

# Clinical Awareness of Do's and Don'ts of Cardiopulmonary Resuscitation (CPR) Among University Medical Students-A Questionnaire Study

MEENA KUMARI K<sup>1</sup>, MOHAN BABU AMBERKAR<sup>2</sup>, SUHAS ALUR S<sup>3</sup>, PAVAN MADHUKAR BHAT<sup>4</sup>, SIDDHARTH BANSAL<sup>5</sup>

## ABSTRACT

**Background:** Medical students today are tomorrow's future doctors. One of the key skills that students should develop during their graduation training is to be prepared for emergency life saving measures like cardiopulmonary resuscitation (CPR) anytime, anywhere. The students play integral role in learning, mastering and inculcating the most pragmatic clinical skill of CPR.

**Objectives:** a) To evaluate the CPR awareness among undergraduate medical students. b) To screen the knowledge regarding accurate, effective CPR procedural techniques and various barriers of CPR failure in clinical practice from student perspective. c) To ascertain interest in CPR training programs and also inculcating CPR as an active part of clinical practice in future.

**Materials and Methods:** The questionnaire comprised of three parts, first one dealing with general questions to know the

importance of CPR in clinical practice, second one comprised of the main goal and accuracy of CPR intervention and the last segment consisted of questions targeting the indications, methods and effectiveness of CPR.

**Statistical Analysis:** Descriptive statistics and multiple response analyses were done by using SPSS 17.

**Results:** The students had good knowledge about the importance of CPR in clinical practice and stand average in knowing its indications and effectiveness. Whereas, only 1.2% of them were completely aware about the universal compression ventilation ratio, and 20.4% were aware of the current order of CPR being compression, airway and breathing.

**Conclusion:** Though, CPR awareness is good among the students but skills of CPR have to be mastered by proper certified training programs at regular intervals and knowledge has to be updated with the changing trends in CPR.

**Keywords:** Clinical practice, Future doctors, Lifesaving technique, Learning, Undergraduates

## INTRODUCTION

Cardiopulmonary resuscitation (CPR) is one of the most evolving areas of modern medicine which comprises a series of lifesaving actions that improve the survival rates following cardiac arrest [1]. "Although the optimal approach to CPR may vary, depending on the rescuer, the victim, and the available resources, the fundamental challenge remains: how to achieve early and effective CPR. Given this challenge, recognition of arrest and prompt action by the rescuer continue to be priorities for the 2010 AHA (American Heart Association) Guidelines for CPR and ECC (Emergency Cardiovascular Care)" [2]. Despite important advances in prevention, cardiac arrest remains a substantial public health problem and a leading cause of death in many parts of the world. Cardiac arrest occurs both in and out of the hospital.

In earlier days CPR training was meant only for health care professionals. Later it was noticed that many of these events occurred outside the hospital setting, and that early CPR need to be performed by the bystanders who witnessed the scene. Hence, CPR is said to be a skill for all [3]. Quality of life is also found to be better for victims who immediately receive bystander CPR even in absence of professional assistance [4]. Studies have shown that immediate CPR after collapse due to ventricular fibrillation doubles or even triples the chances of survival. In contrast survival chances decrease by 7-10% for every min, if CPR is delayed [5].

There is an urgent need that every individual at least one who is associated with health care system, should be educated and facilitated to master the skills of CPR. This could be best achieved at grass root level if CPR training programs are made available to all the undergraduate medical students. Young medical students are generally found to be very enthusiastic, zealous and very inquisitive

to learn lifesaving skills like CPR which has become basic life support (BLS) provided if it is taught in the right manner and in right time.

## MATERIALS AND METHODS

This was a questionnaire based study conducted in the Kasturba Medical College (KMC), Manipal, Karnataka, India after obtaining approval from the Institutional ethics committee. It was conducted during the month of April-November 2011; the students were pursuing second, third, fourth year of MBBS medical course. The questions have been reviewed and validated by the experienced anaesthetists and certified trained professionals who are currently involved in many BLS and ACLS (Advanced Cardiovascular Life Support) training programmes.

The students were explained about the aims and objectives of the study and were invited to participate. Student feedback was obtained using a questionnaire administered in English, the medium of instruction. The questionnaire comprised of three parts, first one dealing with general questions to know the importance of CPR in clinical practice, second one consisted of the main goal and accuracy of CPR intervention and the last segment comprised of questions targeting the indications, methods and effectiveness of CPR. To understand the knowledge in depth and avoid bias certain statements were deliberately reframed as negative questions.

**The answered questions were rewarded as follows:**

- Positive or Negative questions answering correctly - +01 points
- Positive or Negative questions answering incorrectly - +00 point
- The questions having multiple positive or negative answers; each option ticking correctly rewarded with +01 point.

The study protocol tool was examined and validated by conducting a well-designed comprehensive pilot study for readability and ease of understanding. Pilot study was conducted among 25 randomly selected students of different batches and modified accordingly after critical feedback forms.

Total no. of questions answered correctly in each category were counted and scored. Total scores for each category converted into percentages and divided into pre-fixed grades as follows, >60% as excellent, 40-60% good and <40% as poor.

## STATISTICAL ANALYSIS

The sample size, as per World Health Organization (WHO) Epi info software, was calculated to be 250. Data entry, scores, descriptive statistics and multiple response analyses was done using SPSS 17.

## RESULTS

A total of 250 students participated. Among three categories of questionnaire survey, students were excellent (>97% reciprocated with positive response) in first one regarding importance of CPR where they gave more collective positive response on knowledge and need of CPR. Negatively framed question "CPR was harmful" was intelligently understated by 89.6% of students. However, 7.2% of them differed by saying 'did not know' [Table/Fig-1]. In second category, questions chosen were about the main goal and accuracy of CPR intervention (in terms of scores rewarded, 20% of them graded as excellent, 36% scored as good and 44% gave poor response). Third one with respect to indications, methods and effectiveness of CPR, most of them had sound knowledge (in terms of scores rewarded, >47.2% scored with excellent grade, 30% good and 22.8% gave poor response) [Table/Fig-2]. Only 20% students rightly answered as all the options under 'purpose of CPR' question as correct [Table/Fig-3]. When we asked about the 'universal compression to ventilation ratio' in different age groups, only 84% of students partially answered in a correct manner [Table/Fig-4] and only 20.4% were aware of the current upgraded order CPR intervention, being C-A-B from previous A-B-C. Regarding the depth of chest compression only 7-8% of them answered all the options as correct [Table/Fig-5].

## DISCUSSION

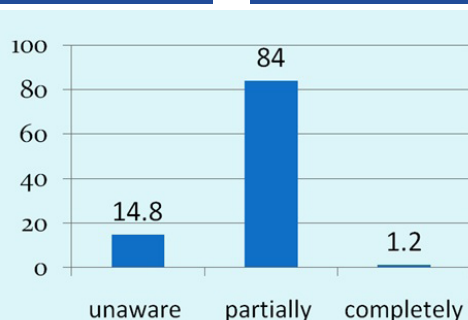
"Cardiopulmonary arrest is the sudden cessation of spontaneous and effective ventilation and systemic perfusion. In the past,

Statement no.	Statement	Yes	No	Don't know
1.	Importance of CPR	98	1.2	0.8
2.	Correct CPR procedure	97.2	1.6	1.2
3.	Basic emergency	96.4	1.6	2
4.	Participate in CPR	90	2.4	7.6
5.	CPR procedures	2.8	94.8	2.4
6.	More harmful	3.2	89.6	7.2
7.	Waste of man power	2	95.2	2.8
8.	Teaching and mastering CPR	96.4	2.4	1.2

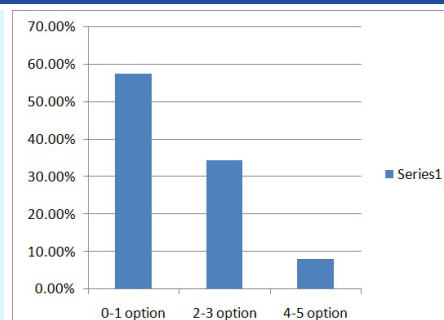
[Table/Fig-1]: Percentage of responders to the general statements regarding the importance of CPR in clinical practice



[Table/Fig-3]: Purpose of CPR



[Table/Fig-4]: Universal compression-ventilation ration



[Table/Fig-5]: Regarding chest compressions

whenever the heart ceases functioning, a patient would consider as dead. But now it is known that certain procedures when carried out within four minutes would make the patient to survive" [6]. CPR training for all health care professionals has been recommended since the inception of formal CPR guidelines more than 40 years ago [7]. During the past 50 years the fundamentals of early recognition and activation, early CPR, early defibrillation, and early access to emergency medical care have saved 100 and 1,000 of lives around the globe. These resurrected lives demonstrate the importance of resuscitation research and clinical translation and are cause to celebrate this 50<sup>th</sup> anniversary of CPR [8].

There is a striking disparity in survival outcomes from cardiac arrest across systems of care, with some systems reporting five-fold higher survival rates than others. "Although technology, such as that incorporated in automated external defibrillators (AEDs), has contributed to increased survival from cardiac arrest, no initial intervention can be delivered to the victim of cardiac arrest unless bystanders are ready, willing, and able to act. Moreover, to be successful, the actions of bystanders and other care providers must occur within a system that coordinates and integrates each facet of care into a comprehensive whole, focusing on survival to discharge from the hospital" [8]. This executive comprehensive questionnaire highlights awareness among medical students about the major changes and most provocative recommendations in the 2010 AHA Guidelines for CPR and ECC [8]. "High-quality CPR is the cornerstone of a system of care that can optimize outcomes beyond return of spontaneous circulation (ROSC). Return to a prior quality of life and functional state of health is the ultimate goal of a resuscitation system of care" [8].

Why a doctor must know and be aware about accurate CPR skill at student level?

"As everyone hopes for a better tomorrow", anybody can be a lifesaving rescuer for a cardiac arrest victim. CPR skills and their application depend on the rescuer's training, experience, and confidence. It is very important that every person in the community know about CPR

Statement no.	Statement	True	False	Don't know
1.	CPR	92.4	2.8	4.8
2.	Attempted always	2.4	94	3.6
3.	Within 6-7 minutes	67.6	10.8	21.6
4.	Artificial respirations	60.4	12.4	27.2
5.	Survive	46.8	20.4	32.8
6.	Irreversible damage	78.4	9.2	12.4
7.	No connection to the victim	39.2	14.8	46
8.	Ceases for >10 hrs	65.2	9.2	25.6
9.	Return of spontaneous circulation	70	10	20
10.	Defibrillator	82.8	3.6	13.6
11.	Compression-only CPR	42.4	14.8	42.8
12.	Survival rate	70.4	6	23.6
13.	Less effective in children	35.2	9.2	55.6
14.	Calm and contented	87.6	2.8	9.6
15.	Misrepresented	66.8	12	21.2

[Table/Fig-2]: Percentage of responders to the statements regarding the indications, methods and effectiveness of (CPR)

skill to save lives and improve the quality of community health. At least the doctors, nursing and paramedical staff are anticipated to know about it, as they are routinely facing life threatening situations and the knowledge of CPR will be definitely useful [9]. However, there is a lack of research studies related to CPR awareness in health care sectors. "The knowledge of CPR is a major determinant in the success of resuscitation and plays a vital role in the final outcome of acute emergency situations" [10]. Various studies investigated the awareness of health professionals' knowledge and experiences of CPR [9, 11-14]. For example, the knowledge and experiences of CPR was examined in 61 medical students and found that out of these students only 9 (14.7%) had taken CPR course while 52 (85.3%) students had not attended any such course. Awareness of BLS was present in 66.6% students, but skills were found in 18% only [11]. Similarly, in another study the knowledge and experience about CPR was less than score of 50% in medical and dental intern's students, despite that all of them were aware of its importance [9]. In a recent study, the awareness was examined among students, doctors and nurses of medical, dental and nursing colleges. The result showed that the awareness of health professionals about CPR was very poor [11, 14]. Very interestingly, one study states that majority of students realize the importance of the CPR skill. However, 85% of them felt their knowledge is inadequate [12] as similar to the study conducted in New Zealand wherein 73% of students were completely unaware about proper CPR technique [15]. In comparison to this study, a US study showed that 9.1% of individuals did not perform CPR as they felt they would not be able to do it correctly [16]. Out of all students interviewed 45% believe that CPR training should be a mandatory graduation requirement [12]. Disturbingly, a significant fraction of society including health care personnel's does not even know the telephone number to call in case of medical emergency. This indicates shortcoming on the part of individual and society.

The present study was aimed to know the level of understanding and awareness about the most sensitive aspects of the CPR and plan to enrich by giving presentations at medical colleges to raise awareness of the growing concerns about BLS so that one becomes capable of a true health care provider. In this study we had chosen practical, easily understandable and most important areas of CPR at par with the student's knowledge. From the results obtained of the questionnaire study, we found that students had excellent knowledge about importance of CPR in clinical practice. However, majority of them scored average regarding accuracy of CPR and effectiveness of CPR. Though quite large number of students were completely ignore regarding the important aspects of the CPR. However, their interest and zeal to know and be part of the CPR, the lifesaving tool should not be underestimated.

It is just not enough making the students theoretically knowledgeable about CPR but also there is an absolute necessity to encourage them to inculcate, master and practically execute learned CPR procedural techniques in day-to-day life or in future clinical practice. After this comprehensive questionnaire study among medical students the university introduced BLS training programme which is now mandatory to all personnel's like medical, dental, nursing students, all interns and also including clinical and non-clinical medical faculties. We are glad to admit that our KMC, Manipal has full-fledged ACLS training crew and programmes which certainly gear up in fostering life saving measure in a most effective manner.

Hence, it is mandatory to not only educate students but also train them regarding mastering the skills of CPR intervention at the grass root level. The study may further be able to recommend means to organize useful awareness programmes like well-designed CMEs, workshops and symposium on the identified issues taking students as participants. According to the recommendation of Smith JM [17] to include pharmacy staff in hospitals CPR response team is also a good suggestion which adds to the learning experience, similarly it can be adopted as training programme when students are undergoing internship in hospitals. If all health care providers become efficient

then they can successfully train and coach bystander irrespective of his identity. This would really help in widening the spectrum of CPR awareness programmes and also prevent disabilities [17]. CPR training should be taught using simulations taking in account of various cardiac arrest scenarios [3]. So that it develops confidence in the student population and it also helps them to understand the importance of team work in 2-rescuer CPR. The new guidelines based on AHA 2010 [8], recommends chest compressions first followed by airway, breathing for adults, children and infants. This change has to be made known to the budding medical students, as they would be the future doctors.

## LIMITATIONS OF THE STUDY

1. The study would have been more comprehensive if all health care providers like interns/ junior/senior doctors, dentists, clinical pharmacists and nursing students/ staff were also included and compared the level of awareness.
2. We received very good response from the students; however one of the barriers for not responding correctly to our questionnaire study would have been exhaustive MBBS class hours.
3. This study was done randomly in students; we must have missed few good scholar students.
4. This questionnaire was more of extracting theoretical knowledge rather evaluating practical skills of CPR which perhaps could have been more assertive.

## CONCLUSION

The ability to recognize and treat a respiratory or cardiac arrest is a basic medical skill that all health care providers including medical students are generally assumed to possess. As we conclude from this questionnaire survey, CPR knowledge in medical students stand average, these major shortcomings could be improved by conducting many well designed certified training programmes, so that the students will be well aware in these aspects right from the graduate level.

We can broaden the spectrum of qualitative knowledge and skills of all doctors at the student level by conducting many questionnaire studies like this. Also these kind of active programmes stir up CPR awareness level, which will help in fostering confidence when he could become a game changer in clinical practice as he could also become a true saviour.

To make it a mandatory component in the curriculum of all health associated fields like medical, paramedical and nursing and to train the undergraduate students the basic skills of CPR. More research is warranted in our set up to determine an appropriate and efficient course design. A step ahead it would be better to train the community also the skills of CPR to increase the survival rates of cardiac arrest. CPR is an important skill that everyone should learn. One need not be a medical professional to know or use CPR. One never knows when, where, and how he would utilize this skill to save someone or to be a hero to a stranger. From this study, we would like to convey a strong message especially to all health care workers irrespective of their status should spare fair amount of time to get certified in CPR training and should enjoy executing the art of life saving.

## ACKNOWLEDGMENT

We thankfully acknowledge the MBBS students of Manipal University, Manipal for their active participation in the study.

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#### A. General questions to know the importance of CPR in clinical practice

1	I am aware about importance of CPR in clinical practice	Y	N	DK
2	According to me knowledge about correct CPR procedure is mandatory to all health care professionals and it should be made compulsory	Y	N	DK
3	I believe CPR is a basic emergency need for the betterment of mankind and health status	Y	N	DK
4	I would like to participate in CPR awareness programs and have life saving experience	Y	N	DK
5	I believe CPR procedures are arduous, unethical, incorrect and purely inhuman	Y	N	DK
6	Rather than being beneficial, it is more harmful to the patients	Y	N	DK
7	Conducting CPR is simply a waste of man power and time	Y	N	DK
8	Teaching and mastering CPR intervention should be made mandatory to all medical undergraduates	Y	N	DK

#### B. The main goal and accuracy of CPR intervention

- 1 **The purpose of CPR is to**  
 1. Restart the heart  2. Restore oxygenated blood to the brain  3. Prevent permanent brain damage  4. Delay tissue death  5. Maintain cardiac output to keep vital organs alive  6. Allow the heart to remain responsive to defibrillation attempts  7. Circulate oxygenated blood
- 2 **The current order of updated CPR intervention for all age groups except newborns is**  
 1. Airway, Breathing, Chest compressions (ABC)  2. Chest compressions, Airway, Breathing (CAB)  3. Airway, Chest compressions, Breathing (ACB)  4. Breathing, Chest compressions, Airway, (BCA)
- 3 **The recommended universal compression to ventilation ratio with a compression rate of at least 100 per minute in all groups is**  
 1. 30:2 for adults, children and infant if only a single rescuer is present  2. 15:2 in children and infants if at least 2 rescuers are present  3. 3:1 in newborns unless a cardiac cause is known
- 4 **Regarding the chest compression the following procedures are recommended**  
 1. Depth in adults and children is about 5 cm (2 inches)  2. In infants it is 4 cm (1.5 inches)  3. In adults rescuers should use two hands for the chest compressions  4. In children they should use one hand  5. With infants two fingers (index and middle fingers)

This section contains questions that have multiple correct answers. Kindly note: 1) This study includes both correct and incorrect statements

#### C. Indications, Methods and Effectiveness of Cardiopulmonary Resuscitation (CPR)

1	Cardiopulmonary resuscitation (CPR) is an emergency procedure which is attempted in an effort to return life in cardiac arrest	TRUE	FALSE	DK
2	It has to be attempted always inside of a hospital not outside	TRUE	FALSE	DK
3	CPR is generally only effective if performed within 6-7 minutes of the stoppage of blood flow to vital organs	TRUE	FALSE	DK
4	Artificial respirations are more appropriate than CPR, if a person is not breathing but has palpable pulse ( i.e. respiratory arrest)	TRUE	FALSE	DK
5	On average, 85-90% of people who receive CPR survive if conducted by experienced personnel	TRUE	FALSE	DK
6	The brain may sustain damage after blood flow has been stopped for about 4 mins and irreversible damage after about 7 mins	TRUE	FALSE	DK
7	According to the recent survey people with no connection to the victim are more likely to perform CPR than a member of their family	TRUE	FALSE	DK
8	If blood flow ceases for >10 hrs, virtually all cells of the body die	TRUE	FALSE	DK
9	CPR is generally continued until the person regains return of spontaneous circulation or is declared dead	TRUE	FALSE	DK
10	Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or "perfusing" heart rhythm	TRUE	FALSE	DK
11	Compression-only CPR by the lay public is recommended to an adult having cardiac arrest out of hospital	TRUE	FALSE	DK
12	The survival rate is very high if immediate CPR is done followed by defibrillation within 3-5 minutes of sudden cardiac arrest	TRUE	FALSE	DK
13	Compression-only CPR is less effective in children than in adults, as cardiac arrest in children is more likely to have a non-cardiac cause	TRUE	FALSE	DK
14	It is always better to be calm and contented while conducting CPR rather than look frightened	TRUE	FALSE	DK
15	CPR is often severely misrepresented in movies and television as being highly effective in resuscitating a person who is not breathing and has no circulation	TRUE	FALSE	DK

#### PARTICULARS OF CONTRIBUTORS:

- Associate Professor, Department of Pharmacology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India.
- Associate Professor, Department of Pharmacology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India.
- Undergraduate, Kasturba Medical College, Manipal University, Manipal, Karnataka, India.
- Undergraduate, Kasturba Medical College, Manipal University, Manipal, Karnataka, India.
- Undergraduate, Kasturba Medical College, Manipal University, Manipal, Karnataka, India.

#### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Mohan Babu Amberkar,  
 Associate Professor, Department of Pharmacology, KMC, Manipal University, Manipal, Karnataka, India.  
 Phone: 09886367003, E-mail: drmohan7amberkar@gmail.com

Date of Submission: **Jan 18, 2014**

Date of Peer Review: **Feb 25, 2014**

Date of Acceptance: **May 02, 2014**

Date of Publishing: **Jul 20, 2014**

FINANCIAL OR OTHER COMPETING INTERESTS: None.