

## Cardiopulmonary Resuscitation Training for Medical Students in Anesthesiology Rotation in Ardabil Medical University (Iran)

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### Abstract

**Background and purpose:** Cardiopulmonary resuscitation (CPR) training for undergraduate medical students has been noted to be poor in the past. Attempts have been made The aim of this study is to determine effect of CPR training in the anesthetic ward to improve knowledge and practice undergraduate medical student of CPR.

**Methods:** A 12 month Educational experimental study with self control was done on all undergraduate medical student (n=30) at the medical university of Ardabil in 2006-2007. During I month of program all this students have undergone CPR training including basic life support (BLS) , advanced cardiac life support (ACLS) and practical skills. Data were collected via questionnaire, demographic, pre/post knowledge and practice.

**Results:** After training the acceptable score (good and very good) about knowledge of BLS, ACLS and practical skill significantly increased %6.7 to %50 (p=0.0001) , % 13.3 to %53.4 (p=0.001) and %3.3 to % 100 (p=0.001) respectively. A significant relationship between knowledge of ACLS and practical skills was shown (p=0.005).

**Conclusion:** The CPR training course in anesthetic ward leads to a significant increased in skills and knowledge. Adding this course to undergraduate curriculum of medical students especially in operatively wards (e.g. Anesthetic ward) is essential.

**Keywords:** CARDIOPULMONARY RESUSCITATION; TRAINING; BASIC LIFE SUPPORT; ADVANCED CARDIAC LIFE SUPPORT

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### Introduction

Good training of medical students for cardio-pulmonary resuscitation (CPR) has long been a major focus for medical educationist (1,2). Our experience as well as many studies

showed that CPR skills of medical graduates and junior physicians are not satisfactory, partially due to defects in training (3).

Effective CPR reduces the likely hood of death after cardiac arrest (4).

Defects in CPR-related knowledge, attitude and practice of interns have shown to affect primary assessment, treatment choices and outcomes of hospitalized patients (5).

The advances in medical technology, more

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invasive interventions, increase in proportion of population reaching old age, higher prevalence of chronic diseases in this age group, more emergency ward admissions have increased the demand for CPR moreover these patients have more serious conditions and are exposed to more medical error and complications which leads to a 3% - 16% complication of therapeutic procedures and 5-8% death (6,7). Of these complications 50% are attributed to physicians' actions (8). In emergency settings where junior physicians provide services without sufficient supervision, the problem appears to be more serious (9).

A systematic approach to CPR training is very important. A physician should be able to do a CPR in all conditions for all patients. Furthermore the physicians should be able to direct other members of medical team and educate them and community for this. To learn how to do CPR, one needs to exercise the skills in a practical setting (16).

Previous studies indicated that CPR training should be included in medical curriculum (11), while there is a lack of evidence of where to introduce the CPR training for medical students in the curriculum (12). CPR training courses are usually delivered by anesthesiologists (13).

In Iran, CPR training is not included in medical curriculum, and several studies should that interns' knowledge and practiced skills of CPR were not satisfactory (14, 15, 16, 17).

This study is an attempt to measure the effectiveness of providing a 15-day rotation of anesthesiology for medical interns on improving their knowledge and skills of basic and advanced life support (BLS, ALS).

## Methods

This study used a pretest-post test single group quasi-experimental design. All interns who studied in 2006 and 2007 participated in this study. An assessment from including 3 sections was completed for each student before they being the anesthesiology rotation

and after they completed the rotation. The assessment from included 5 demographic questions, 25 questions to assess the intern's knowledge of basic life support (BLS) and advanced cardiac life support (ACLS) which was completed by interns. The last section of assessment form was completed by an expert observer who assesses the CPR related practical skills which was performance on a manikin. The skills which were assessed were opening a venous access, intubation, ventilation with Ambu-bag, cardiac massage and defibrillation. These skills were assessed by an experienced physician who was not involved in training the subjects.

The questionnaire was developed based on standard text of cardio-pulmonary resuscitation and its reliability was assessed through a pilot study on 10 interns leading to a Chronbach's  $\alpha$  of 0.75.

The students were introduced for the rotations in groups of 2 or 3. An assessment was completed for each student before they began the rotation, then they took part in 15-day CPR training provided by two experienced anesthesiologist faculty members.

After the rotation, the students were assessed and the same assessment form was completed. Of 25 questions assessing CPR knowledge 12 examined students' knowledge of BLS and 13 examined students' knowledge of ACLS. Each correct answer had 1 point. The interns were classified as "Very Poor", "Poor", "Moderate", "Good" and "Very Good" based on the sum of correct answers for each section.

The practical skill had a total mark of 50 with 12 points for opening a venous access, 11 points for intubation 14 points for ventilation with Ambu-bag, and 13 points for cardiac massage and defibrillator use. The students were classified from "Very Poor" to "Very Good" based on their marks.

The data were analysed with SPSS application ver. 15. A non-parametric Wilcoxon test and a chi-square test were used to examine the differences. A  $P < 0.05$  was considered significant.

## Results

Of 35 students who passed this rotation in 2006-7, 4 did not attend the post-test and one passed the rotation for the second time which was ruled out of study. Of 30 students who remained in the study, 8 (26.7%) were male and 22 (73.3%) were female, 3 (10%) were in the first semester of internship, 12 (40%) were in the second semester of internship and 15 (50%) were in third semester of internship.

Based on pretest results for BLS and ACLS knowledge 2 (6.7%) and 4 (13.3%) were in "Good" and "Very good" groups, respectively

while based on post test results for BLS and ACLS knowledge, 15 (50.1%) and 16 (53.4%) of interns were in "Good" and "Very Good" groups which should a significant difference ( $P<0.05$ ) (Table 1).

Table 2 shows the student CPR-relevant practical skills before and after the rotation. At the beginning of rotation only 1 (3.3%) students had "Good" practical skills while in the end 4 (13.3%), and 26 (86.7%) had "Good" and "Very Good" practical skills, respectively ( $P<0.001$ ). The knowledge of ACLS was associated with practical skills ( $P<0.05$ ) while no association was observed between BLS knowledge and practical skills.

**Table 1.** Frequency distribution of medical interns' knowledge score of BLS and ACLS at pretest and post test.

Knowledge Score	Pretest (%)	Post test (%)	P value
<b>BLS</b>			0.0001
Very poor (0-3)	9(30)	-	
Poor (4-6)	17(56.7)	8(26.7)	
Moderate (7-8)	2(6.7)	7(23.3)	
Good (9-10)	2(6.7)	9(30)	
Very good (11-12)	-	6(20)	
<b>ACLS</b>			0.0001
Very poor (0-3)	1(3.3)	-	
Poor (4-6)	11(36.7)	3(10)	
Moderate (7-8)	14(46.7)	11(36.7)	
Good (9-10)	4(13.3)	11(36.7)	
Very good (11-13)	-	5(16.7)	

## Discussion

CPR training should be an integral part of medical curriculum while many medical schools had acknowledged the problems and attempted to provide solution (18), there remained a number of issues to be resolved including how much time in which point of curriculum should be specified for CPR training and who should be responsible for this training (19).

Given the importance of practical skills to perform

an effective CPR a well designed practical course is the widely accepted solution (20).

In our study the proportion of students with good knowledge of BLS and ACLS increased from 6.7% and 13.3% at the beginning of rotation to 50% and 53% at the end of study respectively. In a study by Cooper et al in 2006 the proportion of study subjects with good knowledge of BLS increased from 60.6% at the beginning of study to 71% at the end of study (21). In another study by Aparieio et al in 2003 the mean CPR

**Table 2.** Frequency distribution of medical interns' skill score in CPR at pretest and post test

Knowledge Score	Pretest (%)	Post test (%)	P value
<b>Opening an intravenous access</b>			0.0001
Very poor (0-1)	-	-	
Poor (2-4)	9(30)	2(6.7)	
Good (5-9)	13(43.3)	5(16.7)	
Very good (10-12)	8(26.7)	23(76.7)	
<b>Intubation</b>			0.0001
Very poor	20(66.7)	-	
Poor	6(20)	-	
Good	2(6.7)	-	
Very good	2(6.7)	30(100)	
<b>Ventilation With Ambu-bag</b>			0.0001
Very poor	1(3.3)	-	
Poor	2(6.7)	-	
Good	27(90)	1(3.3)	
Very good	-	29(96.7)	
<b>Cardiac massage and defibrillation</b>			0.0001
Very poor	2(6.7)	-	
Poor	5(16.7)	1(3.3)	
Good	19(63.3)	4(13.3)	
Very good	4(13.3)	25(83.3)	

knowledge of students increased from  $5.52 \pm 1.28$  at the beginning of study to  $9.55 \pm 0.74$  at the end. The higher increase in CPR knowledge observed in our study might be in part due to longer training period in our study.

In our study the proportion of students with good practical skills increased from 3.3% to 100% (13.3% with good and 86.7% very good skills). In the study by Cooper et al this proportion increased from 50% to 99% (21).

The practical CPR training effectiveness has been shown in several studies (13, 22, and 23). In our study the knowledge of ACLS had a significant association with practical skills. A study by Price et al. found out a significant association between knowledge of CPR and relevant practical skills (24).

If not used, knowledge and skill of CPR decline with time, so it is necessary that CPR training will be repeated in appropriate interval as

continuing medical education program (9).

Although our study showed that a 15-day anesthesiology rotation specifically planned for training CPR is effective but the number of students was limited and no follow up assessment was possible.

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