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## WOULD MANDATORY TEACHING OF BLS, ACLS AND PALS IMPROVE THE KNOWLEDGE, ATTITUDE AND PRACTICE OF MEDICAL STUDENTS IN EMERGENCY CARE?

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**Conflict of interest:** No conflict of interest.

### Abstract

**Background and objective:** The medical students should be trained in BLS/ACLS/PALS in order to attain the skills for emergency patient management. The objective of the study is to compare the knowledge, attitude and practice about BLS/ACLS/PALS among the interventional and non-interventional groups both before intervention and after intervention.

**Methods:** This interventional study was done among final year medical students and house surgeons in six Medical colleges of Northern Kerala. The study subjects were categorized into two groups, Category 1 received an orientation class on BLS/ACLS/PALS and students belonging to category 2 did not receive the orientation class. A pre-validated pretested questionnaire to assess the Knowledge, Attitude and Practice of medical students regarding BLS/ACLS/PALS was distributed after the orientation class. The control group (category 2) who did not receive the orientation class also were given the questionnaire same as that of other group.

**Results:** Total of 608 students participated in this study. Out of which 325 received an orientation class. Unpaired t-test done in pretest among interventional and non-interventional group showed p value > 0.01 which implied that both groups were comparable. The mean scores of Knowledge, attitude and practice in the post test increased to 8.111±1.507, 2.328±.743, 2.065±.297 among house surgeons and an increment to 6.260±1.087, 2.277±.474, 1.659±.659 among final years in the interventional group as when compared with the scores of the non-interventional group. Paired t test also showed significant difference among interventional group while there was no change in the non-interventional group. (p > 0.05).

**Conclusion:** BLS/ACLS/PALS training among undergraduates can improve the Knowledge, Attitude and Practice of medical students thereby increasing the resuscitation as well as the survival of patients in emergency care.

**Keywords:** BLS, ACLS, PALS, Resuscitation

### Introduction:

The life of a person is influenced by various factors like health, education, occupation, relationships and socioeconomic status. Among these, health influences the life of an individual to a great extent. There are certain conditions like myocardial

infarction, congestive cardiac failure, stroke, airway obstructions, trauma which may cause death of an individual if not recognized and properly managed in the initial phase itself. About 610,000 population die of heart disease in the United States every year—that's one in every four deaths. Heart disease is the leading cause of death for both men and

women. More than half of the deaths due to heart disease in 2009 were in men.<sup>1</sup> Coronary heart disease (CHD) is the most common type of heart disease, killing over 370,000 people annually. Every year about 735,000 Americans have heart attack. Of these, 525,000 are first heart attack and 210,000 occur in people who have already had a heart attack.<sup>2</sup> With the turn of the century, cardiovascular diseases (CVDs) have become the leading cause of mortality in India. In comparison with the people of European ancestry, CVD affects Indians at least a decade earlier and in their most productive midlife years.<sup>3,4</sup> In India 9 crore Indians suffer from heart disease and more than 30% of the adult population are at high risk. In Kerala, the mortality rates for CHD per 100,000 population are 382 for men and 128 for women which is actually 3 to 6 times higher than Japanese and rural Chinese and also higher than industrialized countries. Adequate awareness of basic life support (BLS), mainly cardiopulmonary resuscitation (CPR) is an important skill to ensure that individuals can provide necessary life-saving care in emergency situations.<sup>6</sup> Basic life support (BLS) and Advanced Cardiac Life Support (ACLS) are elements of emergency medical care. BLS involves identification of signs of sudden cardiac arrest, heart attack, stroke, foreign-body airway obstruction (FBAO), performing mouth-to-mouth breathing to support ventilation, CPR and defibrillation with an automated external defibrillator (AED) to normalize blood circulation to the brain and vital organs.<sup>7,8</sup> The American Heart Association has adopted, supported and helped to develop the concept of emergency cardiovascular care (ECC) systems for many years.<sup>9</sup> The importance of Pediatric advanced life support (PALS) is to help healthcare provider with knowledge and practice to effectively handle critically ill infants and children for positive outcomes.<sup>10</sup> Every person in the community must know about BLS and which can help to save lives and improve the overall quality of community health. It is mandatory that Health care professionals and trainees to know about it because they are frequently handling such patients with life threatening situations in their daily practice.<sup>11</sup> Various studies have been done to identify the Knowledge, Attitude and Practice regarding ACLS, BLS and PALS but most of them are just cross sectional studies with no intervention ie ACLS, BLS and PALS education and also assess the improvement post intervention . Hence this study aims to find out improvement by giving an orientation class on ACLS,

BLS and PALS and assess the knowledge, attitude and practice of BLS, ACLS and PALS among medical students.

Objectives:

- 1.To find out the existing knowledge, attitude and practice towards ACLS, BLS and PALS among medical students and interns.
- 2.To find out improvement in knowledge, attitude, practice among medical students and interns regarding ACLS, BLS and PALS after intervention.

#### **METHODS:**

Study design: Community based Randomised Interventional study

Study period: March – December, 2018

Setting: Six medical colleges of Northern Kerala, India.

Participants: Final year medical students and house surgeons studying in six medical colleges were selected by using simple random sampling method.

Study size: From each six medical colleges 50 medical students and 50 house surgeons were selected by using simple random sampling technique (Lot method). Another ten more medical students and houses surgeons were selected for the study keeping non-responders in mind. Excluding the twelve study participants who did not give consent for the study, a total of 608 medical students participated in the study.

Variables: Basic demographic profile and scored questions to assess knowledge, attitude and practice of BLS/ACLS/PALS were included in the questionnaire.

Exclusion Criteria:

- a) Students and house surgeons who did not give consent
- b) Students and house surgeons who did not attend the post test.

Data sources/measurement: Six medical colleges of Northern Kerala were categorized into two groups consisting of three colleges each interventional and non interventional by simple random sampling. Then the pre-validated and pretested questionnaire (Before conducting the study the pilot study was done with sample size of 60 to validate the questionnaire. Once the questionnaire was standardised and validated the study was followed) was used to collect the knowledge, attitude and practice of both groups before intervention ie Pre test. Final year Students and house surgeons

belonging to medical colleges of Interventional group received an orientation class on BLS/ACLS/PALS and students belonging to medical colleges of Non interventional group did not receive the orientation class. The orientation class was taken by the principle investigator by visiting each of the 6 medical. It was done with the help of mannequins in addition to LCD projector and chalk/board technique. The topics covered in the orientation class were the importance of CPR, airway (including choking), recent guidelines on Acute Coronary Syndrome (ACS)/stroke/anaphylaxis, simulation on life threatening arrhythmias, techniques of BLS/ACLS/PALS. The questionnaire was distributed after the orientation class. The Non interventional group also received the questionnaire same as that of other group. The study participants were given 30 minutes to answer the questions in the questionnaire. The questionnaire consisted of questions to assess knowledge attitude and practice of BLS,ACLS and PALS. There were 15 scored items to assess knowledge regarding ventilation given during CPR, drugs used during resuscitation, choking, checking pulse in infants, airway opening maneuver, tachycardia and bradycardia, full form of AED, site for chest compression and compression to breath ratio. There were 5 scored items to assess the attitude of study subjects with questions such as attitude towards mandatory inclusion of BLS/ACLS/PALS in MBBS curriculum, their confidence level in using AED, ever felt reluctance to perform mouth to mouth ventilation. The practice level of study subjects was assessed using 5 scored items which included managing an unconscious person, performing BLS , the steps of CPR technique and skill level to give Heimlich’s maneuver. After the intervention the same questionnaire was used for post test to collect the Knowledge, Attitude and Practice of BLS /ACLS/PALS among interventional and non interventional groups.

Quantitative variables:

1. Frequency distribution of final year and interns in study groups.

2. Frequency distribution of gender of study participants.
  3. Total number of study subjects who received orientation regarding Knowledge, Attitude and Practice with good knowledge, attitude and practice.
  4. Total number of final years who received orientation with knowledge attitude and practice.
  5. Total number of house surgeons who received orientation with knowledge, attitude and practice.
- Study Instruments: Pre-validated and pretested Questionnaire, Power point presentations, Mannequins.  
 Statistical methods: Statistical tools like Paired and unpaired t tests were used.

Ethical clearance: Ethical clearance to conduct this study was obtained from Institutional Ethical Board of KMCT Medical College, Calicut. Permission was also obtained from head of the institutions of each of the 6 medical colleges where study was conducted. An informed consent was obtained from the study participants prior to the data collection.

**RESULTS:**

A total of 608 students from the 6 colleges participated in this study .Out of which 310(51%) were final year medical students and 298 (49%) were house surgeons.Mean age of the study participants was 24.51 years with Standard Deviation of 0.582. Majority (75%) of study participants were females. Out of the six colleges, an orientation class on BLS/ACLS and PALS was given to house surgeons and final year medical students of three medical colleges (325 out of 608). Out of the 325 study subjects in whom orientation was given, 173 were final years and 152 were house surgeons [figure 1]. Out of 325 in whom orientation was given among 173 final years 52 were male and 121 females whereas out of 152 house surgeons 30 were male and 122 were female. In the control group of 283, out of 137 final years 42 were male and 95 were female and in total of 146 house surgeons 28 were male and 118 were female.

**TABLE 1: Unpaired t test of pretest among interventional and Non-interventional group**

	Mean difference	t value	F value	p value
KNOWLEDGE	-.020	-.283	.310	.777
ATTITUDE	-.037	-.632	.438	.206
PRACTICE	-.032	-.775	.059	.439

Table 1 shows unpaired t test of pretest among interventional and Non-interventional group on the comparison of pretest score of knowledge, attitude and practice of BLS, ACLS and PALS in the Knowledge, Attitude and

Practice Score there's a mean difference of -.020 , -.037 and -.032, t value was -.283 , -.632 and -.775 and also the F value was .310, .438 and .059 respectively. The p values were .777,.206,.439 respectively. Hence as there is no significant difference between 2 groups they are comparable.

**TABLE 2: Mean Scores of pretest and posttest among interventional group**

	PRETEST			POSTTEST		
	Min Score.	Max. Score.	Mean±SD	Min Score	Max. Score	Mean±SD
FINAL YEARS						
KNOWLEDGE	2.00	5.00	3.976±.927	3.00	10.00	6.260±1.087
ATTITUDE	1.00	2.00	1.098±.298	2.00	4.00	2.277±.474
PRACTICE	1.00	2.00	1.023±.150	1.00	4.00	1.659±.659
HOUSE SURGEONS						
KNOWLEDGE						
ATTITUDE	4.00	6.00	4.980±.422	5.00	13.00	8.111±1.507
PRACTICE	1.00	3.00	1.842±.432	1.00	4.00	2.328±.743
	1.00	3.00	2.000±.162	1.00	4.00	2.065±.297

In Table 2 shows the mean scores of pretest and posttest among interventional group. Among final years for knowledge minimum and maximum score were 2 and 5 respectively with mean±SD 3.97±.927, the attitude had minimum score of 1 and maximum score of 2 with mean±SD 1.098±.298 and for practice Mean±SD was 1.023±.150 with minimum score of 1 and maximum 2 in the pretest. In post test , the Mean±SD of the knowledge, attitude and practice increased to 6.260±1.087 , 2.277±.474 , 1.659±.659 respectively and also there was an increase in minimum and maximum score of Knowledge, Attitude and Practice in post test compared to the pretest score of final years. Similarly in pretest conducted in house surgeons the mean±SD of Knowledge, Attitude and Practice score was 4.980±.422, 1.842±.432 , 2.000±.162 respectively and there was an increase to 8.111±1.507, 2.328±.743 , 2.065±.297 respectively in the Knowledge, Attitude and Practice. Thus we can interpret that in interventional group both the final years and house surgeons the knowledge, attitude and practice had increased as compared in pretest. It is also inferred that house surgeons showed an increase in the Knowledge, Attitude and Practice score than the final years during the post test.

**TABLE 3: Mean Scores of pretest and post-test among Non-interventional group**

	PRETEST			POSTTEST		
	Min Score.	Max. Score.	Mean±SD	Min Score	Max. Score	Mean±SD
FINAL YEARS						
KNOWLEDGE	2.00	5.00	3.978±.942	2.00	7.00	4.292±1.189
ATTITUDE	1.00	1.00	1.372±.485	2.00	3.00	2.146±.354
PRACTICE	0.00	1.00	.992±.085	.00	2.00	1.219±.432
HOUSE SURGEONS						
KNOWLEDGE	4.00	6.00	4.924±.456	9.00	9.00	5.465±.831
ATTITUDE	2.00	3.00	2.034±.182	4.00	4.00	2.123±.350
PRACTICE	1.00	3.00	2.000±.117	3.00	3.00	2.191±.412

Table 4 shows the mean Scores of pretest and post-test among Non-interventional group. In final years , the mean±SD of knowledge was  $3.978 \pm .942$  with minimum and maximum score as 2 and 5, the attitude when assessed , the mean±SD was found to be  $1.372 \pm .485$ , and the practice score with Mean±SD was  $.992 \pm .085$  with minimum score of 0 and maximum 1 in the pretest. In post test , the Mean±SD of the Knowledge, Attitude and Practice were  $4.292 \pm 1.189$  ,  $2.146 \pm .354$  ,  $1.219 \pm .432$  respectively . Also in pretest conducted among house surgeons the mean±SD of Knowledge, Attitude and Practice score was  $4.924 \pm .456$ ,  $2.034 \pm .182$  ,  $2.000 \pm .117$  respectively whereas in post test among house surgeons it was seen that Mean±SD the score was  $5.465 \pm .831$ ,  $2.123 \pm .350$ ,  $2.191 \pm .412$  . Thus in both final years and house surgeons in the non interventional group only slight increase in Knowledge, Attitude and Practice score was seen in the post test which is not significant.

**TABLE 4: Paired t test among interventional group of pre and post test intervention.**

	Mean	Std. Deviation	t	P value
KNOWLEDGE	-2.680	1.384	-34.906	.00
ATTITUDE	-.855	.667	-23.115	.00
PRACTICE	-.369	.597	-11.139	.00

From Table 5 it can be seen that in the Paired t test among interventional group of pre and post test intervention , in the knowledge score , mean value was -2.680, Std deviation .667 and t value was -34.906. Mean value of the total attitude was -.855 (SD:1.384 ) , t value showed value of -34.906. The mean value of practice score was -.369, (SD: .597), t value -11.139. Since there has been an increase in the scoring, all these values were found to be statistically significant which implies that there’s a positive change happened in the interventional group.

**TABLE 5: Paired t test among Non-interventional group of pre and post test.**

	Mean	Std. Deviation	t	P value
KNOWLEDGE	.431	1.306	5.551	.214
ATTITUDE	.420	.580	12.190	.395
PRACTICE	.208	.415	8.440	.273

Table 6 shows the Paired t test among Non-interventional group of pre and post test, the Knowledge, Attitude and Practice score in the non interventional group pre and post test and mean value are .431, .420, .208 respectively. The "t " value was found to be 5.551,12.190,8.440 for Knowledge, attitude and practice respectively . The p value was .214, .395, .273 . The p values were statistically non-significant. Hence its shows that since no intervention was done, the Knowledge, Attitude and Practice score of the control group remained almost the same in and there is hasn’t been an increase in score in the pretest and post test.

**TABLE 6: Unpaired t test of post-test among interventional and non-intervention.**

	Mean difference	t	F	P value
KNOWLEDGE	2.242	19.370	20.071	.000
ATTITUDE	.167	4.037	126.797	.000
PRACTICE	.128	2.629	24.464	.000

Table 7 shows that when Unpaired t test of post-test among interventional and non-intervention was done it was seen that mean difference for Knowledge, attitude and practice was 2.42, .167, .128 , the t values were 19.370,4.037 , 2.629 and the F value were 20.071, 126.797 and 24.464 respectively. The p value was found to be significant. Thus it shows that there is a significant difference in Knowledge, Attitude and Practice score of post test of interventional group compared to that of non-interventional group which was because of intervention.



## DISCUSSION:

ACLS and BLS are very important aspects of the medical curricula and every medical student must have the perfect knowledge, attitude and practice regarding the same. In the current scenario where many studies have found that there is a gap between the ACLS and BLS knowledge, attitude and practice, this study looks into the effect of the intervention ACLS and BLS education on the knowledge, attitude and practice of medical students.

In a study conducted by Vausedvan B et al<sup>12</sup> entitled the knowledge assessment of BLS in tertiary care hospital in Kottayam, Kerala it was found only 3.7% showed good knowledge regarding BLS (6.6±2.5) which when compared with our study with a mean score of knowledge among final years 3.97±.927 whereas 4.980±.422 among house surgeons in the pretest interventional group. There were 575 MBBS students and all were between the age 18-21 whereas in our study it was 24.51 years. Also percentage of males were 40.3% were male and 59.7% were the females whereas in our study it was found 75% of study participants were female and 25% male. This is due to different study settings.

In a study Impact of basic life-support training on the attitudes of health-care workers toward cardiopulmonary resuscitation and defibrillation by Abolfotouh et al<sup>13</sup> the attitude score increased significantly (t value -4.38 in post vs pre bls) which when compared to our study t value was .632 in pretest and 4.037 in post test. This study is similar to our study after the intervention was done the attitude score has increased.

A study conducted by T.M. Khan et al<sup>14</sup> about the impact of different teaching modalities for pharmacy students in cardio pulmonary resuscitation course in Saudi Arabia showed that the addition of traditional chalkboard teaching to the multimedia teaching strategies significantly improved the students' understanding and learning in CPR session, thereby increasing the students memory. Our study found that, when orientation class was given there was a significant increase in knowledge, attitude practice of BLS, ACLS and PALS among medical students.

In Study of the impact of training of registered nurses in cardiopulmonary resuscitation in a tertiary care centre on patient mortality by Mayureshkumar Pareek et al<sup>17</sup> Training regarding CPR was given to nurses, and CPR mortality 1-year before basic life

support (BLS) and advanced cardiac life support (ACLS) training were collected and compared with post-training 1-year CPR mortality. A total of 632 adult patients suffering in-hospital cardiac arrest over the study period. CPR was attempted in 294 patients during the pre-BLS/ACLS training period and in 338 patients in the post-BLS/ACLS training period. In the pre-BLS/ACLS training period, 58 patients (19.7%) had return of spontaneous circulation (ROSC), while during the post-BLS/ACLS training period, 102 patients (30.1%) had ROSC ( $P = 0.003$ ). Sixteen of the 58 patients (27.5%) who achieved ROSC during the pre-BLS/ACLS training period survived to hospital discharge, compared 54 out of 102 patients (52.9%) in the post-BLS/ACLS training period ( $P < 0.0001$ ). This shows that significant improvement in resuscitation post intervention. In our study too we found that significant improvement in knowledge, attitude and practice among house-surgeons and final year MBBS students post intervention.

Various studies done at different settings like Ralapanawa et al<sup>18</sup>, Lami et al<sup>11</sup>, MdYunus et al<sup>19</sup>, Salameh et al<sup>20</sup>, Wittayachamnankul B et al<sup>21</sup> found that the current knowledge, attitude and practice among medical and para students is not sufficient enough as per the needs at emergency room or casualty.

Jensen ML (2009), Smith KK (2008), Miotto HC (2008), Semeraro F (2006) and Boonmak P (2004)<sup>22</sup> did studies on retention of ACLS and BLS knowledge, attitude and practice in various medical and paramedical health care workers found that as in due time the knowledge, attitude and practice decreases.

Hence all the above authors suggest that ACLS teaching and training which starts at the undergraduate period, should be frequently and regularly revised, with continued medical education (CME), along with the testing of knowledge and skills at regular intervals. This will improve knowledge, skills and confidence among doctors, and keep them up to date with any revision of the guidelines. The current study agrees in regards with the above authors and suggests that there is a need of well defined curriculum for ACLS and BLS prescribed by the Medical Council in the syllabus with hands on training during MBBS.

Funding: None.

Limitations:

ACLS and BLS Knowledge, Attitude and Practice retention were not studied and hence is an opportunity for further research in the same study subjects.

Conflict of interest:

There is no external funding for this research project.

Conclusion:

To conclude BLS/ACLS/PALS should be an integral part of curriculum right from the first year of MBBS with hands on experiences so that the medical students and future health care professionals acquire the necessary skills to manage and improve the outcome of the patients during the emergency situations.

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