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Impact of Continuing Medical Education on Health Care Provider Performance in a Medical University, Karachi, Pakistan.

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Abstract:

Introduction: Basic life support (BLS), is the chain of survival and decreases the rate of cardiac arrest; health care professionals should know at least how to perform BLS individually as they may encounter such emergency very often. In the developed world, sudden cardiac death represents the single largest cause of natural death accounting for 12–18% of total mortality and 50% of cardiac mortality.
Objectives: To determine the level of awareness regarding Basic Life Support and knowledge of involved skills and its practice among medical and non-medical personnel.
Methodology: A retrospective study conducted by using valid questionnaire regarding Basic Life Support by 323 personnel. The results were analyzed with SPSS version 16.
Results: Twenty-five questions were used to assess the level of knowledge/awareness and skills after BLS training. The percentage of correct answer varied from 33.1% to 95.7% for knowledge related items; and for skills items, it was varied from 35.3% to 68.4%.
Conclusion: We recommend that Cardio Pulmonary Resuscitation/Basic Life Support should be a basic skill across all medical and non-medical personnel.

Key words: Cardio-pulmonary resuscitation, Basic Life Support, KAP.

Introduction:

The Cardio vascular diseases are the group of heart and blood vessels disorders. Myocardial infarction and strokes are usually acute events and are mostly caused by a blockage that prevents blood from flowing to the heart or brain. Sudden cardiac arrest (SCA) is one of the leading cause of death worldwide and the reduction of mortality from cardiac arrest in the community remains remain a challenge (WHO)[1].

Cardiovascular disease is the most important global cause of death, accounting for more than 17.3 million deaths annually in 2013, expected to rise more than 23.6 million by 2030[2]. In 2010, the estimated global cost of cardiovascular disease was $863 billion, and it is estimated to grow more than $1044 billion by 2030. In United States alone, 300,000 people die from cardiac arrest. Approximately 790,000 people have heart attacks each year. Therefore, around 114,000 will die. The estimated incidence of heart attack per annum in the US is 580,000 new attacks and 210,000 recurrent attacks. Average age at the first heart attack is 65.3 years for males and 71.8 years for females. Around every 40 seconds, an American will have a heart attack[3]. The average age of sudden death cases reported in Seattle, Washington, and Maastricht, Holland, is 66 years and 62 years, respectively, and the incidence of SCA increases with age. Men are two to four times more affected than women (age-adjusted mortality). Clinical epidemiologic studies conducted over the past five years have identified a variety of factors that are associated with an increased risk of sudden cardiac death in the society[3].

Basic life support (BLS), is the chain of survival and decreases the rate of cardiac arrest. Health care professionals should know at least how to perform BLS individually as they may encounter such emergency very often. In the developed world, sudden cardiac death represents the single largest cause of natural death accounting for 12–18% of total mortality and 50% of cardiac mortality. In the United States, BLS training has been recommended for all health care professionals since 1966, especially for those who are member of recuse team. The demand of BLS courses is rapidly increasing in worldwide. Current years, several publications have highlighted that the shortages in CPR quality, both out-of-hospital and in-hospital, which have partly been addressed in the latest BLS guidelines[4].

Basic life support (**BLS**): It is a level of medical care given to victims to restore cardiac circulation after sudden cardiac arrest; they give full medical care until they reach at a hospital. It can be provided by trained medical personnel, including emergency medical technicians, paramedics, and by qualified bystanders. Resuscitation skills have progressed into a proper protocol, which includes cardiopulmonary resuscitation (CPR) commonly known as Basic Life Support (BLS)[5]. CPR quality is not satisfactory in some hospitals, and the healthcare providers have inadequate knowledge about CPR, particularly proper thoracic compression and escaping from continuous hyperventilation. CPR training is a major part of medical courses, but the most effective method of training is still unclear and depends on trainees' groups and previous theoretical knowledge of CPR among them. Although the importance of BLS, studies has shown that these skills are not acquired sufficiently [6]. Acquisition of BLS skills can be difficult. One study reported that untrained rescuers performed only 1.7% of rescue breaths and 3.5% of chest compressions correctly immediately after instruction. Ventilation technique has been recognized to be poorly acquired with ventilation flow rates tending to be in excess of guidelines. Retention of BLS skills is also poor, particularly chest compressions and rescue breaths[7]. Unluckily only 1 in 5 adults survive in-hospital from cardiac arrest[8]. In South Asia, Pakistan being a developing country needs strong emergency medical services for cardiac arrest.[9.10] Sudden cardiac deaths (SCD) occur approximately 40 cases 100,000 peoples yearly in each country of Asia. Myocardial infarction and ventricular fibrillation are cause of cardiac arrest among out-of-hospital death[11]. One Pakistani die every hour due to heart attack while more than one third (34 per cent) of all deaths in Pakistan are caused by cardiovascular diseases (CVDs), making it the leading non-communicable disease in the country.

The aim of this study to determine the knowledge in health care providers about BLS and improvement in CPR skills, both having considerable impact on mortality.

Methodology:

A retrospective study was conducted by assessing the responses to 25 selected questions regarding BLS, among medical and non-medical personnel. Data was analyzed on Statistical Package for the Social Sciences (SPSS) version 16.0. The duration of study was Jan 2016 to Dec 2017. The target population was medical and non-medical personnel. The study was conducted at Dow University of Health Sciences, Dow Institute of Health Professional Education/ Professional Development Centre.

A questionnaire with 25 questions regarding the awareness and skills involved in Basic Life Support was used to assess the level of awareness about Basic Life Support and its hands-on practice. The aspects covered by these questions were about the abbreviation of AED (Automatic External Defibrillator) and EMS (Emergency Medical Service), sequential steps in Basic Life Support, assessment and resuscitation techniques with regard to airway, breathing, circulation in unresponsive victims of different age groups, techniques regarding obstruction removal (choking), recognition of early signs of acute coronary artery disease.

After excluding the incomplete question forms the data of 323 responders was analyzed. Permission was taken from Head of the Department before involving the healthcare provider and non-healthcare provider. The results were analyzed using an answer key prepared from the basic life support booklet.

Results:

Three hundred and sixty-five participants enrolled in BLS training program during 2016-2017. Among them, 42 cases were excluded from the study due to missing information that comprised final data sample of 323 individuals. Of 323 participants, 107 were faculty members of clinical and basic medical sciences, 158 were of dentistry, 39 were registered nurse, and 19 were of non-medical background. Among all the participants, 142 (44.0%) were male and 181 (56.0%) were female. Questionnaire having twenty-five questions were used to assess the level of knowledge/awareness and skills after BLS training. Table 1 presents the percentages of correct knowledge about each item used in assessment procedure. The percentage of correct answer varied from 33.1% to 95.7% for knowledge related items; and for skills items it varied from 35.3% to 68.4%. For knowledge related items, participants reported less than 50% correct knowledge. Similarly, participants showed less correct knowledge for three skills related items. (See Table 1)

Table 1: Descriptive of study participants according BLS training evaluation (n=323)

BLS Evaluation	Correct Answer	Wrong Answer
	n (%)	n (%)
Knowledge Evaluation		
Item 1	183 (56.7)	140 (43.3)
Item 2	107 (33.1)	216 (66.9)
Item 3	225 (69.7)	98 (30.3)
Item 4	224 (69.3)	99 (30.7)
Item 5	107 (33.1)	216 (66.9)
Item 6	118 (36.5)	205 (63.5)
Item 7	165 (51.1)	158 (48.9)
Item 8	171 (52.9)	152 (47.1)

Item 9		164 (50.8)	159 (49.2)
Item 10		282 (87.3)	41 (12.7)
Item 11		228 (70.6)	95 (29.4)
Item 12		208 (64.4)	115 (35.6)
Item 13		309 (95.7)	14 (4.3)
Item 14		179 (55.4)	144 (44.6)
Item 15		194 (60.1)	129 (39.9)
Skills Evaluation		**n (%)**	**n (%)**
Item 1		143 (44.3)	180 (55.7)
Item 2		219 (67.8)	104 (32.2)
Item 3		221 (68.4)	102 (31.6)
Item 4		114 (35.3)	209 (64.7)
Item 5		170 (52.6)	153 (47.4)
Item 6		196 (60.7)	127 (39.3)
Item 7		199 (61.6)	124 (38.4)
Item 8		176 (54.5)	147 (45.5)
Item 9		122 (37.8)	201 (62.2)
Item 10		185 (57.3)	138 (42.7)

Furthermore, levels of knowledge and skills were also assessed based on their professional knowledge. Analysis was stratified on their professions; medical, dentistry, nursing and non-medical. Results showed that significant differences (p-value <0.05) were observed between each profession for both knowledge and skills related items except few knowledge related items. Participants having medical profession reported higher percentage of correct answer as compared to those who have non-medical profession. See Table 2.

Table 2: Frequency and percentages of correct answers in BLS post training evaluation

BLS Evaluation	Medical	Dentistry	Nursing	Non-medical	
	n (%)	n (%)	n (%)	n (%)	p-value*
Knowledge Evaluation					
Item 1	76 (71.0)	75 (47.5)	29 (74.4)	3 (15.8)	<0.001
Item 2	38 (35.5)	52 (32.9)	13 (33.3)	4 (21.1)	0.675
Item 3	89 (83.2)	89 (56.3)	33 (84.6)	14 (73.7)	<0.001
Item 4	78 (72.9)	112 (70.9)	23 (59.0)	11 (57.9)	0.266
Item 5	44 (41.1)	58 (36.7)	5 (12.8)	0 (0)	<0.001
Item 6	46 (43.0)	43 (27.2)	21 (53.8)	8 (42.1)	0.004
Item 7	75 (70.1)	68 (43.0)	18 (46.2)	4 (21.1)	<0.001
Item 8	69 (64.5)	74 (46.8)	25 (64.1)	3 (15.8)	<0.001
Item 9	59 (55.1)	72 (45.6)	27 (69.2)	6 (31.6)	0.014
Item 10	85 (79.4)	146 (92.4)	33 (84.6)	18 (94.7)	0.012
Item 11	68 (63.6)	127 (80.4)	18 (46.2)	15 (78.9)	<0.001
Item 12	77 (72.0)	106 (67.1)	11 (28.2)	14 (73.7)	<0.001
Item 13	100 (93.5)	154 (97.5)	37 (94.9)	18 (94.7)	0.458
Item 14	82 (76.6)	75 (47.5)	18 (46.2)	4 (21.1)	<0.001
Item 15	83 (77.6)	74 (46.8)	32 (82.1)	5 (26.3)	<0.001
	n (%)	**n (%)**	**n (%)**	**n (%)**	**p-value**
Skills Evaluation					
Item 1	56 (52.3)	62 (39.2)	21 (53.8)	4 (21.1)	0.018
Item 2	87 (81.3)	95 (60.1)	29 (74.4)	8 (42.1)	<0.001
Item 3	85 (79.4)	110 (69.6)	23 (59.0)	3 (15.8)	<0.001
Item 4	56 (52.3)	41 (25.9)	12 (30.8)	5 (26.3)	<0.001
Item 5	75 (70.1)	64 (40.5)	28 (71.8)	3 (15.8)	<0.001
Item 6	89 (83.2)	70 (44.3)	29 (74.4)	8 (42.1)	<0.001
Item 7	55 (51.4)	116 (73.4)	23 (59.0)	5 (26.3)	<0.001
Item 8	77 (72.0)	62 (39.2)	31 (79.5)	6 (31.6)	<0.001
Item 9	63 (58.9)	47 (29.7)	7 (17.9)	5 (26.3)	<0.001
Item 10	72 (67.3)	77 (48.7)	31 (79.5)	5 (26.3)	<0.001
*p-value calculated using Chi-square analysis					

Further, post training knowledge was also assessed using mean scores for each participant, stratified on their profession. Results showed that participants with medical profession reported high mean scores regarding knowledge (mean ±SD: 9.99 ±2.82) followed by profession nursing (8.79 ±1.83), dentistry (8.38 ±3.79), and non-medical participants (6.68 ±2.70). However, similar results were found for skills based related evaluation. Post training knowledge scores were significantly different among participants of different profession, (P-value <0.05). (See Table 3, figure1 and figure2)

Table 3: Total scores in BLS training regarding knowledge and skills-based evaluation (n=323)

	Medical	Dentistry	Nursing	Non-medical	
	mean ± SD	mean ± SD	mean ± SD	mean ± SD	p-value*
Knowledge based evaluation	9.99 ± 2.82	8.38 ± 3.79	8.79 ± 1.83	6.68 ± 2.70	<0.001
Skills based evaluation	6.68 ± 2.44	4.70 ± 3.27	6.00 ± 2.16	2.73 ± 3.17	<0.001
*p-value calculated using ANOVA test for mean comparisons.					

Fig 1

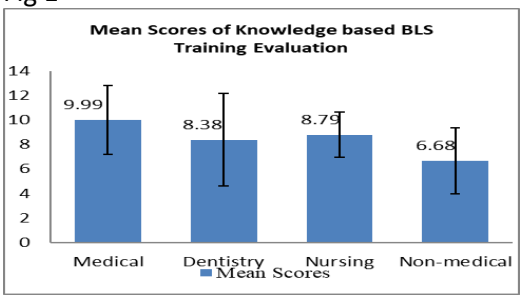
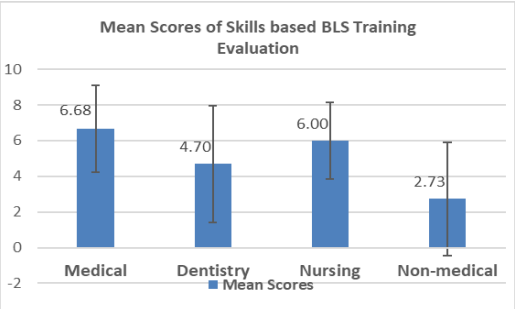


Fig 2



Discussion: Sudden cardiac arrest due to coronary artery disease is the third global burdened disease ranked by WHO and will be the leading fatal disease till 2020. Sudden cardiac arrest has killed millions of people's worldwide[12]. Sudden cardiac arrest is defined as the death occurring due to sudden circulatory collapse.

The current study compared the knowledge and skills of Basic Life Support among medical and non-medicals at the end of the training course in Professional Development Centre at Dow International Medical College, DUHS. We found that Basic Life Support (BLS) training course could significantly increase the knowledge of medical and non-medical enabling them to diagnose several life-threatening emergencies and provide Cardio Pulmonary Resuscitation (CPR) in a safe, timely, and effective manner[13]. The impact of adequate knowledge on the accuracy and quality of Basic Life Support/Cardio Pulmonary Resuscitation has been shown in studies [14]. In addition, early institution of CPR can usually increase the victim's chance of survival from sudden cardiac arrest[15,16]. Knowledge and skill of CPR after BLS training is improved. It is also a fact that after graduation, training of resuscitation skills is difficult due to busy schedules and lack of teachers and resources in developing countries like ours. It is stated[17]state that those who were involved in resuscitation frequently secured significantly higher median score in comparison to those who were rarely involved or not involved at all. 18. C.W. Flesche et al[18] also highlighted this same issue with identical results. The result of current study for nonmedical are in agreement with the result of the study conducted by Flesche C et al [18]. It is observed that with CPR, survival rates can be as high as 49 to 75% after given the first shock [19,20], while missing or delay in the diagnosis of sudden cardiac arrest will reduce the patients' survival rate to zero within about 10 minutes[21]. Therefore, with a simple course we could improve skills of BLS in medical and non-medicals. The study conducted by Flesche et al[18], has shown that only 50% medical student trained in BLS on Cardio Pulmonary Resuscitation manikins and 3% lay person trained in Basic Life Support were able to assess unresponsiveness and carotid pulse within 30 seconds[22,23]. These steps, apparently simple, have many important effects on the Cardio Pulmonary Resuscitation outcome. Hence, Basic Life Support training may improve these essential skills in medical students. In addition, the findings of this study showed a significant improvement in Cardio Pulmonary Resuscitation skills except depth of hand position and chest compression. The less improvement in correct hand position and depth of chest compression may be due to previous knowledge of the students in this study. In conclusion, Cardio Pulmonary Resuscitation workshops and use of manikin for Cardio Pulmonary Resuscitation training can improve medical students' skills and should be considered as mandatory part of training in medical courses [24,25].

This study has exposed a serious issue that the average health personnel in our region lacks adequate knowledge and skill in Cardio Pulmonary Resuscitation/Basic Life Support. The situation can be reversed back by simple Basic Life Support Training. It must be a part of regular CME/CPD for medical and non-medical personnel.

In conclusion, we recommend that Cardio Pulmonary Resuscitation/Basic Life Support should be a basic skill across all medical and non-medical personnel.

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