UDC 61

The Basic Life Support Training and Its Importance for Medical University Staff

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Abstract

Background

The survival rate of a cardiac arrest victim increases with basic life support (BLS) as the first level of medical care. The purpose of this study was to compare BLS knowledge and skills of medical university staff before and after training course.

Methods

Thirty eight medical university staff participated in a BSL training course. The course included the assessment of participant's knowledge by a pretest questionnaire, a lecture, hands-on training in BLS skills, a post-test questionnaire and an interview to evaluate their attitudes. Data were analyzed by the SPSS software version 19, using t-test, one-way ANOVA and chi square tests. P value less than 0.05 was considered statistically significant.

Results

Our results demonstrated that the mean knowledge score was 6.00 ± 2.09 vs. 8.26 ± 2.10 in pre- and post- education, respectively. A significant mean gain score (2.26) from the pre-test scores to post-test scores was statistically observed (P<0.05). According to the results, 23.68% of trainees had an ineffective level and 76.32% of them had an effective level. No differences were statistically found between trainees' gain scores and effectiveness level in terms of gender, age, work experiences and the prior first aid training experience (p>0.05) whereas, there were the significant differences between trainees' gain scores and, education and career fields(p< 0.05). Our result also presents that staff attitudes toward the training were positive.

Conclusion

The present research shows the BLS training had a positive impact on the knowledge and attitudes among university staff. BLS training is extremely useful for medical university staff.

Keywords: attitude, basic life support, first aid training, heart attack, knowledge, medical university staff.

Introduction

Cardiovascular diseases (CVD) are a world leading cause of death. In 2010, CVD was responsible for 18.1 million deaths, representing 30.8% of global deaths [1-3]. In some developing countries, heart disease is the primary cause of mortality [4-6] and nearly 80% of CVD deaths occurring in low- and middle-income countries [3;7]. It is predicted that by 2030 over 23.3 million people will die from CVDs annually [8;9]. In Iran, approximately, 70000 people die annually from heart and blood vessel diseases, 38 to 46 percent of all deaths [1;10;11]. The modifiable risk factors for CVD include physical inactivity, hypertension, unhealthy diet, obesity, cigarette smoking, risky alcohol consumption, illegal drug use and diabetes [8; 11- 14].

Heart attack or myocardial infarction(MI) is the most common form of cardiovascular disease with sudden interruption or insufficiency of the blood supply to the heart (coronary heart disease or CHD)**,** typically resulting in death or damage of heart muscle [13-15] that can be fatal [15-17].

The heart attack warning signs include chest pain burning, pressure or tightness, pain elsewhere in the body such as the left upper arm, shoulder, jaw or back (referred pain), fainting, nausea and vomiting, shortness of breath (dyspnea), extreme weakness, rapid or irregular heartbeats, light-headedness and heavy sweating (diaphoresis) [13-16;18]. However, heart attack can occur without any symptom, which is called a "silent" heart attack [15; 16].

It is estimated that more than 95 percent of cardiac arrest victims die before reaching the hospital. Almost three-quarters of these sudden deaths occur at home. [18;19]. With every passing minute from the arrest time without cardiopulmonary resuscitation (CPR) and defibrillation, the survival rate of a cardiac arrest victim falls 7 to 10 percent and the heart stops pumping blood can damage the brain in just 4 to 6 minutes after cardiac arrest. [19-21]. Moreover, 10 minutes after of cardiac arrest, few resuscitation attempts can succeed; it is clear that time is valuable in a sudden cardiac arrest emergency [19;20;22]. In most crowded cities, precious minutes quickly pass for reaching emergency medical help or ambulance. What to do to save a life?

"*If any one saved a life, it would be as if he saved the whole humanity*" [23].

One of the ways to save the heart attack victims is to improve people's awareness of the heart attack risk factors and symptoms by holding short courses, and to train laypersons in basic life support (BLS) skills that is the most crucial step in medical care and the foundation for saving lives following sudden cardiac and respiratory arrest [13;18;24].

Studies on general knowledge of the population about cardiovascular diseases, heart attack symptoms, basic life support skills have been conducted in some countries [5;17;25-27] and the some results have evinced poor awareness of CVD and BLS among doctors**,** medical students, paramedics, university staff [28-34].

Many professions such as academic and university staff require to be trained in the first aid techniques and acquire health-related knowledge because most people expect those who working in medical school have the knowledge and BLS skills. Hence, the purpose of the present study is to compare BLS knowledge and skills of university staff before and after training course, and to evaluate the impact of BLS training on the staff in International Branch of Shiraz University of Medical Sciences. The relationship between trainees' knowledge level and demographic characteristics was evaluated.

Experimental Procedure

The cross-sectional and Quasi-experimental (Pretest/Post-test design) study was carried out among staff attending a basic life support training organized at the International Branch of Shiraz University of Medical Sciences, in 2013.

The study was approved by Institutional Ethics Committee. The participation was voluntary. A written, informed consent was obtained from all participants.

The five hour course was conducted in three fields including heart attack symptoms and risk factors, the prevention of heart disease and stroke, and BLS demonstration such as the basic steps of CPR using hands-on CPR feedback manikins [13;18;24].The lecture, along with PowerPoint slides, videos, problem solving and practical training in small groups, was offered by a professional physician and first aid trainers.

To assess the effectiveness of the training, a questionnaire, based on the American Heart Association (AHA) guidelines[35;36], the lecture's goals and content, and other published studies

[17;37], was designed which consisted of 18 questions, 6 questions to gather the trainees' background and demographic information, and the other 12 questions to evaluate their baseline relevant knowledge.

The validity of this questionnaire was approved by emergency medicine specialists and cardiologists. To assess instrument reliability, 1- week test-retest reliability was performed for a different sample of 10 individuals. The Cronbach's alpha was 0.85.

We requested each trainee to complete pre and post-test questionnaires carefully.

Trainees had 15 minutes to fill the pre-test questionnaires before the course started. Immediately after the course, participants were given 15 minutes to fill the post-test questionnaires. Furthermore, the practical CPR steps were accomplished on the CPR manikins by the trainees whose activities were checked and corrected by the mentors.

At the end of training course, the trainees' opinions and attitudes toward BLS training were also evaluated by the mentors via interview.

The total score ranged from 0 to 12 (correct answer=1, incorrect answer =0). The effectiveness of training was showed on the basis of the trainees' gain score (Gain score = posttest score – pretest score), which was categorized into ineffective (0 and -1), low effect (1 to 3), average effect (4 to 6) and high effect (7 to 12) levels.

Data were analyzed by the SPSS software version 19, using t-test, Analysis of Variance (one-way ANOVA) and chi square tests. P value less than 0.05 was considered statistically significant.

Results

38 out of 42 trainees, 20 males and 18 females, filled in the two questionnaires. The trainees' demographic characteristics are shown in the Table 1.

Table 1: The trainees' demographic characteristics (n = 38)

Characteristic	Numbers	Percent (%)
Age (years)		
< 25	1	2.6
25-30	17	44.7
30-**35**	16	42.1
35-**40**	3	7.9
> 40	1	2.6
Gender		
Male	20	52.6
Female	18	47.4
Education(in Iran)		
Less than high school degree	8	21.1
High school degree(diploma)	10	26.3
Fogh-e-Diplom degree	4	10.5
Bachelor degree	15	39.5
Master degree	1	2.6
Work experience(years)		
<1	4	10.5
1-3	12	31.6
3-**5**	12	31.6
>5	10	26.3
Career fields		
Office of Educational affairs	2	5.3
Laboratory	2	5.3
Office of Research affairs	2	5.3
Office of Student affairs	8	21.1
Administrative affairs	6	15.8
Housekeeping	10	26.3
Office of Financial affairs	1	2.6
Security	6	15.8

IT service	1	2.6
prior first aid training experience		
Yes	32	84.2
No	6	15.8
-The bold number of the age and work experience parts included these years.		

The pre-test and post-test scores and mean gain score

The results show a significant increase in mean post-test score (8.26 ± 2.10) compared with the mean pre-test score (6.00 ± 2.09), as shown Table 2 (P<0.05). The mean gain score is calculated 2.26± 2.16.

Table 2 also demonstrates that 76.3% of trainees had the positive gain score vs. 15.8% have the negative gain score. According to the results, 7.9% of them have zero gain score.

The positive gain score of the most trainees (52.6%) range from 1-3.

13.2% of the trainees have the lowest pre-test score (0-3) while zero percent of them have the lowest post-test score. The highest pre-test and post-test scores ranged from 9-12 are seen in 2.6% and 34.2% of trainees, respectively (Table 2).

Table 2: Frequencies and comparison of mean and standard deviation (M±SD) of knowledge score before and after BSL training

The range of Scores	Numbers	Percent (%)	Mean ± SD	P value
pre-test score				
0-**3**	5	13.2		
3-**6**	14	36.8	6.00 ± 2.09	
6-**9**	18	47.4		
9-**12**	1	2.6		
post-test score				
0-**3**	0	0		
3-**6**	11	29	8.26 ± 2.10	
6-**9**	14	36.8		
9-**12**	13	34.2		
Gain score				
-1	6	15.8		
0	3	7.9		
1- 3	20	52.6	2.26± 2.16	0.000*
4-6	7	18.4		
7-12	2	5.3		
-The bold number of the pre-test and post-test scores parts included these scores. pre-test score: The knowledge score before BSL training course. post-test score : The knowledge score after BSL training course. Gain score: The difference between pre-test and post-test scores. * statistical significance was defined as P < 0.05				

The highest positive gain score is 8, belonging to one woman with more than 5 years experience in office of educational affairs.

The Effectiveness level of BLS training

23.68% of trainees have an ineffective level and 76.32% of those have an effective level although 52.63%, 18.42% and 5.62% of trainees have low, average and high effect levels, respectively.

The mean gain score and trainees' characteristics

No differences are found between trainees' gain scores and in terms of gender (p=0.74), age (p=0.58), work experiences (p=0.29) and prior first aid training experience (p=0.77) whereas, there are the significant differences between trainees' gain scores and, education (p=0.031) and career fields (p= 0.035), as shown in Table 3.

After the course, 90% of trainees perform the CPR correctly, while before the course only 1% of the trainees are able to do it correctly.

The effectiveness of BLS training and trainees' characteristics

No differences are seen between the effectiveness of BLS training and in terms of trainees' gender (p=0.34), age (p=0.96), work experiences (p=0.28) and prior first aid training experience (p=0.85) whereas, there are the significant differences between the effectiveness of BLS training and, trainees' education (p=0.073) and career fields (p= 0.005), as shown in Tables 4, 5 and Fig 1.

Our result also presents that staff attitudes toward the CVD and BLS training course are positive. All staff are not reluctant to perform CPR when needed.
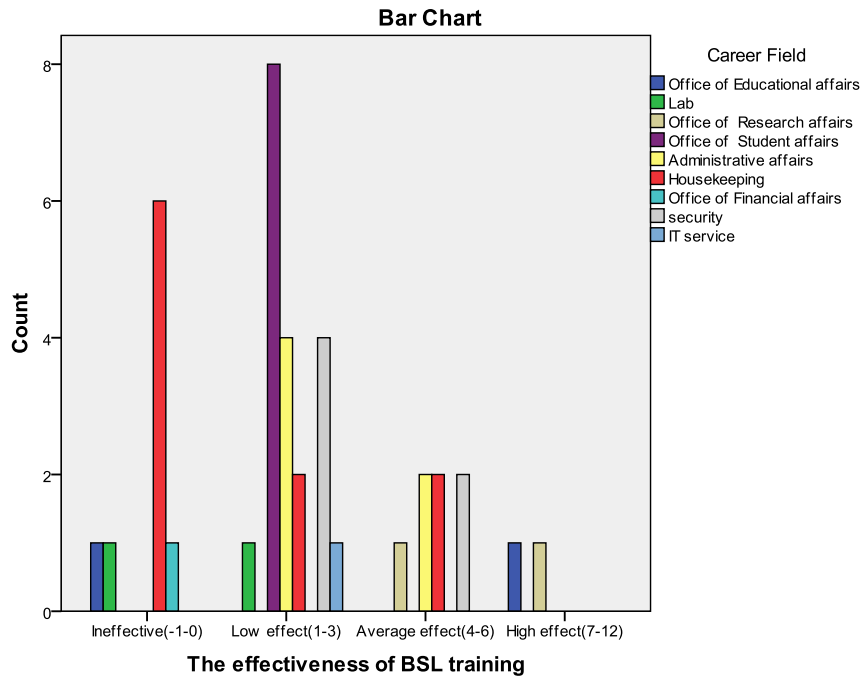

Fig. 1. Effectiveness of BSL training at four levels basis on trainees' career fields. **P value**=0.005

Ineffective level: gain score= -1 and 0, Low effect level: gain score=1-3, average effect level: gain score=4-6 and High effect level: gain score=7-12. Count= Number of trainees

Discussion

As most people expect the medical academic and university staff to have the knowledge and skills regarding the first aid techniques such as maintaining open airways, supporting ventilation, and controlling bleeding, they should perform the first aid techniques in life-threatening emergency situations. Some investigators have suggested that the program provides with basic knowledge and adequate practical skills in BLS [28-34]. The present research is about a basic life support and cardiovascular emergencies training course for the university staff.

According to the results, the trainees' pretest mean gain score show their knowledge level was average, while after the training course they get, 2 points more. Therefore, the course help improve their knowledge level in a significant way.

Other researches meant to assess the efficiency of basic life support and cardiovascular emergencies training, have found out that the interventional training courses help improve the participants knowledge level [2; 27; 31; 37-42].

We are now going to discuss the effectiveness level of our training course to find out if it is related to the trainees' personal and professional characteristics.

Mean Gain Score, Effectiveness of BLS training and their relationship with age

The trainees' mean gain scores and effectiveness levels, classified according to the age, are shown in Tables 3 and 4, respectively. 55.6% of trainees with an ineffective level are in the age group 30-35. Trainees aged under 25 have the highest score (mean gain score: 3), and those in the age groups 35-40 and over 40 have the lowest score (mean gain score: 1). However, there is no

significant difference between the different age groups in terms of effectiveness level and mean gain scores. The results also show no significant difference in mean gain score varied inside each of age groups. For example, in the age group 25-30, the mean gain score ranges from -1 (the lowest) to 8 (the highest). This can lead to the conclusion that learning capacities have more to do with the motivation than age, although people are expected to care more about learning these kinds of skills with age.

Mean Gain Score, Effectiveness of BLS training and their relationship with gender

Although there is no significant statistic difference between male (2.15) and female's (2.39) mean gain score (P value=0.74, Table 3), 100 % of trainees with high effect level are female and 55.6% of those with a ineffective level are male (Table 4). The result show that in low effect level, the percentage of males and females is equal (50%), and in the average effect level, 71.4% of trainees are male. Generally speaking, the gender doesn't seem to affect the effectiveness level and gain score of trainees in a significant way. The fact that the two sex groups have taken the training seriously is a positive point but female trainees care more about the details.

Table 3: Mean and standard deviation of gain score based on trainees' characteristics

Characteristic	N	Mean Gain Score	Std. Deviation	Minimum	Maximum	P value
Age (years)						
< 25	1	3.00	-	3	3	
25-30	17	2.82	2.243	-1	8	0.58
30-**35**	16	1.94	2.205	-1	7	
35-**40**	3	1.00	1.732	-1	2	
> 40	1	1.00	-	1	1	
Gender						
Male	20	2.15	1.92	-1	5	0.74
Female	18	2.39	2.45	-1	8	
Education (in Iran)						
Less than high school	8	0.63	2.06	-1	4	
degree	10	3.00	1.41	0	5	
High school	74	1.75	1.89	-1	3	0.031*
degree(diploma)	15	3.00	2.20	0	8	
Fogh-e-Diplom degree	1	-1.00	-	-1	-1	
Bachelor degree						
Master degree						
Work experience (years)	4	3.50	1.00	3	5	
<1	12	1.50	2.02	-1	4	0.29
1-3	12	2.08	1.83	-1	4	
3-**5**	10	2.90	2.80	-1	8	
>5						
Career fields						
Office of educational affairs	2	3.50	6.36	-1	8	
Laboratory	2	0.00	1.41	-1	1	
Office of research affairs	2	5.50	2.12	4	7	
Office of student affairs	8	2.13	0.64	1	3	0.035*
Administrative affairs	6	3.33	1.03	2	5	
Housekeeping	10	0.90	2.13	-1	4	
Office of financial affairs	1	0.00	-	0	0	
Security	6	3.17	1.16	2	5	
IT service	1	3.00	-	3	3	

prior first aid training experience						
Yes	32	2.22	2.22	-1	8	0.77
No	6	2.50	1.97	-1	5	

-The bold number of the age and work experience parts included these years.
Gain score: The difference between pre-test and post-test scores.
* statistical significance was defined as P < 0.05

Table 4: Effectiveness of BSL training basis on trainees' age, gender and work experience

The effectiveness level of BSL training		Age (year)					Gender		Work experience				Total within effectiveness level
		<25	25-30	30-35	35-40	>40	Male	Female	<1	1-3	3-5	>5	For every character
Ineffective level	N	0	3	5	1	0	5	4	0	5	2	2	9
	Percent(%)	0	33.3	55.6	11.1	0	55.6	44.4	0	55.6	22.2	22.2	100
Low effect level	N	1	8	8	2	1	10	10	3	4	8	5	20
	Percent(%)	5	40	40	10	5	50	50	15	20	40	25	100
Average effect level	N	0	5	2	0	0	5	2	1	3	2	1	7
	Percent(%)	0	71.4	28.6	0	0	71.4	28.6	14.3	42.9	28.6	14.3	100
High effect level	N	0	1	1	0	0	0	2	0	0	0	2	2
	Percent(%)	0	50	50	0	0	0	100	0	0	0	100	100
Total	N	1	17	16	3	1	20	18	4	12	12	10	38
statistical significance was defined as P < 0.05		P value=0.96					P value=0.34		P value=0.28				------------

-The bold number of the age and work experience parts included these years.

Mean Gain Score, Effectiveness of BLS training and their relationship with work experiences

As shown in the Table 3, trainees with a work experience less than 1 year, have 3.50 and those with 1-3 years of work experience have 1.50 mean gain score. Trainees with 3-5 years of work experience have 2.08 and those with more than 5 years of work experience, have 2.90 mean gain score (P value=0.29). The results of the Table 4 show that 100% of trainees with a high effect level have more than 5 years of work experience, while 55.6% of those with an ineffective level have 1-3 years of work experience(P value =0.28). Hence, no significant difference is statistically observed in the mean gain score, the effectiveness level, and trainees' work experiences. Unexpectedly, work experiences don't help with the effectiveness level of training. The personal motivation and the need one can feel to learn seem to have a greater impact.

Mean Gain Score, Effectiveness of BLS training and their relationship with education

As the Table 3 shows, the trainees with an associate degree or a bachelor degree have the highest mean gain score (3), while those with a master degree have the lowest mean gain Score (-1). There is a significant statistic link between the education and the mean gain score. The Table 4 shows a significant statistic link between the education and the effectiveness level.

Only the trainees with a bachelor degree have a very high effectiveness level, those with a high school degree have an average effectiveness level and there was even a master degree holder with ineffective level. The level of effectiveness can vary inside a group with the same level of education (Table 5).

Table 5: The Effectiveness of BSL training basis on trainees' education
and prior first aid training experience

The effectiveness level of BSL training course		Education (in Iran)					prior first aid training experience		Total within effective ness level
		Less than High school degree	High school degree (diploma)	Fogh-e Diploma degree	Bachelor degree	Master degree	Yes	No	For every character
ineffective level	N	5	1	1	1	1	8	1	9
	Percent (%)	55.6	11.1	11.1	11.1	11.1	88.9	11.1	100
Low effect level	N	2	5	3	10	0	16	4	20
	Percent (%)	10	25	15	50	0	80	20	100
Average effect level	N	1	4	0	2	0	6	1	7
	Percent (%)	14.3	57.1	0	28.6	0	85.7	14.3	100
High effect level	N	0	0	0	2	0	2	0	2
	Percent (%)	0	0	0	100	0	100	0	100
Total	N	8	10	4	15	1	32	6	38
*Statistical significance was defined as P < 0.05		**P value**=0.073*					**P value**=0.85		---------

Trainees with different or even the same level of education can have different amounts of previous knowledge, different way to focus on the training course, and particularly different level of willingness to learn. Contrary to what we expected, there is an inverse relationship between the trainees' education and their effectiveness levels. This can be a proof that even highly educated individuals need lifelong training. We propose that life support training should be embedded in the undergraduate, regardless of the field of study, and even in the secondary curriculum in order to help students acquire the basic knowledge before they enter the university. Researches from around the world have made such a suggestion [28-34; 43-47]. For example, Aachen University has offered a 3-week emergency medical care program for new freshmen [39]. The Faculty of Medicine and the Faculty of Health Sciences in Maribor has also held basic life support training courses [31].

Researchers believe that people can acquire a higher level of first aid knowledge and skills if they are trained from the school [8; 12; 18; 48; 49].

Mean Gain Score, Effectiveness of BLS training and their relationship with prior first aid training experience

As the results show in the Table 3, the trainees with prior first aid trainings experience, have a lower mean gain score compared to those with no prior training experience (2.22 vs. 2.50) although, there is no a significant statistic difference (P value=0.77). Furthermore, the trainees with pervious first aid training experience are the only ones to have the highest level of effectiveness (Table 4).

There is no significant statistic link between the mean gain score and prior first aid training experience held last year at the Shiraz University of Medical sciences. There are two possible reasons why such a relationship has not been seen:

1. The last training was not focused on cardiovascular problems and dealt with a variety of subjects.

2. It was held last year and trainees had forgotten a part of the skills they had acquired. Therefore, such training courses need to be offered on a regular basis to ensure that trainees' life

support skills are always ready to be used. It is believed that educational training should be refreshed every seven months [31]. The university is now planning to hold first aid trainings every three months.

Mean Gain Score, Effectiveness of BLS training and their relationship with career field

As the results show in the Table 3, a significant statistic difference is observed in the mean gain score among trainees with different career fields (P value=0.035). The trainees' working in the research or the educational affairs office have the highest mean gain score (5.55 and 3.55), while lab and financial affairs staff have the lowest score (0). Figure 1 shows that the largest number of the trainees with ineffective level were housewives, most of those in the low effect level are student affairs office staff and most trainees with a high effect level come from the research or the educational affairs office. A significant difference is statistically found in the effectiveness level (P value=0.005).

A significant link is seen between the trainees' knowledge level and their career fields. We have found out that trainees working in education and research departments are more motivated to learn and have a high level of educational effectiveness. Generally speaking, researchers have found out that there is a direct link between people's awareness and the trainings they are offered [2; 40; 48; 50-54].

In the present research, there is no significant link between the most of personal characteristics (gender, age, work experiences and prior first aid training experience) and trainees' knowledge level after the training. However, the link between trainees' career fields and their education, and their knowledge level is significant. In some researches, no significant link has been seen between trainees' effectiveness level, and their background and demographic information [53-55]. This shows the importance of direct and face to face training courses on people's level of knowledge about cardiovascular disease and basic life support skills.

Conclusion

The present research shows the BLS training enhanced the knowledge, skills among university staff and the first aid/BLS training should be regularly updated held. It is suggested to set the standard in health and medical education, medical universities must first care about training their staff. It is emphasized that the workshops and training courses on first aid techniques, basic life support and cardiovascular diseases for university staff and students can help put our slogan, "Journey toward good health and a healthy heart [14]", into practice.

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