

Assessment of cardiopulmonary resuscitation knowledge and experiences between emergency department nurses hospital pre and post basic life support training course, Egypt

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Abstract

Aim: Determination of the effect of training CPR program on the nurses working practice and knowledge in Emergency department (ED). Nearly 20% survive rate in adult of hospital cardiac arrest (CA). Cardiopulmonary Resuscitation (CPR) is increase the survival rate into double number but CA without treatment is falling 10–15% per minute of survival rate; however, the performed proper CPR likely shifts this curve towards a higher probability of survival.

Material and Methods: The study is Interventional included 65 nurses. They fill questionnaire sheet used and constructed via the Research Committee in Murcia's Hospital based on the "American Heart Association (AHA) 2010 Guidelines of CPR". To assess nurses' knowledge about sudden cardiac arrest and CPR but we used Pre and post questionnaire knowledge that applied in three phases: Assessment phase, Implementation phase, and Evaluation phase.

Results: The study revealed 73% of nurses do not have previous training. Twenty-seven percentage nurses not have any information about CPR and 22.5% of them the main source of the information gained through training program more than one year ago. While the 94.6% of them willing to attend CPR training program and report they need to perform high quality CPR respectively.

Conclusion: The study give a clear view of the current knowledge and practice of CPR among nursing staff in our institution and can help in developing it. It also gives detailed information about the exact weak points, which would improve, in next workshops.

Keywords: Skill programme; cardiopulmonary resuscitation; nurses staff.

INTRODUCTION

Sudden cardiac arrest (CA) is life a threatening condition that known as cardio-pulmonary arrest or circulatory arrest. Electrical heart malfunction caused by CA that induced arrhythmia and disrupts the blood flow of the lungs, brain and other organs which leading to death. Usually it discovered as (absence of pulse, loss of consciousness and breathing) (1).

Many recent studies reported 1,000,000 people died from CA in the Europe and United States every year. Nearly one every 30 second with 200,000 treated CA among USA hospitals patients annually (2).

In Egypt, it estimated that the mortality rate as result of cardiovascular diseases (5.6%) and by 2018, over millions people would suffer serious CA. Unfortunately, of all who suffer CA only less than 8% survive (3).

CPR is a critical part of the management and prevention of sudden CA. It started early soon as possible by combination of chest compressions and rescue breathing delivered to die patients (4).

In addition, CPR is essential component of basic life support (BLS) that is a level of first-aid resuscitation that can used in emergencies until victims are placed into the care of medical professionals. Techniques of BLS can

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started when victims appear to be drowning, choking, suffering from CA or unconscious. Knowing the proper high quality steps for BLS could mean the difference between death and life (5).

The aim of CPR is to maintain body functions so that vital organs and brain receive a sufficient blood flow to nutrients, supply oxygen to keep their functions, and removed the waste products (6).

CPR is increase the survival rate into double number, however the CA without treatment is falling 10–15% per minute of survival rate, but the performed proper CPR likely shifts this curve towards a higher probability of survival (7).

The quality of CPR may be poor in clinical situations especially with lack of resuscitation skills in nurses for BLS. However contributing factor may be identified as poor outcomes of CA victims. High quality CPR skills have considered impact on mortality (8).

Mostly the nurses are first respond at the scene of CA and their ability to perform high quality care are critical to improve outcome of a resuscitation CPR attempt. Moreover, to perform the procedure of CPR in a meticulous, knowledge and expertise nurses also effect on the manner of CPR which effect on survival rate. In addition, nurses are one important part of healthcare system and perceived to be skilled in providing institutional care to victim patients (9).

Many studies on CPR conducted in developed countries by the USA, Finland Bahrain, the United Kingdom (UK), Greece and South Africa showed that inadequate levels of CPR skills and knowledge amongst ER nurses (10).

Therefore, CPR is mandatory training for nurse's staff and essential because the nurses often discover die patients of CA in hospitals.

The aim of the work is assessment the knowledge and experience of the ER nurses in Emergency Department pre and post BLS course.

MATERIAL and METHODS

The study type

Interventional study

Setting of the study

The study conducted in Suez Canal University Hospital (SCUH) in ED.

Study population

All registered ED nurses at SCUH.

A) Inclusion criteria:

- Registered nurse.
- Having ≥ 1year clinical experience.
- Both sexes.

B) Exclusion criteria:

- Absent nurses due to sick leave.
- Nurses who have a valid BLS certificate or previously trained.

The study aims to improve and increase awareness, Knowledge and skills of the ED nurses on BLS, which by its turn reflected on the managements, and outcomes of arrested patients.

Primary objectives

-Pre course phase: evaluate the knowledge and experience of ED nurses regarding CPR using a questionnaire based on "AHA 2010 Guidelines of CPR 2010" (11).

-BLS Course: to all the ED nurses carried out by instructors according to the latest European resuscitation Council recommendations.

-Post course phase: evaluate the knowledge and experience of ED nurses regarding CPR using a questionnaire based on "AHA 2010 Guidelines of CPR" (11).

Study question

Is the BLS training course increase the knowledge and experience of ED nurses?

Null hypothesis

BLS training course not increase the ED nurse knowledge and experience regarding CPR.

Alternating hypothesis

BLS training course increase the ED nurse knowledge and experience regarding CPR.

Sample size: the entire registered emergency department at Suez Canal University hospital nurses number, which are 65 during year of 2017.

Patients and Methods

The tools used in our study firstly started with "questionnaire sheet" It is developed, done and constructed by the Committee of Research in Murcia's General Hospital Universities Reina Sofia based on "AHA 2010 Guidelines of CPR" (11) to evaluate and assess the nurses' knowledge about sudden CA and CPR via knowledge of Pre and post questionnaire). It has two parts.

Part I

It includes items related to socio-demographic data about the studied nurses. E.g. age, working area, years of experience, professional qualification, attendance courses in CPR and CPR taught in school of nursing (Table I).

Part II

It includes many questions to nurse's knowledge regarding sudden CA, and CPR (definition, clinical features, causes, complications, prevention and actions to prevent sudden CA) based on "AHA 2010 Guidelines of CPR and ECC" one week before and after the determined time of BLS training course." (11). In Table II, appendix included twenty questions for assessment knowledge and skills regarding sudden cardiac arrest and CPR.

Data collected coded, entered and analyzed using Microsoft Excel software and SPSS software program version 22.0 for analyzed. According to the data, the following tests were used for significance: t test, Chi square. Chi square test compare categorical variables. P

value was set at <0.05 for significant differences results. Data were in the form of numeric presentations, graphs and tubular presentations.

Ethical consideration

1) Approval of local ethical committee of Faculty of Medicine (FOM), Suez Canal University (SCU) taken.

2) We confirmed confidentiality of data.

3) We explained our research to nurses.

An informed consent were taken from nurses before taking any data or doing any intervention.

The consent contained:

Arabic form for the title of the work.

Aim of the work and brief scientific review.

We explained all direct and indirect benefits.

All data was confidential.

All nurses announced by results of the study.

The nurses knew the authors' phone numbers and all possible communicating tools.

RESULTS

Sixty-five nurses enrolled in this study. The data obtained using a predesigned self-administered questionnaire to evaluate cardiopulmonary resuscitation knowledge and experiences among our study population, pre and post basic life support training course.

Table (1) revealed that the mean age of our populations were 31.83 ± 6.206 years. As shown in this table, most of our study population aged between 20-40 years old (84.6%, $p < 0.05$). In addition, the gender is 52% female and 48% male.

Our study populations categorized in terms of their educational qualifications, the two groups were a statistically significant difference. Most of our study population graduated from the nursing technical institute (75.4%, $p < 0.05$) as shown in the following table (2). In addition, According to years of experience, most of our study population has about (1-10 years) of experience (86.1%, $p=0.032$) as shown in table (3). In this study revealed that the majority of our study population has attended training courses before (90.8%, $p < 0.05$).

As seen in table (4), the mean of correct responses of the whole population pre-course was 12.4 ± 3.1 versus 17.2 ± 2.51 after the course ($p < 0.05$). This indicates a significant increase of the knowledge after attending the course. However, in age groups + 40 years, in pre and post course settings there were no statistically significant difference between. ($p > 0.05$). Our study revealed the effect of the training course on our study population in terms of gender. There was a statistically significant increase of knowledge after attending our course in each study group ($p < 0.05$). However, there were no significant differences between males and females pre or post course attendance ($p > 0.05$). In addition, that our population has been classified according to their level of education there was no statistically significant difference between the two groups ($p > 0.05$), however each group showed significant increase in their knowledge and experience after the course ($p < 0.05$).

As our work, the study nurses groups classified according to years of experience revealed there were statistically significant in different between ($p < 0.05$). When each group compared before and after the course, there was statistically significant increase in their knowledge levels ($p < 0.05$) except in + 10 years of experience groups ($p > 0.05$). In addition, our study showed that the there was a statistically significant difference between the two groups when they were compared before the course ($p < 0.05$). In addition, there was a statistically significant increase in the knowledge of groups after the course ($p < 0.05$).

In Table 5, reveal that there was a statistically significant different between two groups when they were compared in terms of multiple BLS situations and knowledge ($p < 0.05$).

Table I. Socio-demographic characteristics of nurses based on AHA 2010 Guidelines of CPR and ECC (2005): (12).

Name:

Age:

Addresses:

Graduation year:

Date of employment:

Items	N(65)	Percent %
Age:		
<20 years		
20-<30 years		
30-<40 years		
40-<50 years		
50+ years		
Sex		
female		
male		
Educational Qualification:		
- Secondary nursing school		
- Nursing technical institute		
Years of Experience:		
1 - <5 years		
5-<10 years		
10-<20 years		
20+ years		
training courses		
yes		
no		

Table 1. Distribution of the study population in terms of age

Variable	(n=65)	p value
Age (Mean \pm SD)	31.83 \pm 6.206	
Age (Groups)		p < 0.05
<20 Years	5 (7.7%)	
20-<30 Years	30 (46.1%)	
30-<40 Years	25 (38.5%)	
40-<50 Years	2 (3.1%)	
50+ Years	3 (4.6%)	

Table 2. Distribution of the study population in terms of educational qualification

Variable	(n=65)	p value
Educational Qualification		
2ry Nursing School	16 (24.6%)	
Nursing Technical Institute	49 (75.4%)	

Table 3. Distribution of the study population in terms of experience years

Variable	(n=65)	p value
Years of Experience		0.032
<1 years	4 (6.2%)	
1- <5 years	34 (52.3%)	
5-<10 years	22 (33.8%)	
10-<20 years	2 (3.1%)	
20+ years	3 (4.6%)	

Table 4. comparison between pre and post course settings in terms of age

Variable	Pre	Post	p value
Overall	12.4 \pm 3.1	17.2 \pm 2.51	0.014*
Age (Groups)			
<20 Years	9.3 \pm 4.1	16.2 \pm 3.17	< 0.001*
20-<30 Years	10.27	18.3 \pm 2.12	< 0.001*
30-<40 Years	12.9 \pm 3.4	18.6 \pm 2.67	0.012*
40-<50 Years	17.2 \pm 4.3	18.9 \pm 2	0.16
50+ Years	17.8 \pm 5.2	18.1 \pm 1.2	0.21

Table 5. Comparison between pre and post course settings in terms of different BLS skills & scenarios

Variable	Pre		Post		p value
	N	%	N	%	
1 Basic high-quality CPR	22	33.85%	57	87.69%	0.035
2 Correct sequence of the BLS steps	23	35.38%	64	98.46%	0.017
3 Common deadly mistake	19	29.23%	65	100%	0.003
4 High-quality chest compressions	17	26.15%	61	93.85%	0.009
5 Describes pulseless electrical activity	25	38.46%	63	96.92%	0.02
6 Perform high-quality CPR on a patient with an advanced device for the airway	26	40%	60	92.31%	0.04
7 Capnography in intubated patients	24	36.92%	60	92.31%	0.03
8 Safe and effective in the defibrillation sequence	22	33.85%	64	98.46%	0.011
9 Medication and dosage to treat persistent ventricular fibrillation	24	36.92%	65	100%	0.017
10 Appropriate interval to interrupt chest compressions	22	33.85%	65	100%	0.01
11 Action improves the quality of chest compressions	18	27.69%	61	93.85%	0.01
12 Adequate ventilation strategy for an adult	26	40%	59	90.77%	0.04
13 Highest priority intervention	17	26.15%	58	89.23%	0.017
14 Rhythm for synchronized Cardioversion	19	29.23%	63	96.92%	0.009
15 Range of PETCO2 target	22	33.85%	64	98.46%	0.011
16 The correct location of an endotracheal tube	18	27.69%	64	98.46%	0.003
17 Monitoring of cardiac activity	28	43.08%	63	96.92%	0.035
18 Incorrect response in CPR maneuvers	14	21.54%	61	93.85%	< 0.001
19 Correct action if doubt between VF and asystole.	19	29.23%	64	98.46%	0.005
20 Ventricular fibrillation in a pregnant woman	22	33.85%	57	87.69%	0.035

DISCUSSION

We enrolled 65 nurses in our study to evaluate cardiopulmonary resuscitation knowledge and experiences among our study population, pre and post basic life support training course using a predesigned self-administered questionnaire in order to improve and increase awareness, knowledge and skills of the ED nurses on BLS, which by its turn reflected on the managements, and outcomes of arrested patients.

Our study passed through three phases, pre course phase: to evaluate the knowledge and experience of ED nurses regarding CPR using a questionnaire based on "AHA 2010 Guidelines of CPR" Then, a BLS Course conducted to all the ED nurses carried out by instructors in the latest European Resuscitation Council (ERC) guidelines. Finally, the post course phase to evaluate the knowledge and experience of ED nurses regarding CPR using a questionnaire based on "AHA 2010 Guidelines of CPR"(13).

In terms of the pre-training knowledge levels that

assessed by the passing rates of the pre-course test, we found unacceptable passing rate (34.42%). These findings did not agree with these reported in Norway by Nagashima K, et al (2003); who reported higher pre-course knowledge levels (70.2%). This difference attributed to service of working with high risk of a hemodynamic compromised in the health patients, receive more formation in this area of research provide greater motivated to healthcare professionals and training level with higher educational in Norway in comparison to us (14).

However, notable differences exist among the different educational levels in our study as we reported that when our population has been classified according to their level of education there was no statistically significant difference between the two groups ($p > 0.05$), however each group showed significant increase in their knowledge and experience after the course ($p < 0.05$). These findings confirmed by another survey conducted in Spain who reported higher level of knowledge among nurses with higher educational levels (45.7%) in comparison with

their colleagues (31.2%). Kyriakou in a Greek hospital also reported similar findings (15).

Experience years play an important role in assessment of knowledge and practice on CPR effectively as described in our study. There were statistically significant differences between the study groups when classified according to years of experience ($p < 0.05$). When each group compared before and after the course, there was statistically significant increase in their knowledge levels ($p < 0.05$) except in + 10 years of experience groups ($p > 0.05$). (2) Reported similar findings who also reported higher levels of knowledge and correct practice among nurses with higher experience when compared to their colleagues ($p < 0.05$) (16)

Our study reported that about (90.8%) of our study population received a refresher course regarding BLS. However, these findings are not similar to those reported by García et al who reported that about 78.7% of their surveyed population took a refresher course. This explained by the need of the nurses in our country to attend courses and workshops individually to obtain the needed certificates that enable them to work in better private health facilities in contrary to nurses in García's survey who attend the regular training courses organized by their institutions (17).

However, there is a concern is noted on professional continuous formation, our study reported that there was a statistically significant difference between the two groups when they were compared before the course ($p < 0.05$). In addition, there was a statistically significant increase in the knowledge of groups after the course ($p < 0.05$). These findings are similar to those reported in García's survey who also reported the significant difference ($p < 0.05$). This may raise the need of organizing regular obligatory courses by health institutes to upgrade and improve the CPR skills among nurses and even other health professionals (17).

If we follow the quality parameters of international organizations (80% correct answers), authors found high passing levels which supported a research by Su et al., who revealed that the training for six months, an evident decrease noted of the knowledge acquired in CPR. Besides, another one of the problems to solve is the methodology used during the training. The literature reflects the need for training in BLS and ALS, by experience-based learning physicians. Studies by Kidd et al. And Su et al (1983) revealed that practical training is more effective however, the conclusions of a work conducted by Jensen et al. There was no difference between the formations carried out by ERC or AHA, regarding student knowledge immediately after the formation (10,18).

Recent researches revealed the combination use of the practical training and new technologies on CPR formation; however, the conclusions are still not significant. Lo et al. donate that informatics simulators on CPR actions did not imply higher levels of retention of knowledge or

skills with one year compared to practical methodology used currently for formation by AHA or ERC. Sandroni T J et al. (2009). also did not find evidence to indicate that combined use of e learning and classroom formation produced a difference in the theoretical results, although it did lower costs, compared to the current methodology. However, use of direct mailings to physicians to keep them informed of developments in CPR and send reminders resulted effective to increase theoretical knowledge on the subject, according to a study by Madden C et al. (2006) (10).

According to the quality and correct sequence of the CPR steps, our study showed significant difference ($p < 0.05$) as Dwyer N et al. in the post training results comparing with those pre training one. That boosts our hypothesis that training improves CPR performance among nurses (8).

In different scenarios, the trainees showed significant difference ($p < 0.05$) between pre- and post training. Our result supported by Lo et al. and Perkins et al. Who showed improving of the nurse's knowledge results in variant scenarios? This result is good indication that learning through introducing different scenarios give best and significant result more than traditional training courses as by Parajulee S. et al. (2011) mentioned in their study (19).

In different procedures taken during the CPR, our study showed significant improvement ($p < 0.05$) of nurses' knowledge post-training comparing with pre-training results. This result was similar to Lee, W. et al (2000) study which showed increase the quality, rapidity and effectiveness in different procedures in the CPR process post-training course (20).

Our study showed much strength, as it is the first study to discuss this topic in Suez Canal University hospital. Therefore, it can give a clear view of the current knowledge and practice of CPR among nursing staff in our institution and can help in developing it. It also gives detailed information about the exact weak points, which improved, in next workshops.

In addition, our training did not follow traditional learning method but it included different scenarios and hypothetical stories, which introduced to the trainees to assess their knowledge and behavior to different CPR procedures.

However, this work has some limitations, which need to mention. The selection only emergency nurses in this work, as also nurses in ICU and inpatient wards perform CPR to their patients when needed. Therefore, we can include all hospital nursing staff and even all health care personnel who are involved in CPR to get the full image about all defected points, which need to be improved. We suppose the nurses those did not give high pass marks so they need more training than those answered. Which they have a greater interest in CPR and are more be aware about CA. These limitations, we do not believe the validity of the conclusions, as a whole.

Finally, we contacted with Suez Canal university hospital authority responsible persons for developing of health care worker performance to show them our results and recommendation. In addition, we suggest that CPR training should provide obligatory and systematically according to schedule with reassessment of health care worker.

This study has limitations

The study was limited to emergency nurses working in Emergency department of Suez Canal University.

In addition, there was not a valid Arabic questionnaire so we translated one based on AHA guidelines. Moreover, it was the first research to assess such an initiative in SCU.

From this study, we have concluded

The present study identified inadequate knowledge about BLS among the nurses as well as poor experience regarding the CPR skills and it suggests the need for annual training programs.

Periodical reinforcement and refresher training with skills assessment needed.

Nurses' knowledge, skills and performance to CPR increased especial immediate post-training program.

The results of the work should discusses with the nursing and appropriate training in ED, which vital areas for the practicing nurses.

Recommendations

To improve management process in arrested patients, we recommend the following:-

1. Conducting similar BLS courses in a regular manner to improve the performance of BLS team.
2. Conducting similar studies with involving all nursing staff who exposed to BLS situations like ICU, CCU and inpatient wards nursing staff.
3. Further study with long follow-up period recommended to assess the knowledge and practice again and to evaluate the need of continuous workshops.
4. Further studies to assess other factors effect on CPR knowledge, with a large sample of the hospitals in Egypt, to determine if these results are applicable to manage in wider nurse's population.
5. Applied CPR guidelines for giving a high care standard, which result in satisfaction for both nurses and patients. However, enhance successful CPR improve outcome of victims.
6. CPR education using audio-visual and demonstration to nurses before attendance to ALS or/and BLS courses, which increase, pass marks level and confirm skills with knowledge about CPR.
7. CPR among nurses should assessed and recertified annually, according to recent published guidelines, to keep nurses' skills and knowledge up to date.
8. Cognitive CPR training programmes, which provide

nurses with good skills to cope stressful minutes of CA victims and maintain effectiveness CPR.

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Ethical approval: All nurses give consent to participate in the study without affecting their jobs accordingly to Institutional approvals of the Research Ethics Committee of the Faculty of Medicine, Suez Canal University (Number:-204) was taken.. 1) Approval of Research ethics committee. 2) Administrative of SCUH was informed consent. 3) Confidentiality of data.

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