

## Evaluation of basic life support knowledge and the impact of basic life support training on pre-clinical and clinical undergraduate MBBS students

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### Abstract

**Introduction:** There is increased risk of severe morbidities or death from sudden cardiovascular incidence, stroke, choking and drowning if not resuscitated by first responders at the site of crisis.

Health care professional are expected to be competent in resuscitate technique from their initial posting and demand for BLS training is increasing worldwide.

**Objectives:** Aim was to assess the awareness about Basic Life Support (BLS) among the undergraduate MBBS students. Simultaneously we have investigated impact of our BLS training by the post-training evaluation and the feedback from student's performance.

**Materials and Methods:** Study group comprised of 432 undergraduate MBBS students from medical college. We had divided students in pre-clinical 1<sup>st</sup> & 2<sup>nd</sup> year and clinical for 3<sup>Rd</sup> 1<sup>st</sup> & final year MBBS students. We had constructed questionnaire having multiple choice questions. Questionnaire, lecture and videos of BLS were prepared based on 2015 American Heart Association Resuscitation Council.

**Results and Discussion:** In our study only 2% from male and only 1.56% from females were already BLS trained, showing gross lack of BLS training. When we compare the pre-test between inter group it was showing p value of 0.899 (mean score 10.6±2) and post-test inter group it was 0.913 (Mean score 16.8±1.8), showing insignificant. But, when we compare pre-test and post-test in pre-clinical students and for the clinical (intra group) it was showing p value of 0.000001(<0.005), so highly significant. Regarding scores none was there in excellent group (score ≥ 85%) in pre-test evaluation from either group, but in post-test there were 55.15% students from pre-clinical and 56.75% were from clinical group, showing knowledge improvement in students of both the groups. When we compare the skill-based difference between gender it was showing only 29% females were perfect to perform CPR with adequate depth and rate in first attempt while for male it was 85.14% students. And even after all correction and practice still 20% female students needed much practice while in male it was only 1%.

**Conclusion:** From this study we come to know that knowledge of BLS/CPR is so less in our study groups. But we can improve this by frequent lectures and hands on training in under graduate students. Hence it is essential to train the medical students from the beginning from their MBBS training.

**Keywords:** Basic life support, CPR (Cardio Pulmonary Resuscitation), Cardiovascular arrest, MBBS students, Feedback, Medical college, AED (Automated External Defibrillator), Mannequin.

### Introduction

Cardio-Pulmonary arrest is the most common medical crisis that occurs and can leave the victims with severe morbidities or lead to death if not attended and intervene timely. Overall atherosclerotic heart disease is the leading cause of death<sup>6</sup> among 40-60 years of age,<sup>3</sup> it is of paramount priority to sensitize, train and regularly update every person in the community<sup>5</sup> about BLS to save lives and improve the overall quality of resuscitation technique. Health care professional are expected to be competent in resuscitate technique from their initial posting. Demand for BLS training is ever increasing worldwide and in developed country they have started BLS training from their High-School teaching. Meissner (2012) et al<sup>15</sup> and Aaberg (2014) et al<sup>16</sup> have trained high-school students for BLS and studied retention of the knowledge. However, in developing countries like India, there is still no standard teaching programme for BLS and resuscitation training is not a routine practice. However, low confidence among medical students in performing BLS has been reported from Europe and other countries also.<sup>13,17</sup>

In this study we want to evaluate the knowledge of BLS among undergraduate medical students of our institute which will help in understanding the deficits and for further formulating medical education protocol/curriculum in this

regard. The knowledge of basic science behind the BLS/CPR and practical skills of BLS are the primary determining factor of a successful resuscitation technique. Attitude also plays a great role, especially for initiating the resuscitation on any victim.

The recent BLS guidelines are available as "Highlights of the 2015 AHA update for CPR & ECC (Emergency cardiovascular care)" on internet which is there since October 2015 while the complete printed manual available since March 2016. Even in august 2018 India have formulated BCLS (Basic Cardiopulmonary Life Support) CPR guidelines in accordance with current Indian Society of Anaesthesiologist (ISA).

CPR is a simple and effective procedure but it requires frequent training to maintain the skill. In India, there is no mandatory training in medical education regarding BLS at the M.B.B.S level and ACLS (advanced cardiac life support) course during internship or MD/MS course. In routine scenario interns and Post Graduate Resident doctors are directly facing several victims in the emergency department so it is essential that they are well-trained with BLS. In few hospitals it is mandatory to undergo BLS training but till the course is refreshed, the efficiency in skills and knowledge can come down. Therefore, it is essential to timely train and

assess BLS providers to maintain the efficiency in performing CPR.

Evaluation and feedback are two factors that could influence the quality of simulation-based medical training.<sup>8</sup> Trainees will be also evaluated after the BLS training (post-training evaluation).

## Aims and Objectives

### Primary

The objective of this study was to assess the awareness about Basic Life Support among the undergraduate MBBS students.

### Secondary

1. This study was to investigate the impact of our BLS training by the post-training evaluation and the feedback from the undergraduate MBBS student's performance
2. To develop and validate the planned teaching program (PTP) based on knowledge and practice regarding BLS and the prospective introduction of these skills into our routine teaching schedule in future.

## Materials and Methods

After getting the SRC (Scientific Review Committee) and Ethical committee approval from Government Medical College on 28/02/2018, we had conducted a cross-sectional, longitudinal study in the month of May to July among the 2<sup>nd</sup> year to final year MBBS students. We have registered for CTRI also, no: CTRI/2018/05/013900 [Registered on: 15/05/2018]. Study group comprised of 432 undergraduate MBBS students from GMC Surat and total 16 students were excluded from study due to previous BLS training from another institute in past. We had constructed the questionnaire to explore the knowledge and attitude of BLS among the participants. It was conducted on all undergraduate MBBS students from government medical college Surat, Gujarat. As first year MBBS students had final exam we had not enrolled the 1<sup>st</sup> year students in our study. Students were requested not to write their names or roll number to maintain confidentiality and for any bias. Those who were on leave, unwilling to participate in, incomplete questionnaires and those who had already undergone BLS training in the past were excluded from the study. Informed verbal consent was obtained from all the participants.

A questionnaire was prepared having the following criteria:

1. Qualification of the students,
2. Having questions regarding abbreviations, protocol, skills, cardiac arrest scenario, resuscitation techniques in victims of different age groups, airway and breathing, and response in case of emergency.<sup>6,7</sup>
3. Attitude of the participants for BLS/CPR (5 Questions),
4. Based on 2015 American Heart Association Resuscitation Council BLS Guidelines.

The validity of the questionnaire was pre-determined by our pilot study which was conducted in hospitals before it was finalized for this study.

After we had enrolled our students with attendance and informed verbal consent, we had distributed them Pre-Test questionnaires comprised of 20 MCQ having four options

with single best answer and 5 attitude-based questions so total 25 questions to be finished within 30 minutes. After this pre-test we had collected all filled questionnaires from the students and sent to be checked. Once the pre-test was completed, we had taken our theory session for BLS regarding history, flowcharts, AED & its use, all anatomy regarding airway manure and 2015 latest guidelines with science behind the BLS and Resuscitation.<sup>6,7</sup> Lecture was taken by single AHA certified BLS & ACLS instructor for all study groups to prevent bias. Once the theory lecture finished all queries were also solved regarding BLS and lecture. Then students were divided into groups for hands on training for CPR, Airway manure and AED. And we had showed them 3 videos regarding how to perform BLS and Self demonstration on mannequin by the instructors. We had total 4 instructors for hands on training on mannequin.

Post hands on training we had again distributed the post-test questionnaires to all the students having same 25 questions as pre-test. After we had completed our study the individual answer sheets were evaluated and the study groups were divided into five categories based on their percentage scores: 0-30%, 31-50%, 51-70%, 71-85% and >85%. A score of <30% was considered as "very poor" >30% to 50% was considered as "average", >50% to 70% was considered as "good", >70% to 85% was considered as "very good" and >85% was considered as "excellent" in this study for pre-test and for post-test.

Apart from multiple choice questions for knowledge there were Attitude-based questions in the form of yes/no/not sure pattern. At the end of the course, we had collected the feedback from the students regarding our course. Post training, they were asked regarding their confidence, enthusiasm for CPR, hands-on training, structure of our course and scientific explanations & clarifications for BLS either from three: strongly agree, agree or disagree on feedback form. Post training all data were gathered and submitted for analysis. Data analysis will be done by independent persons who were not involved in this study.

## Data Analysis

In this descriptive analysis, continuous variables were expressed as Mean  $\pm$  S.D and categorical variables were expressed as count (percentage). All statistical analysis was performed using EPI info™, version 7.2. 2018. A paired *t*-test analysis of the pre- and post-training scores of the students was done and the level of significance was set at  $P < 0.05$ .

**Observations and Results**

**Table 1: Demographic data**

	Participants (n=432)	
Age (years)	Mean	20.01 Years
	SD	± 2.08 Years
	Range	19 to 23 Years
Sex	Male	237 (54.86%)
	Female	195 (45.14%)
	Total	432 Students (p = 0.478)
Previous BLS training (excluded from study)	Male	9 (2.00%) Excluded
	Female	7 (1.56%) Excluded

4 students (2 Males/2 Females) were excluded from Pre-clinical and 12 (7 Males/5 Females) students were excluded from clinical batch as they were already trained in BLS.

**Table 2**

Pre-Test	0 -30%	31 -50%	51 -70%	71 -85%	≥85%
	V-Poor	Average	Good	V-Good	Excellent
Pre-Clinical	13 (9.10%)	66 (46.15%)	56 (39.15%)	8 (5.65%)	0 0%
Clinical	17 (5.87%)	119 (41.16%)	130 (44.97%)	23 (8%)	0 0%

**Table 3**

Post-Test	0 -30%	31 -50%	51-70%	71-85%	≥85%
	V-Poor	Average	Good	V-Good	Excellent
Pre-Clinical	0 0%	4 3%	17 11.80%	43 30.05%	79 55.15%
Clinical	0 0%	6 2.08%	38 13.15%	81 28.02%	164 56.75%

**Table 4: Significance**

Inter -group comparison:	Mean	SD	P-value
Pre-test (pre-clinical)	10.63	2.551	0.8992
pre-test (Clinical)	10.66	2.189	
Post-test (pre-clinical)	16.80	1.901	0.9131
Post-test (Clinical)	16.84	1.757	
Intra-group comparison:	Mean	SD	P-value
Pre-test (Pre-Clinical)	10.63	2.551	<0.000001
Post-test (Pre-Clinical)	16.80	1.757	
Pre-test (Clinical)	10.66	2.189	<0.000001
Post-test (Clinical)	16.84	1.757	

Significant if p<0.005, insignificant if p>0.005

**Table 5: Skill based assessment: Post BLS video session and Self demonstration by instructors on mannequin.**

Airway and Bag Mask:	Male students		Female students		
	No	%	No	%	
Perfect in single attempt	118	49.79%	88	43.13%	
With one correction	95	40.08%	74	37.95%	
Needed much practice	24	10.13%	33	16.92%	
Chest Compression:	Male students		Female students		
	Perfect in single attempt	202	85.14%	58	29.74%
	With one correction	33	13.86%	74	50.26%
	Needed much practice	2	01.00%	33	20.00%

**Discussion**

Cardiac arrest or cardiopulmonary arrest is the most common emergency crisis<sup>6</sup> that occurs anywhere. Only theoretical knowledge is not enough that we usually get from books but with that proper and timely interval skills is also must. High quality CPR and timely rapid defibrillation are two most important steps in resuscitation for any out-hospital or in-hospital cardiac arrest. BLS and CPR techniques are simple and it's not only a job of doctors and paramedics but any layman should have knowledge of this.<sup>5</sup> Many developed countries have already started BLS training for their high school students since last few years.<sup>15,16</sup> However, in India doesn't have any recommendation and structure for this BLS/CPR training even in Medical students and paramedical students. But they are expected to perform CPR from the very first day of their post-graduation or in their duty. Delay in resuscitation decreases the chances of survival by 7-10% for every minute.<sup>4</sup> In present task we had conducted a study to Evaluate the knowledge of basic life support and the impact of basic life support training on preclinical and clinical MBBS students in Government Medical College.

In this study total 432 MBBS students were enrolled, from that 237 students were male and 195 students were females. Total 16 students were excluded from this study as they were already BLS trained. If we calculate those trained students with our total population then only 2% from male and only 1.56% from females were BLS trained, showing gross lack of BLS/CPR training in medical students. When we had calculated the p value for gender difference it was 0.478(>0.005) so it was comparable for this study (Table 1).

When we compare the pre-test between inter group it was showing p value of 0.8992(>0.005) and post-test between inter group it was 0.9139(>0.005). Thus, these data showed that when we compare either pre-test or post-test between the pre-clinical and clinical it was showing insignificant difference in their knowledge wise. For pre-test for pre-clinical students mean score was 10.63 with SD=2.55 where for clinical students mean score was 10.66 with SD=2.19. so, for both the groups there was no significant score difference in pre-test evaluation (Table 4). For post-test

for pre-clinical students mean score was 16.80 with SD=1.90 where for clinical students mean score was 16.84 with SD=1.75. Again, for both the groups there was no significant difference in post-test evaluation.

But When we compare the pre-test and post-test in intra group it was highly significant showing p value 0.000001 (<0.005) for both pre-clinical and clinical. So, these intra group statistics shows that there was significant knowledge improvement among both the groups after lecture and hands on training to students (Table 4). Christina G (2017)<sup>10</sup> et al have assessed the pre-test score of interns was 12.33 ±2.710 and the post-test score was 18.34±2.081 where difference was significant (p<0.001). Similarly, they have compared the pre-test scores 12.6±2.60 with post-test scores 20.04±2.154 among the post graduate students which was statistically significant (p<0.001).

Same things when we look at scores there was none in excellent group (score ≥ 85%) in pre-test evaluation from neither pre-clinical nor clinical students (Table 2). These results were quite similar to what was reported by Chaudhary M (2017) et al,<sup>1</sup> Chandrasekharan S (2010) et al<sup>2</sup> and Srinivas HT(2018) et al<sup>14</sup> which showed poor knowledge by participants about the appropriate actions to be taken during resuscitation. But in post-test evaluation when we look at same excellent group there were 55.15% students from pre-clinical and 56.75% students were from clinical group showing knowledge improvement in students of both the groups (Table 3). And for Very Good score group (71 to 85% score) there were 30.05% students from pre-clinical and 28.02 from clinical group. A M Owojuyigbe (2015) et al<sup>11</sup> al showed that the mean score (standard deviation) for pre-test was 4.7 (±1.47) with a range of 2–8 out a total of 10, while the mean post-test score was 8.04 ± 1.47 with a range of 3–10. The differences were statistically significant (P<0.01). There was a marked improvement in the knowledge of the respondents with 88.2% of them having a post-test score of ≥7.

Now when we compare our attitude-based question, one of the questions was ‘‘will u give CPR to unknown?’’ in pre-test 50% students were giving answer ‘‘yes’’ they will give, 20% denied while 30% students hesitate to give CPR to unknown person. After our lecture and hands on training on mannequins in post-test 90% students were saying yes, 5% still denied and 5% hesitate to give CPR. And the other question was ‘‘will u give mouth to mouth breathing to unknown?’’ in pre-test 50% students were saying yes, 40% no and 10% hesitate to do. After lecture and Hands on training on mannequins in post-test 60% students were now ready to give, 30% still no and 10% students hesitate to do. Above data showing that attitude towards CPR to unknown and fear is reduced after proper knowledge and training on mannequin. But for mouth to mouth breathing without barrier device still students are not convinced. 30% students still saying no and 10% have fear and they will hesitate to do mouth to mouth breathing. We have already taught them to do ‘Hands Only CPR’ for victims if they unwilling or unable to do mouth to mouth breathing.

When we compared the skill-based difference between gender it was showing gross difference in perfect chest compression. When we look in table it shows that only 29% females were perfect to perform CPR with adequate depth and rate while for male its 85.14% students were perfect in CPR technique in single attempt. And even after all correction and practice still 20% female students needed much practice while in male students it was only 1% who needed further correction to perform perfect CPR technique. Where we look for airway and bag mask technique there was not much difference gender wise (Table 5).

For any lecture or knowledge sharing practice feedback plays an important role if you want to find out minor or major issues as well as positive-negative points regarding your teaching methodology.<sup>8</sup> Here we have also collected feedback after our post-test session, so we can further improve our BLS session for next time. In our feedback most of the students were strongly agreed to our course objectives, quality of videos with BLS materials, skill mastery with instructor’s knowledge, problem solving and hands on training. We had less score in feedback related to equipment content and we readily agreed for the same, as we had one old and one outdated mannequin for hands on training. We will solve this issue in next BLS session as we have already discussed this with BLS training in charge and BLS committee. And at the last in feedback form we have asked to all participants regarding ‘‘BLS must be a part of your curriculum from the beginning of your MBBS study’’, then 95% students were strongly agreed for this. Thus, students have shown an excellent attitude towards BLS/CPR training. Yunus MD (2015) et al<sup>12</sup> has also conducted the study among the trained and untrained medical students with junior doctors in a medical institute and concluded that a significant portion of trainees did not acquired adequate knowledge in a single session of training. Limitation: We had assessed the knowledge at one point of time. Like Na JU (2012) et al<sup>9</sup> we can do study and training on frequent interval also, to know the retained knowledge of BLS among the participants. We could have been spare more numbers of mannequins and time for hands on training.

## Conclusion

There is increased risk of severe morbidities or death from cardiovascular incidence, stroke, choking and drowning if not resuscitated by first responders at the site of crisis. From this study we come to know that knowledge of BLS/CPR is so less in our undergraduate medical students. But we can improve this by frequent lectures and hands on training in under graduate students. Christina George (2017)<sup>10</sup> et al have also concluded that many post graduate students from clinical site are not confident even to handle such an emergency aid procedure (CPR). Hence it is essential to train the medical students from the beginning from their MBBS training.

**Conflict of Interest:** None.

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