ASSESSMENT OF BASIC LIFE SUPPORT KNOWLEDGE AMONG NURSING PROFESSIONALS

By

Zayed HA[1]and Saied SM [2]

[1]Department of Occupational Medicine,[2] Department of Public Health and Community Medicine, Tanta University, Egypt

Corresponding author: Saied SM: shimaasaied@med.tanta.edu.eg

Abstract

Introduction: Basic life support (BLS) is an emergency method which includes identifying an arrest situation and starting immediate appropriate cardiopulmonary resuscitation (CPR) procedures to keep life till sufferers either recover or transported to a medical facility where advanced life support is existing. It is extremely vital that all nurses know regarding basic life support to save patients` lives. **Aim of work:** To assess the knowledge concerning Basic Life Support (BLS) among nursing professionals at Tanta University Hospitals. **Materials and methods:** A cross-sectional study was conducted for a period of 6 months upon 510 randomly chosen nurses working in various Intensive Care Units (ICUs), Emergency Department and wards of Tanta University Hospitals using stratified sampling, a self-administered validated questionnaire was used to collect data. **Results:** The mean of total knowledge scores was 10.92 ± 3.73, about one third (33.92%) of nurses had adequate knowledge level. A significant association was found between participants` knowledge level and their academic qualification, place of current work, previous training on BLS and duration since the last training. About 42 % of studied nurses had previous BLS training. Trained nurses had significantly higher mean total knowledge score than untrained ones (12.99 ± 3.27 vs. 9.37 ± 3.27, $p < 0.001$). **Conclusion and recommendations:** The knowledge level of BLS was found to be inadequate among the majority of nursing staff working at Tanta University Hospitals. Regular in-service training and recertification of BLS competency are greatly recommended as well as rotating work schedule between ICUs, Emergency departments and other non emergency hospital wards.

Keywords: Nursing knowledge, Basic life support, Knowledge level, Academic qualification and Training.

Introduction

Cardiac arrest (CA) is a life-threatening incident that accounts for 15% of the worldwide mortality. It is more common among individuals with pre-existing cardiovascular morbidity (Pundalika et al., 2015; and Bogle et al., 2016). The global incidence of sudden cardiac arrest (SCA) outside the hospital ranged between 20 and 140 for every 100,000 people, with an alarmingly low survival rate ranging between 2 and 11% (Aranzábal-Alegría et al., 2017).

In Egypt, it is assessed that coronary heart disease and hypertension affect about 8.5% and 25% of the total population, respectively, raising the liability to sudden cardiac arrest events (Kurdi, 2012).

Cardiac arrest and accidents are the most common daily emergencies with extremely high morbidity and mortality. However, the associated high mortality is mostly preventable by very simple maneuvers and skills. These emergencies can be simply managed by the knowledge and practice of resuscitation skills. Over time, revival skills evolved into a suitable protocol, which includes Cardiopulmonary Resuscitation (CPR) commonly known the same as Basic Life Support (BLS). Basic Life Support involves procedures other than CPR as well, but the two terms are commonly used interchangeably (Zaheer and Haque, 2009).

Basic life support (BLS) is an emergency procedure that consists of maneuvers which include recognizing sudden cardiac arrest signs, stroke, heart attack, and foreign body airway obstruction, CPR, and defibrillation using an automated external defibrillator (AED) (Chandrasekaran et al.,2010; and Qassim, 2014).

Immediate and efficient CPR based on enough knowledge and practical skills is essential to improve this situation (Filho et al.,2006) as the quality of this intervention is influential for improving patient survival (Ravari et al., 2012).

Cardiac arrest is a problem of ultimate importance from the perspective of nursing. In developed countries, it has been reported that 33% to 40% of cardiac arrests occur inside the hospitals, and more than 60% of those arrests are firstly recognized by nurses (Taha, 2012). So, the importance of having the appropriate knowledge to start immediate CPR has been established, specifically when done by trained healthcare professionals, improving in-hospital CA survival in 7–24% of registered cases (Fritz and Gempeler, 2015).

In Egypt, it was estimated that the cardiovascular diseases mortality rate was 46.2%, and in 2015 over million people suffered from serious cardiac arrest (WHO, 2013). On average, a victim starts to suffer irreversible brain

damage four minutes next to the cardiac arrest occurs and if no CPR administered (Basavantappa, 2003). For each minute that an arrested victim does not receive immediate CPR, his survival chances drop by 10 percent. An effective CPR from a witness could double chances of surviving a cardiac arrested victim. Several countries all over the world are training the people in schools, colleges, and in workplaces regarding CPR to save sudden cardiac victims from death (Yakel, 1989).

Although there are establishments that provide training on BLS, there are still knowledge gaps and shortages in the application of the CPR procedure (Rojas et al., 2012). According to our knowledge in Egypt, there is paucity in researches and data concerning this critical subject, hence the need to identify the current BLS knowledge among nurses at Tanta University Hospitals to detect points of weaknesses and recommend solutions.

Aim of work

To assess knowledge about Basic Life Support (BLS) among nursing professionals at Tanta University Hospitals.

Materials and methods

Study design: It is a cross-sectional study.
Place and duration of the study: The study was performed for a period of 6 months (from October 2018 to March 2019) among the nursing professionals working at Tanta University Hospitals with an inpatient bed capacity of 1962 beds; it incorporates seven Hospitals; the Chief Hospital, Emergency, Internal Medicine, Pediatrics, Ophthalmology, Students' Hospital, and International Educational Hospital. These Hospitals receive diverse medical and surgical cases, injuries and road traffic accidents in Gharbia Governorate and nearby Delta Governorates.

Study sample: According to statistical records of Tanta University Hospitals, the total number of the nursing staff is 4007 (Tanta University Information and Statistics Unit; 2018). The sample size was calculated using Epi Info™ software created by WHO and CDC, Atlanta, Georgia, USA version 7.2.2.6. Assuming that the expected frequency of adequate BLS knowledge among nurses as 34% (Chandrasekaran et al., 2010), with a margin of error of 5 and 95% confidence limit. The least required sample size was 317; it was doubled to compensate for incomplete responses and to increase the accuracy of the study.

The requisite sample was obtained using one stage stratified random sampling method; the Hospitals` Departments were divided into two strata; ICUs including the Emergency Department and Hospital wards, departments were randomly chosen from each stratum. The total sample

size was divided by the weight of the total subjects of each stratum. After excluding the incomplete, unanswered and non-returned questionnaires, the data analysis was done for 510 respondents; with a response rate of 80.44% (510 out of 634). In the Emergency stratum, the sample was 211 nurses while in the Non-Emergency stratum it was 299. The study included nurses who were in service during the study period with work experience for at least 1 year.

Study methods:

Aself-administered structured questionnaire was used for data collection which consisted of two parts:

-Part (1): included the participants` background characteristics such as age, gender, residence, marital status, qualifications, place, and duration of work experience, and previous BLS training and duration since the last training.

-Part (2): to assess BLS knowledge; developed and validated by Chandrasekaran et al., 2010. It consisted of 20 multiple choice questions. Arabic language translation was done, and a jury of six Emergency and Community Medicine experts performed face and content validation. Reliability was assessed using Cronbach`s as 0.812.

The answers were marked utilizing key answers based on the recent guidelines of American Heart Association guidelines,

Correct responses were assigned a mark of "1" while the incorrect response was assigned a mark of "0". Consequently, the highest for the total of knowledge scores for nurses' responses was 20. Since nurses should have sufficient knowledge in this very critical area, so knowledge scores of 15 or more ($\geq 75\%$) were considered as "adequate" knowledge and scores less than 75% were considered as "inadequate" knowledge.

Consent

Informed consent was obtained from all nurses who accepted to participate in the study prior to the distribution of the questionnaires which were filled anonymously. No personal identifiers were included in the forms. Nurses were interviewed and informed regarding the objective of the study, and that the data will be only used for scientific research. Confidentiality of personal data and information was guaranteed.

Ethical approval

The study was approved by Tanta Faculty of Medicine Research Ethics Committee (REC).

Data management

The collected data were analyzed using SPSS 25.0 software (IBM Corp. Released in 2017. IBM SPSS Statistics for Windows, Armonk, NY). Descriptive variables were presented as Mean ± SD, frequency, and percentages. Chi-squarewas used to test for association between categorical variables. Students` t-test was used to compare mean scores. The adopted significance level was p-value <0.05.

Results

Table (1): Socio-demographic and occupational characteristics of the study participants.

Characters (No=510)	No	%
Gender		
Male	59	11.6
Female	451	88.4
Residence		
Urban	212	41.6
Rural	298	58.4
Age groups (years)		
< 40	409	80.2
≥ 40	101	19.8
Mean ± SD	31.59±7.77	
Range	20-55	
Marital status		
Unmarried [a]	139	27.3
Married	371	72.7
Academic Qualification		
Nursing school & health Technical Institute	395	77.5
Bachelor›s degree	115	22.5
Place of current work		
ICUs [b] & Emergency Department	211	41.4
Hospital wards	299	58.6
Duration of work experience (years)		
1-10	308	60.4
>10	202	39.6
Mean ± SD	10.68±7.36	
Range	1-35	

Previous training on BLS		
Yes	218	42.7
NO	292	57.3
If yes, what is the duration since the last training course on BLS? (years)		
< 5	123	24.1
≥ 5	95	18.6
Mean ± SD Range	4.22±2.42 1-10	
Having accredited certification in BLS (No=218)		
Yes	177	34.71
NO	41	8.04

[a] Unmarried including single, divorced and widows.

[b] ICUs: intensive care units.

Table 1 revealed that our study included 510 participants; most of them (88.4%) were females with a mean age of 31.59±7.77 years. Most of the respondents (77.5%) were nursing technicians and about 60% employed in Hospital wards. About 60 % of our study subjects had work experience between 1- 10 years. Formal training courses on BLS were attended by 218 (42.7%) of the study participants, most of them attended the courses during the last 5 years.

Table (2): Association between independent subject variables and level of knowledge about basic life support (BLS).

Characteristics	Adequate knowledge No= (173)		Inadequate knowledge No = (337)		χ^2 p
	No	%	No	%	
Gender					
Male	17	28.8	42	71.2	0.777
Female	156	34.6	295	65.4	0.378

Residence					
Urban	62	29.2	150	70.8	3. 450
Rural	111	37.2	187	62.8	0.060
Age groups (years)					
< 40	143	35.0	266	65.0	1.000
≥ 40	30	29.7	71	70.3	0.317
Academic qualification					
Technical school	124	31.4	271	68.6	4. 999
Bachelor›s degree	49	42.6	66	57.4	**0.025***
Place of current work					
ICUs & Emergency Department	92	43.6	119	56.4	**15.046** **< 0.001****
Hospital wards	81	27.1	218	72.9	
Duration of work experience (years)					
1-10	111	36.0	197	64.0	1.555
>10	62	30.7	140	69.3	0.212
Previous training courses on BLS					
Yes	125	57.3	93	42.7	93.154
NO	48	16.4	244	83.6	**< 0.001****
Duration since last training course on BLS (years)					
< 5	81	65.9	42	34.1	8.365
≥ 5	44	46.3	51	53.7	**0.004***
Total (No = 510)	**173**	**33.92**	**337**		**66.08**
Total knowledge score (Mean±SD)	10.92 ± 3.73				

*: Statistically significant   **: Highly statistically significant

Table 2 showed that generally, the total knowledge score was found to be low, with a mean of 10.92 ± 3.73, considering the maximum score being 20. There were statistically significant associations regarding academic qualification, place of current work, previous training on BLS and duration since the last training course. The higher percentages of the subjects who had adequate knowledge were among those with a Bachelor degree (42.6%), working in ICUs and Emergency Departments (43.6%), and trained nurses on BLS (57.3%) during the last 5 years (65.9%).

Table (3): Nurses` correct responses to BLS knowledge questions in relation to their training status.

Statements	Correct answers				χ^2
	Trained nurses (No=218)		Untrained nurses (No=292)		p
	No	%	No	%	
1. Abbreviation of BLS.	187	85.8	229	78.4	4.49 **0.034***
2. Safety in BLS.	166	76.1	152	52.1	30.86 **< 0.001****
3. Activating EMS.	134	61.5	85	29.1	53.34 **< 0.001****
4. Location of chest compression in adults.	176	80.7	182	62.3	20.21 **< 0.001****
5. Location of chest compression in infants.	125	57.3	148	50.7	2.22 0.136
6. Awareness of CPR without mouth-to-mouth breathing.	121	55.5	116	39.7	12.49 **< 0.001****
7. Rescue breathing in infants.	142	65.1	157	53.8	6.65 **0.010***
8. Depth of chest compression in pediatrics.	133	61.0	93	31.8	43.01 **< 0.001****
9. Depth of chest compression in adults.	132	60.6	140	47.9	7.97 0.005*
10. Location of chest compression in neonates.	138	63.3	114	39.0	29.39 **< 0.001****
11. The rate of chest compression in adults and children.	145	66.5	134	45.9	21.43 **< 0.001****
12. Chest compression/ventilation ratio in adults.	124	56.9	119	40.8	13.01 **< 0.001****
13. Chest compression/ventilation ratio in newborns.	132	60.6	130	44.5	12.84 **< 0.001****
14. Meaning of AED.	130	59.6	155	53.1	2.17 0.140

15. Meaning of EMS.	135	61.9	144	49.3	8.01 **0.005***
16. First response in suspected foreign body obstruction in an adult.	126	57.8	109	37.3	21.05 **< 0.001****
17. First response in the severe form of foreign body obstruction in an infant.	150	68.8	157	53.8	11.78 **0.001***
18. Need of recovery position.	133	61.0	136	46.6	10.43 **0.001****
19. Recognition of stroke and appropriate immediate action.	109	50.0	113	38.7	6.46 **0.011***
20. Recognition of ACS and appropriate immediate action.	136	62.4	123	42.1	20.50 **<0.001****
Total knowledge score (Mean±DS)	12.99±3.272		9.37±3.274		t=12.37 **<0.001****

BLS: Basic Life Support.   EMS: Emergency Medical Services.

CPR: Cardiopulmonary Resuscitation.   AED: Automated External Defibrillator.

ACS: Acute Coronary Syndrome

*: Statistically significant   **: Highly statistically significant

Table 3 revealed a statistically significant difference regarding total knowledge score between trained (3.272±12.99) and untrained nurses (3.274±9.37) on BLS with significant associations between frequencies of correct answers and training on BLS.

Discussion

As nurses are commonly the first healthcare professionals in a hospital to recognize that a patient is in cardiac arrest, they must have adequate knowledge of BLS together with the relevant skills (Hamilton, 2005; Lima et al., 2009; and Marzooq and Lyneham, 2009).

Our study included 510 participants; the majority of them were females (88.4%) (Table 1). This was in accordance with the results reported by Ehlers and Rajeswaran, 2014 in their study on cardiopulmonary resuscitation knowledge and skills of registered nurses in Botswanaand, they detected that most of the studied group were females. Also, Varughese and D'Silva, 2018 in their work about knowledge and perspective on CPR among staff nurses, declared that most of their study group was females.

The present study revealed that most of our respondents (80.2%) were less than 40 years old and more than half of them (60.4%) had work experience from 1 to 10 years, with 57.3% of the respondents did not attend any formal BLS training courses (Table 1). These findings were in agreement with Ehlers and Rajeswaran, 2014, who reported that the majority of their respondents were between 23 and 40 years old, and they had 2 to 10 years' experience with 52.0% of the respondents, had no formal training on CPR.

In our study, the knowledge scores of our respondents were low with a mean of 10.92±3.73 and about two-thirds of them (66.08%) had inadequate knowledge level (Table 2). These findings may be attributed to the absence of pre-employment orientation programs, in-service training courses and increased workload which could hinder their ability to keep their knowledge updated.

Our results were close to that reported by Parajulee and Selvaraj, 2011 who found low overall total knowledge scores with a mean of 11.45 ± 2.67. Also, Marzooq and Lyneham 2009 and Al Kary et al., 2007 had documented poor knowledge scores among the nurses regarding BLS.

The current work revealed no significant differences in BLS knowledge level and gender (Table 2). This was in accordance with Ehlers and Rajeswaran, 2014.

In the current study, a statistically significant association was detected between the BLS knowledge level and academic qualification of the respondents (Table 2). Our results were supported by Salameh et al., 2018 who found a significant relationship between nurses' level of education and BLS knowledge scores; where bachelor`s group had the highest mean. Also, Marzooq and Lyneham, 2009 found that nurses with less educational qualifications had poor knowledge.

In contrary to our results, Bajracharya and Nagarkotil, 2016 in their study on knowledge regarding basic life support among nurses of a tertiary level hospital in Nepal; concluded that there was no association between nurses' knowledge and their academic qualification.

In our research, we reported a statistically significant association between the BLS knowledge level and the current workplace of respondents, where a higher percentage of nurses employed in ICUs and Emergency Departments (43.6%) achieved adequate BLS knowledge level compared to those in Hospital wards (27.1%) (Table 2). This was consistent with the findings of Gonzi et al., 2015 in their study about the correlation between the quality of cardiopulmonary resuscitation and self-efficacy and concluded that "learning through doing" enhances self-confidence and provides in-depth knowledge by placing individuals in the situ-action of dealing with BLS on a regularly whenever it is required.

Also, our results were corroborated by Parajulee and Selvaraj, 2011 and Salameh et al., 2018 who found a significant relationship between the work sites, and the total mean of BLS knowledge scores with ICUs and Emergency Departments which had the highest mean. This could be explained that nurses who are daily performing BLS in emergency units in real-life situations retained knowledge and skills better than nurses working in other departments (Hamilton 2005 and Edgren and Adamson 2009).

The current study revealed no significant association between BLS knowledge level and nurses 'years of experience (Table 2). This finding was supported by Bajracharya and Nagarkotil, 2016 and Salameh et al., 2018 who reported a non-significant association between nurses' work experience and the total mean of BLS knowledge scores.

In contrast to our results, Al Kary et al., 2007 and Marzooq and Lyneham, 2009 found that nurses with less experience had poor knowledge. Also, a study conducted in Belgium by Verplancke et al., 2008 on the determinants of the quality of basic life support among hospital nurses; detected that accumulated work experience was associated with enhanced CPR skills and knowledge.

BLS training is essential in nursing practice as supported by O'Donnell, 1990 who showed that the nurses who joined post-qualification training in resuscitation recorded significantly better knowledge in this area and were more self-confident of their resuscitation skills. In the current study, we found a significant association between the knowledge level and training courses attendance on BLS (Table 2) also the difference between means of knowledge score of trained (12.99 ± 3.27) and

untrained nurses (9.37±3.27) was found to be statistically significant (P <0.001) (Table 3). Our results agreed with the findings of Chaudhary et al., 2011 and Khan et al., 2015 who reported that BLS training is highly effective and made a statistically significant difference in the knowledge of professional nurses and updating their knowledge as well.

Also, the current results were consistent with that of Broomfield, 1996 who stated that nurses should possess the exact knowledge through the education on the changed contents of the revised guideline and through the periodic reeducation on the new guideline, to improve the insufficient knowledge. The education must be provided to them often. Considering the study results reported by Kim et al., 2009 Yoo and Yu,2011; who stated that the higher knowledge is, the higher performance ability gets, so knowledge education for enhancing the performance ability of CPR is very important.

Our study revealed that 65.9% of respondents who attended training courses on BLS during the last 5 years achieved a higher knowledge level compared to 46.3% from earlier courses' attendants (Table 2). These results were supported by previous studies which have emphasized that BLS knowledge skills diminish over time and BLS training should be provided each 3–6 months to avoid deterioration of CPR skills and knowledge (Hamilton 2005; Edgren and Adamson 2009).

Yildirim and Celik, 2008, found that there were significant differences between the nurses` average scores achieved on the CPR testing depending on when they received the training. The nurses' knowledge might have lapsed next to a certain period. Guaranteeing the sustainability of this knowledge is vital for correct and reliable CPR skills. In the study done by Celik, 2008, the author emphasized the need for assessment of CPR knowledge and skills every 6 to 12 months. Also, in the same study, a significant decline in the knowledge preservation level was found after the resuscitation course by 10 weeks.

Conclusion and recommendations:

The knowledge level of BLS was found to be inadequate among the majority of the nursing staff at Tanta University Hospitals which could be attributed to lack of in-service training and recertification on BLS, and fixed work placement of nurses through their service period inside the Hospital Departments`. So, regular in-service training and recertification of BLS competency are critically recommended in addition to rotating work schedule between ICUs, emergency departments and other non emergency hospital wards.

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