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How well are we Prepared? - An Observational Study of Basic Life Support Knowledge amongst Doctors, Interns and Medical Students from Gujarat

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Abstract

Background: Successful Cardio Pulmonary Resuscitation for a good patient outcome requires teamwork and appropriate knowledge amongst health professional is necessary. Uniform protocols can be put in place only if hospital personnel have sound knowledge of Basic Life Support, which is achievable with regular training alone. We conducted this study to assess the knowledge and attitude among medical faculties, interns and students regarding BLS at our institute. *Methods:* An observational study was conducted at a tertiary care hospital from Gujarat, India. A self-prepared questionnaire was distributed to the participants and based on their responses; the percentage of knowledge and attitude regarding BLS was assessed. *Results:* Total 230 participants (94 faculties/senior residents, 36 junior residents/medical officers and 100 students/interns) were included in the study. For the purpose of analysis the faculty/SRs were divided in two groups based on their involvement in emergency services. The mean score (out of 15) for Faculty/ SR (Emergency) was 7.3, Faculty/ SR (Non- emergency) was 6.5, JR/ Mo was 8.1 and Student/ Intern was 8.0., indicating that Faculty/ SR (Non-emergency) scored significantly lower. Only one participant scored between 91-100%, five between 81-90%, 20 (8.7%) between 71-80%, 89 (38.69%) scored 51-70% and 115 (50%) scored less than 50%. Trained participants scored better versus those who were untrained (p = 0.0012). Years of clinical experience did not affect the knowledge scores (p = 0.3905). *Conclusion:* Overall knowledge of the doctors and students of our Institute was not satisfactory which warrants an Institutional policy for regular BLS training.

Keywords: BLS (Basic Life Support); CPR (Cardiopulmonary resuscitation); Questionnaire; Training; Knowledge; Attitude.

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Introduction

Cardiac arrest is a very important critical event within and outside the hospital and has a high level of mortality [1]. Early initiation of Basic life support (BLS) – cardio pulmonary resuscitation (CPR) is known to improve the survival rates [2]. Successful CPR requires appropriate teamwork

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and hence knowledge of BLS amongst medical and paramedical staff becomes necessary. In developing countries like India, CPR training is not yet a routine practice and there are only few publications addressing the level of knowledge among the health care professionals in India [1,3,4]. Institutions where BLS training is not a mandatory part of job profile, the staff are unable to follow uniform protocols. We assessed the knowledge and attitude among medical faculties and students regarding CPR at our institute as a preliminary step to formulate a future plan for their regular training.

Materials and Methods

Ethics consideration

The study was conducted after Institutional Human Ethics Committee approval. Written and informed consent of the participants was taken. The information collected from all the participants was kept confidential.

Study design

An observational study was conducted at a tertiary care teaching hospital from Gujarat, India.

Study setting

This medical college and hospital is relatively new in its operations as it was started recently in the year 2011. The hospital is a 750 bedded public hospital with all speciality departments being operational. At present the college runs undergraduate medical course with yearly intake of 150 MBBS students since 2011.

Study population

We planned to include all doctors and students from our medical college in this study. Our sampling frame included Faculties and Senior Residents (178), Junior Residents (48) and third MBBS students and Interns (180) from our college. Those on leave and / or unwilling to participate were excluded from the study. Hence, we were able to reach 120 Faculties and Senior Residents (SRs), 40 Junior Residents (JRs) and Medical Officers (MOs) and 126 students and interns who were distributed the questionnaire. Data was collected from on-duty, above mentioned participants from hospital and college during two months of study period. Participants were given a maximum of two reminders to return the filled questionnaire at two days interval through a phone call. The questionnaires which were not returned by this time or were incomplete were excluded from analysis. Therefore, the total participants available for study analysis were 94 faculty/SRs, 36 JRs/MO and 100 students /interns.

Study instrument

A structured questionnaire was prepared to measure the knowledge and attitude of the participants based on American Heart Association Guidelines 2010/2015 [5]. The questionnaire consisted of 20 questions out of which 14 were Multiple Choice Questions and 6 short answer questions. We also collected the basic demographic details of the participants.

Face validation as well as content validation was done by three independent experts in this field for the prepared questionnaire and changes were made according to their suggestions in the second version of the questionnaire and this was sent to two participants from each group for pilot testing. Based on this the final version of the questionnaire was prepared.

Outcome Measures

Primary outcome measures: Following analysis of the data, we assessed the following:

The percentage of knowledge score among faculties/senior residents, junior residents/medical officers and students/interns.

Difference in knowledge scores amongst BLS trained (within 5 years) vs not trained.

Effect of number of years of experience on knowledge scores.

Effect of frequent or infrequent exposure to patients requiring CPR on knowledge scores.

Data analysis

The collected data was entered in Microsoft office excel 2007 and then statistical analysis was done using Open Epi Software Version 3.01. Descriptive analysis was done using percentage, mean and median as appropriate. Comparison between various groups was done using ANOVA and Chi square test. A p value of < 0.05 was considered statistically significant.

Results

The following section presents the findings from the survey done among 230 participants

(94 Faculties/SRs, 36 JRs/MOs and 100 Students/ Interns). For the purpose of analysis the faculty/SRs were divided in two groups based on whether their department was involved in emergency services or not. Table 1 shows the basic demographic profile of the participants.

Among the faculty/SRs from emergency departments (Faculty E), only one third had received any prior training in CPR during the five years preceding the survey. Among non-emergency department (Faculty NE) less than one in five faculty members was trained in CPR. Among those who had received training majority had taken AHA or Non-AHA certified training with hands on component. Among the students who reported to have been trained, for majority this exposure was as part of their curriculum in anaesthesia. The self-reported level of involvement in CPR among these categories of study participants is also presented in Table 1. The knowledge assessment was done using 15 questions. Table 2 shows the average marks obtained by different categories of study participants. On applying one way ANOVA test, a significant difference was found among the mean marks obtained by participants of different categories. We applied post ANOVA Student-Newman-Keuls test for all pair wise comparisons. The marks obtained by the faculty from non-emergency departments were significantly lower than the Junior Residents and students on this test.

For ease of interpretation of the findings we first converted the obtained marks in percent. Then, we classified the obtained marks in three categories. Poor score was defined as <50% marks, Average score as 50-85% marks and Good score as >85% marks. Figure 1 shows the distribution of study participants as per their obtained marks across these categories. As can be seen from the figure very few study participants belonged to the good score category. Among the study participants scoring more than 50% marks, again, majority were in category of 51-60% marks. (Not shown as a separate range in figure 1).

We analysed whether the type of the prior training received, the years of experience or prior involvement in CPR were associated with good knowledge among study participants. Since the number of participants with good score category are very few, we have clubbed the average score and good score categories to simplify the interpretation of this analysis. Table 3 shows the findings of this analysis. The prior training experience significantly affected the knowledge score. As can be seen from the table, only a small proportion of participants with prior experience of AHA and Non-AHA certified training had poor score. Whereas almost half participants among those having training exposure in form of CME / lecture or no training exposure had poor score. With regard to the cumulative years of experience, there was a deterioration seen in knowledge score as the experience increased, though this was not statistically significant. Those having higher involvement in CPR had better scores but the difference was not statistically significant.

Important highlights of BLS includes rate of chest compression, ratio of compression to breathing in adults and paediatrics, location of hand placement and AED. Table 4 presents the details on proportion of the study participants who could correctly answer individual questions. Around 54% participants did not know the correct rate of chest compression.

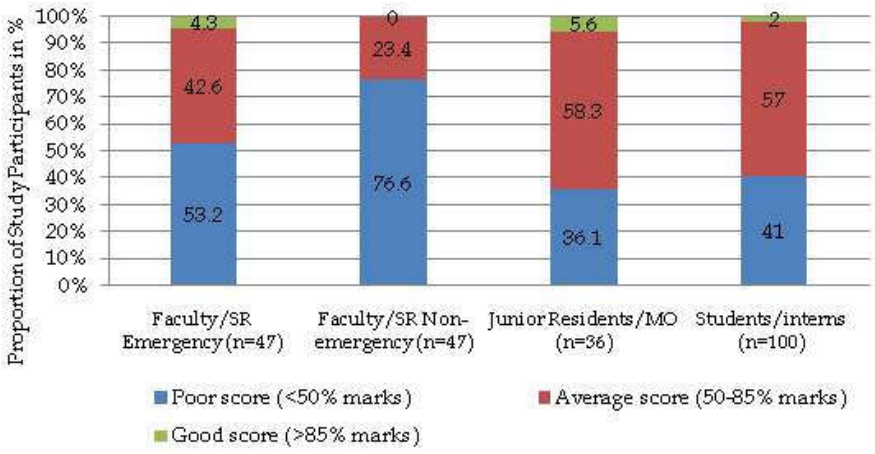

Fig. 1: Distribution of the study participants as per their category of obtained marks

For ratio of chest compression to breathing, 43% participants didn't know the correct ratio in adults and 76% didn't know the ratio in paediatric patients. Approximately 72% participants were not clear about the correct location of chest compression. 78% participants didn't know the step after AED (Automated External Defibrillator). These questions require special mention as they are utmost basic and vital if a person is involved in performing CPR.

The participants' responses on the questions measuring their attitude towards CPR are presented in table 5.

Table 1: Demographic profile of the study participants

Demography	Faculty/SR Emergency (n=47)	Faculty/SR Non-Emergency (n=47)	Junior Residents/ MO (n=36)	Intern/ Students (n=100)
Age [Mean (SD) years]	36.5 (6.4)	35.4 (6.5)	28.3 (6.2)	22.3 (0.5)
Gender				
Male (%)	30 (63.8)	22 (46.8)	23 (63.9)	31(31)
Female (%)	17 (36.2)	25 (53.2)	13 (36.1)	69(69)
Median years of experience	12	9	2	NA
Prior Training received in CPR (%)	15 (31.9)	8 (17)	8 (22.2)	60 (60)
Involvement in CPR (%)				
Very frequent	14 (29.8)	1 (2.1)	8 (22.2)	3 (3)
Occasional	27 (57.4)	12 (25.5)	23 (63.9)	23 (23)
Only observed	4 (8.5)	15 (31.9)	4 (11.1)	56 (56)
Never	2 (4.3)	19 (40.4)	1 (2.8)	18 (18)

*SD = Standard Deviation; NA= Not Applicable

Table 2: Marks obtained by study participants (out of 15)

Category	Mean (+/-SD)	Statistical significance
Faculty/SR Emergency (n=47)	7.3 (4.2 – 10.5)	F ratio = 5.2 * p= 0.002
Faculty/SR Non-emergency (n=47)	6.5 (4.4 – 8.6)	
Junior Residents/MO (n=36)	8.1 (5.9 – 10.4)	
Students/interns (n=100)	8 (6 – 10)	

* One way ANOVA

Table 3: Analysis of predictors of good knowledge among the study participants

	Fair score (>50%)	Poor score (<50%)	Statistical test
Training (duration of training)			
AHA certified (four hours with hands on practice)	16 (84.2)	03 (15.8)	$\chi2$= 13.5 * p= 0.0012
Certified Training Non-AHA (two-four hours with hands on practice)	4 (80)	1 (20)	
CME / Lecture (one-two hours, without hands on practice)	37 (54.4)	31 (45.6)	
Non trained	58 (42)	80 (58)	
Experience (n=130) +			
<5 years	22 (51.2)	21 (48.8)	$\chi2$= 1.881 p= 0.3905
5-10 years	15 (41.7)	21 (58.3)	
>10 years	19 (37.3)	32 (62.7)	
Involvement in CPR			
No involvement	14 (35)	26 (65)	$\chi2$= 6.390 p= 0.0941
Only observed	42 (53.2)	37 (46.8)	
Occasional	42 (49.4)	43 (50.6)	
Very frequent	17 (65.4)	09 (34.6)	

* The categories of certified non-AHA training and CME/lecture were clubbed while calculating $\chi2$ test, + Students and interns are not included in this analysis, Numbers in bracket indicate row percent.

Table 4: Question-wise proportion of the study participants able to answer correctly (n=230)

No	Question	Correct (%)	Incorrect (%)	Blank (%)
1	Full form of BLS	221 (96.1)	2 (0.9)	7 (3)
3	First step in outside hospital arrest situation	141 (61.3)	87 (37.8)	2 (0.9)
4	Rate of chest compression in adult CPR	105 (45.7)	118 (51.3)	7 (3)
5	Ratio of chest compression to breathing in adult CPR	130 (56.5)	98 (42.6)	2 (0.9)
6	Airway manoeuvre for unresponsive polytrauma patient	105 (45.7)	118 (51.3)	7 (3)
7	About rescue breaths	57 (24.8)	168 (73)	5 (2.2)
8	Chest compression to breathing ratio in pediatric CPR	53 (23)	168 (71.3)	13 (5.7)
9	Depth of chest compression in adults	172 (74.8)	56 (24.3)	2 (0.9)
10	Location for chest compression in adult	65 (28.3)	164 (71.3)	1 (0.4)
11	Need to check carotid pulse	201 (87.4)	27 (11.7)	2 (0.9)
12	Ventilation rate in intubated patient	94 (40.9)	123 (53.5)	13 (5.7)
13	Full form of AED	96 (41.7)	88 (38.3)	46 (20)
14	Step after AED	50 (21.7)	164 (71.3)	16 (7)
15	Components of high quality CPR	71 (30.9)	151 (65.7)	8 (3.5)
16	Manoeuvre for choking	129 (56.1)	100 (43.5)	1 (0.4)

BLS- basic life support, AED-automated external defibrillator, CPR-cardio-pulmonary resuscitation.

Table 5: Participant responses on the attitude questions (n=230)

Attitudinal attribute	Number (%)
Attitude of the participants regarding mouth to mouth breathing*	
Prefer to use some barrier device	126 (55)
Would stay back and let someone else to volunteer	2 (0.8)
Willing to perform without any hesitancy	85 (37.1)
Will just give chest compressions	16 (6.9)
Proportion of participants expressing readiness to take a lead	181 (78.7)
Proportion of participants recommending to include CPR as part of curriculum	229 (99.6)

*One student didn't give any answer for this question hence, n=229

Discussion

All healthcare professionals should have the knowledge as well as skills for performing effective CPR. Effective CPR needs proper training [6], and that too regularly and repeatedly. Our institute is relatively new with just two batches of MBBS graduates and no post graduate students. No formal BLS training is mandatory before recruitment within the hospital for health care professionals. Moreover refreshment of their knowledge regarding BLS does not occur on a regular basis.

We conducted this questionnaire based study to assess current knowledge of BLS among doctors and students so as to make a future plan for training. It showed that overall knowledge of doctors and students of our institute was inadequate. Other studies done previously on different study population have similar conclusions [3,7–9].

In our study, only one (0.43%) participant obtained a score between 91-100% who was from intern/student group. Total five (2.17%) participants (two Faculty/SR E, two JR/MO and one intern/student) obtained a score in range of 81-90%. 20 (8.7%) participants scored between 71-80% marks. 89 (38.69%) participants scored 51-70% marks. Total 115 (50%) participants scored less than 50% marks.

In a study conducted at Quassim University, Kingdom of Saudi Arabia, published in 2014, the results were similar to our study. They assessed knowledge of BLS among clinical practitioners, medical students, interns and medical science students. They found only two responders (1.4%), scored 90–99%. Six responders (4.3%) scored 80–89%. Medical students achieved a higher score than students of allied health college [8].

In a study conducted in Iran, the authors assessed the knowledge of the general dental practitioners with a questionnaire and their practical CPR skills on a manikin by giving them a hypothetical cardiac arrest scenario. They concluded that the dental practitioners were lacking in appropriate knowledge and skills regarding CPR; 39% did not answer any question correctly and only 4% performed CPR properly on manikin [10].

A cross sectional study was conducted in Tamilnadu, India on 1054 medical practitioners, medical, dental, homeopathy students and nurses. No one had complete knowledge on BLS. Only two out of 1,054 (0.19%) had secured 80–89% marks, Ten out of 1,054 (0.95%) had secured 70–79% marks, Forty-three of 1,054 (4.08%) had secured 60–69% marks. 894 (84.82%) secured less than 50% marks. The study results showed that medical, dental and nursing students and faculty in the study group had poor knowledge of BLS [3].

In our study we collected information regarding the speciality of the faculties/SRs and made a broad division into the emergency and non-emergency group. Those who work in emergency branches, come across arrest scenarios more often. We found that knowledge of Non Emergency (NE) group of faculties was the lowest (mean 6.5, P value 0.002), the probable reason being that they are not involved in clinical emergency work in hospital and CPR/ BLS may not have been included in their post graduate curriculum. We couldn't find any other report of such comparison of knowledge of CPR among the emergency and non-emergency faculties in currently available data.

We collected information regarding participants' training status in the last 5 years. Total 91 participants out of 230 had received a prior training (39.56%). We also collected data regarding the type of training received. Various training that the participants mentioned were broadly classified into four groups; AHA certified training, non-AHA certified training, CME or Lecture and lecture with hands on training. 60% of students and interns reported having received training which was mostly lecture with hands on practice during their clinical posting in anaesthesia department. This may have helped them in attaining relatively higher mean knowledge score 8/15 (table 2). In our study the participants who had received prior training, received a significantly higher score as compared to those who were untrained (p value 0.0012) as shown in Table 3.

In a study conducted in Nepal by Roshana et al., in 2012, the participants were asked about any resuscitation training after their basic degree. The participants who had been trained in CPR in last five years had significantly more mean knowledge score than those who had been trained more than five years ago and those who had not been trained at all (no training vs. training <5 years, $p<0.001$; training <5 years vs. training >5 years $p=0.001$ [7].

Hence, it can be concluded that training in some form, whether structured or non-structured helps to build the knowledge base of an individual but due to limited retention capacity, there is definitely a need for re-training in BLS. Some studies show that the retention of this knowledge after training is between three to six months [11,12].

Partiprajak et al., 2016, showed that the training had an immediate significant effect on the knowledge, self-efficacy and skill of chest compression; however, the same significantly declined after three months post-training. Chest compression performance after training was positively retained for three months compared to the first post-test but was not statistically significant. So they emphasized on retraining programme after three months post-training [11].

Cooper S et al., 2007, studied impact of Immediate life support (ILS) training in a primary setting. They suggested there was a significant deterioration in skills six months after the ILS course ($p = 0.02$). However, skills measured six months after attending the course remained significantly higher than before the course ($p < 0.001$), hence it indicates, skills do not decrease to pre-course levels [12].

Sharma et al., 2012 studied Adult basic life support awareness and Knowledge among medical and dental interns after completion of their internship. Majority of the responses mentioned non availability of professional training as the prime reason for lack of BLS knowledge [1].

Ajjappa et al. conducted a study on effectiveness of BLS Training in improving the knowledge and skills among medical interns in Karnataka, India. The study was done amongst 91 interns who were previously not aware about the BLS skills. As per AHA schedule, the course book was provided to the participants and they were required to give a pre-test prior to the training. The BLS training was based on theoretical and practical teaching (2010 AHA guidelines). After the training, a post-test was conducted to re-assess their BLS skills theoretically as well as practically. The mean pre test score was 75.09%, with a minimum of 24% and maximum of 82%. The mean post test score was 92.7%, with a minimum of 90% and maximum of 95% [13].

Although formal practical training might be the best way to teach BLS, other means such as internet, electronic media or smart phone applications can be used to teach or reinforce knowledge of BLS. This training should be provided not only to the health care professionals but also to lay persons. A study conducted in Australia by Gavin et al. on high school students concluded that the online course improved participant's knowledge of

BLS significantly, but not their skills to perform CPR [14].

In our study, With regard to the cumulative years of experience, there was a deterioration seen in knowledge score as the experience increased, though this was not statistically significant. This observation warrants repeated training. Similar observation was found in another study where no association was found between knowledge of the participants and the duration of their clinical work (p=0.91) [7].

In our study, 99.4% of participants suggested inclusion of CPR training in curriculum. 76.9% were ready to take a lead in CPR. 47.8% preferred barrier device for mouth to mouth breathing, 12.5 % were ready to give just chest compression. Since there is a high motivation to take the lead, the health care professionals, in general, seem to be receptive for such atraining. Roshana et al observed that 95% of the participants favoured BLS to be included in the undergraduate curriculum, 82.6% of the participants were not reluctant to perform CPR, 64% preferred to use some type of barrier for mouth to mouth breathing, and 7% refused to perform that [7].

An important issue raised in our study by one of the participating faculties was that, not only should the BLS training be mandatory but it should also be sponsored by the Institute. In India, in most of the government institutes, various trainings are mandatory during the person's tenure, for example medical education training (MET), computer training etc. Equal importance should be given to achieving a high score in the BLS training and evaluation.

Conclusion

Overall knowledge of BLS is very poor among the doctors and students (third MBBS) of our institute. Knowledge among the participants who were trained is better than untrained participants, so there should be some institutional policy regarding regular training sessions for students, doctors and paramedical staff for BLS. Retraining every six months should also be stressed upon for retention of knowledge.

Limitation

The practical skills to perform CPR were not assessed in this study.

Future implication

On the basis of the results of our study, we would like to formulate a plan for regular BLS training in our institute. A multicentric observational study can be conducted across the state or even country to know the current status of knowledge of BLS among the doctors to sensitize them regarding the need of BLS training and retraining.

Equal importance should be given to lay person's training for basic life support and first aid for example police personnel, ambulance drivers, teachers, high school students etc. Hence future plans can include community BLS training as a regular practice apart from in hospital trainings.

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