of the theoretical and practical training, 99% of the participants were able to perform effective CPR, whereas 96.2% were self-confident about the intervention of the arrest patient.

Only 43.2% of the nurses working in study hospital are able to perform effective CPR. In addition to practical training, CPR experience in real life has been identified as the most important factor in increasing successful CPR rates, and real-life experience is more evident in emergency department and ICU nurses. As a result, CPR

trainings of the nurses working in the hospital should be theoretically and practically renewed, and these nurses can be assigned to ICU or emergency departments at certain intervals to gain real-life experience.

Limitations: The main limitation of the study was that the participants were evaluated only in terms of chest compression practice, and that no other practical steps or theoretical evaluation was conducted. Moreover, the background, time, number and real-life CPR experience of previous trainings were based solely on the participants' statements. Even all the nurses working in the hospital should had been participated in the trainings, during study period half of the all working stuff nurses had the course and all of them included in the study.

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