Original Research Article

Effectiveness of basic life support training in improving the knowledge and skills among medical and dental students

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ABSTRACT

Background and Aim: The knowledge and skills about Basic Life Support (BLS) is the most important determining factor of cardiopulmonary resuscitation (CPR) success rates. This study was conducted on BLS skills to assess the effects of pre training evaluation followed by post training evaluation and retention of knowledge after six months among medical and dental students.

Materials and Methods: Cross sectional study was conducted by assessing the responses of 20 basic questions regarding Basic Life Support prepared from BLS 2015 AHA Guideline. Total number of 300 respondents were selected for the survey which included 200 medical and 100 dental students. The assessment of the knowledge of the students was done in three phases in the form of (pre test) performance in pre training evaluation, immediately after training (post test) and at follow up after six months (retention test). The data was analysed and expressed as mean, standard deviation and percentage. T test were used for statistical analysis and P values <0.05 were considered statistically significant.

Results: Among Medical students the average score in pre test was 56.92+18.90%, in post test the score was 80.87+17.97%, and in retention test the score was 72.45+17.85%. Among Dental students the average score in pre test was 50.40+16.34%, in post test the score was 67.70+15.75%, and in retention test the score was 59.45+15.96%. P values <0.05 were considered statistically significant.

Conclusion: The knowledge of BLS before training was inadequate. The present BLS training programme was effective in enhancing the knowledge of resuscitation among the students. To enhance the retention power time to time retraining by working on mannequins to practice and perfect their skills is highly recommended for the students.

1. Introduction

Basic life support (BLS) is the foundation for saving lives following cardiac arrest.[1] It is recommended that all medical students and staff, who are exposed to patients must be trained to offer basic life support.[2] It has been reported that knowledge and practice of BLS increase the survival of patients after cardiac arrest.[3]

According to American Heart Association (AHA) 2015 Guidelines, Basic life support includes immediate recognition of sudden cardiac arrest, activation of emergency response system, early cardiopulmonary resuscitation (CPR) (high quality, compressing the chest at an adequate rate and depth) and rapid defibrillation with an automated external defibrillator.[4]

Cardiac arrest is the sudden cessation of effective cardiac function in an apparently healthy individual.[5] Sudden Cardiac Death (SCD) is the leading cause of death globally, and the incidence of SCD is increasing in India also. The global incidence of out-of-hospital cardiac arrest (OHCA) is 62/10,000. Estimated survival to hospital discharge is 8% and not much has changed for many years. Nearly 50% of all deaths in ST-elevation myocardial infarction and 50% of all CVD deaths are due to SCD. Nearly 80% of all SCDs are due to ventricular arrhythmias. OHCA is a major public health problem that has not been addressed adequately. The survival rate can be improved if high-quality CPR

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is attempted. In-hospital cardiac arrests (IHCAs) occur in 3–6/1000 hospital admissions. These are often secondary to hypotension and shock which is the end result of physiological deterioration from the underlying medical conditions such as infections, renal failure, anemia, toxins, electrolyte imbalance, hypoxia, drugs, and trauma. In these cases, the best approach is treating the underlying disease to prevent cardiac arrest. These patients tend to have a better survival to discharge (37%).[6]

CPR is series of actions done by witnesses at the scene, and its aim is to restore cardiac and pulmonary functions and prevent brain damage.[7] It is very important that every person in the community know about Basic life support to save lives and improve the quality of community health.[8]

Poor awareness among basic life support (BLS) is a matter of great concern. The presence of a trained rescuer is the key determinant of ultimate survival from life threatening emergencies. To achieve this goal, early exposure to such life saving skills is the right decision to foster these skills for the students, which can be reinforced in succeeding years.[9]

In India, very little data are present which addresses the awareness among medical and dental students regarding this highly effective and easy maneuver. Such studies will be useful to understand the prerequisites for forming guidelines in this regard. The objective of this study is to determine the level of awareness regarding BLS and knowledge of involved skills among undergraduate students of medical and dental profession.[10]

It has been recommended that CPR awareness as well as training should be provided to every person because providing effective CPR can bring down mortality.[11]

2. Materials and Methods

A cross sectional study was conducted in tertiary level care institute at Ghaziabad. Total number of 300 students were selected for the study of which included 200 medical and 100 dental students. Ethical clearance was obtained from the Institutional Ethical Committee. The study procedure consisted of training of medical and dental students, assessment of knowledge of students by-

1. Pre-test questionnaire based on AHA 2015 BLS guidelines, a lecture and hands-on training using a mannequin (with special emphasis on the site, depth, rate, and sustainment of uninterrupted chest compressions).
2. Post-test was conducted to assess the knowledge gained.
3. The retention of knowledge and skills after six months was evaluated by Retention test.

A questionnaire comprising 20 questions regarding the awareness and skills involved in BLS was used to assess the levels of awareness of BLS and its practical knowledge.

The aspects on which they were interrogated are the abbreviation of BLS, AED and EMS (Emergency Medical Service), sequential steps in BLS, assessment and resuscitation techniques with regard to airway, breathing, circulation in unresponsive victims of different age groups, techniques regarding removal of foreign body obstruction.

The results were analyzed using an answer key prepared from BLS 2015 AHA Guideline to assess the levels of awareness of BLS and its practical knowledge.

3. Observations

Table 1: Distrbution of students

GPS	No.	Mean	Std. Deviation
Dental Students	100	22.65	0.808

Table 2: Gender wise distribution

GPS	Male N (%)	Female N (%)	Total
Dental Students	51 (51.0%)	49 (49.0%)	100
Total	158	142	300

4. Results

A total number of 300 respondents were selected for the study of which included 200 medical and 100 dental students. Among medical students 53.50% were male and 46.5% were female with mean age of 23.27 and standard deviation of 1.21. Among dental students 51.0% were male and 49.0% were female with mean age of 22.65 and standard deviation of 0.808 (Tables 1 and 2).

In intra group comparison of knowledge scores among medical students the average score in pre test was 56.92+18.90% and in post test the score was 80.87+17.97% and in retention test the score was 72.45+17.85%. Therefore, the Gain in knowledge in pretest and post test was 23.95±16.94 (p value 0.001) and in pre test and retention test was 15.52±12.32 (p value 0.001) and no Gain in knowledge in post test and retention test was 8.42±1.42 (P value was 0.001) which was significant. Among dental students the average score in pre test was 50.40+16.34%, in post test the score was 67.70+15.75% and in retention test the score was 59.45+15.96%. Therefore, the Gain in knowledge in pretest and post test was 17.30±8.97 (p value 0.001) and in pre test and retention test was 9.05±7.40 (p value 0.001), and no Gain in knowledge in post test and retention test was 8.25±1.30 (P value was 0.003) which was significant (Tables 3, 4 and 5).

Table 3: Shown Gain of knowledge among students

GPS	Pre test	Post Intervention	Gain in Knowledge	T value	P value
Dental Students	50.40±16.34	67.70±15.75	17.30±8.97	7.622	0.001 (Significant)

Table 4: Shown retention of knowledge among students

GPS	Pre test	Retention Period	Gain in Knowledge	T value	P value
Dental Students	50.40±16.34	59.45±15.96	9.05±7.40	3.062	0.001 (Significant)

Table 5: Shown loss of knowledge among students

GPS	Post Intervention	Retention Period	Loss in Knowledge	T value	P value
Dental Students	67.70±15.75	59.45±15.96	8.25±1.30	2.242	0.003 (Significant)

5. Discussion

5.1. Intra group comparison of knowledge scores between pre and post intervention among medical students

In present study among 200 medical students, the average score in pre test was 56.92+18.90% and in post test the score was 80.87+17.97%. Therefore, the Gain in knowledge was 23.95+16.94%. T value applied was 12.987 and P value was 0.001 which was significant.

A similar study by Arun Kumar Ajjappa et al[1] showed that mean pre test score was 75.09% and the mean post test score was 93.17%, statistically applied test shows significant difference between pre and post test scores of the participants at 5% level (P<0.05). Thus, indicating the effectiveness of the BLS training programme as a successful tool in enhancing the knowledge of the medical interns has been evaluated which was comparable to our study.

In another study done by Afzalimoghaddam M et al,[7] compared the knowledge and skills of BLS among 90 medical students at the beginning and at the end of the training course in an emergency department and it was found that the mean scores increased significantly after training, the score in the pre test in the form of OSCE (Objective Structural Clinical Examination) was 61.1% (having score between zero and five) and 35.89% (score between five and ten) and in post test 21.1% (having score between zero to seven) and 78.9% (score between seven and ten). The study was comparable to our study.

In a study from south India by S. Chandrasekaran et al[8] showed that the awareness about BLS among students, doctors, and nurses was found to be poor with 84.82% scoring less than 50% marks. This study has shown a serially increasing overall mean score from students to interns and then residents. Similar increments were observed among study subjects across nursing, dental, and medical course. Also, the score was higher in those who have done a CPR rather than just seen a CPR, and it was even more among those who had attended a workshop on CPR previously. The results of the study were comparable with our study.

Sushma Pande et al.[9] in their study included forty-two first-year medical students participated in this study. The entire procedure consisted of faculty training, assessment of knowledge of students by a pretest questionnaire, a lecture, a demonstration, and hands-on training using a mannequin (with special emphasis on the site, depth, rate, and sustainment of uninterrupted chest compressions). Post test 1 was conducted to assess the knowledge gained. The results of the study showed that the posttest 1 (2.81) was significantly higher than the pretest (1.26), indicating a gain in knowledge. The study concluded that MBBS 1st year students have inadequate knowledge about CPR and that the knowledge improved after CPR workshop, which is comparable with our study.

A similar study by Akshatha Rao Aroor et al.[10] showing the overall score of awareness was 4.16+ 1.40 (score ranging 0-10) among 520 study subjects, 229 were students, 171 were interns, 120 were postgraduate students in a tertiary care hospital in South India. The study therefore, stressed the need to include basic life support training at all levels as the awareness among students was below average.

A similar study done by Shaista M Saiyad et al.[11] on implementation of CPR workshop in first MBBS showed that there was significant improvement in knowledge as shown from results of pre and post questionnaire which was comparable with our study.

A study by HT Srinivas et al.[12] had a survey on basic life support which showed that the awareness regarding BLS among the study groups was varied and was generally poor, which calls for standardizing training in BLS and making it a mandatory part of all medical and paramedical teaching program, which is similar to our study.

In another study by Li Q, Zhou RH et al.[13] showed similar results as the results of our study by including three hundred and thirty 3rd year medical students. The study concluded that the pre training evaluation and feedback have been shown to improve medical student's skills acquisition

of basic life support (BLS) immediately following training.

In a study by Asmita Chaudhary et al.[14] in their study analysing the BLS knowledge among medical and paramedical staff reported that only 3 out of 117 participants had secured 80-90% marks in pretest and post workshop assessment 7 showed 70% candidates securing more than 80%, thus indicating the effectiveness of the BLS workshop in enhancing the pre existing knowledge among the participants. The result of this study is comparable with our study.

5.2. Intra group comparison of knowledge scores between pre and post intervention among dental students-

In the present study among 100 dental students, the average score in pre test was 50.40+16.34% and in post test the score was 67.70+15.75%. Therefore, the Gain in knowledge was 17.30+8.97%. T value applied was 7.622 and P value was 0.001 which was significant.

In a similar study among Nigerian dental students by AM Owojuyigbe et al.[15] included 68 dental students, pre and post BLS training assessment were conducted with a questionnaire and found that mean pre test score(std. deviation) was 4.7(+ 1.47) and mean post test score was 8.04 (+ 1.47) the difference was statistically significant as P< 0.01. There was a marked improvement in knowledge of the respondents with 88.2% of them having a post test score > 7. The results of the study were comparable to our study.

Similar findings was also reported in 2010 by Chandrasekaran et al.[8] Awareness of basic life support among medical, dental, nursing students and doctors in India. It was conducted by assessing responses to 20 selected basic questions regarding BLS among students, doctors and nurses of medical, dental, homeopathy and nursing colleges. After excluding the incomplete response forms the data was analysed on 1,054 responders. The results were analysed using an answer key prepared with the use of the Advanced Cardiac Life Support manual. Out of 1,054 responders 345 were medical students, 75 were medical interns, 19 were dental students, 59 were dental interns, 105 were homeopathy interns, 319 were nursing students, 72 were doctors, 29 were dentists, 25 were nursing faculty and six were homeopathy doctors. No one among them had complete knowledge of BLS. Only two out of 1054 (0.19%) had secured 80- 89% marks, 10 out of 1054 (0.95%) had secured 70 – 79% marks, 40 of 1054 (4.08%) had secured 60 – 69% marks and 105 of 1054 (9.96%) had secured 50 – 59% marks. A majority of them, that is, 894 (84.82%) had secured less than 50% marks. Awareness of BLS among students, doctors and nurses of medical, dental, homeopathy and nursing colleges is very poor which was comparable with our study.

5.3. Intra group comparison of knowledge scores between pretest and retention period among medical and dental students

In our study, among Medical students, the average score in pre test was 56.92+18.90% and in retention test the score was 72.45+17.85%. Therefore, the Gain in knowledge was 15.52+12.32%. T value applied was 8.448 and P value was 0.001 which was significant. Among Dental students, the average score in pre test was 50.40+16.34% and in retention test the score was 59.45+15.96%. Therefore, Gain in knowledge was 9.05+7.40%. T value applied was 3.062 and P value was 0.001 which was significant.

Intra group comparison of knowledge scores between post test and retention period among medical and dental students.

In our study, among Medical students, the average score in post test was 80.87+17.97% and in retention test the score was 72.45+17.85%. Therefore, there was no gain in knowledge as the score was reduced to 8.42+1.42%. T value applied was 4.701 and P value was 0.001 which was significant. Among Dental students, the average score in post test was 67.70+15.75% and in retention test the score was 59.45+15.96%. Therefore, there was no gain in knowledge as the score was reduced to 8.25+1.30%. T value applied was 2.242 and P value was 0.003 which was significant.

5.4. Comparison of knowledge scores between pre test, post test and retention period among medical students

In our study among medical students, when compared between pre test and retention test the average score in pre test was 56.92+18.90% and in retention test the score was 72.45+17.85%. Therefore, the Gain in knowledge was 15.52%+12.32%. However, statistically P value is 0.001 which is significant. When the score between post test and retention test were compared, the average score in post test was 80.87%+17.97% and in retention test the score was 72.45%+17.85%. Therefore, there was no gain in knowledge as the score was reduced to 8.42%+1.42% which was significant (P value 0.001). This showed that after the BLS training, student knowledge and skills improved and there was significant retention as compared from the pre test.

A similar study by Shushma Pande et al[9] which included 42 first year medical students, the entire procedure consisted of faculty training, assessment of knowledge of students by a pretest questionnaire, a lecture, a demonstration, and hands-on training using a mannequin (with special emphasis on the site, depth, rate, and sustainment of uninterrupted chest compressions). Posttest 1 was conducted to assess the knowledge gained. The retention of knowledge and skills in the second year was evaluated by posttest 2 and directly observed procedural skills, respectively. The mean rank for

post test 1 (2.80) to be significantly higher than the pre test (1.26), indicating a gain in knowledge. The mean rank for post test 2 (1.93) was lower than for post test 1 but was significantly higher compared with the pre test, indicating a significant retention of knowledge during the second year. The study is comparable to our study.

A study by AHA 2015 Guidelines[4] on BLS retraining intervals showed that given the rapidity with which BLS skills decay after training, coupled with the observed improvement in skill and confidence among students who train more frequently, it may be reasonable for BLS retraining to be completed more frequently by individuals who are likely to encounter cardiac arrest. Also, frequent refreshers with mannequin based simulation may provide cost savings by using less total retraining time as compared with standard retraining intervals. Therefore, there is need for more studies to be done to compare the retention phase.

The results that were obtained from the study showed that-

1. During the pre test, the awareness regarding BLS among the study groups was generally poor, which calls for standardizing training in BLS and making it a mandatory part of all medical and dental teaching programme.
2. Student knowledge and skills improved after a lecture and hands-on training using a mannequin (post test).
3. There was significant retention as compared to pre test therefore, regular refreshing courses are necessary with hands on experience as after the BLS training.
4. When the results of medical and dental students were compared, it was found that medical students had scored more as compared to dental students. Therefore, dental students should also take regularly BLS training as dentistry is also a health profession that should provide complete medical care.

6. Source of Funding

7. Conflicts of Interest

None.

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