



Research Article

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Knowledge Regarding Cardiopulmonary Resuscitation of Pregnant Women among Iranian Medical Sciences` Students during Internship: A Cross- sectional study

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Abstract

Background: Cardiac arrest is a rare condition in pregnancy. Lack of knowledge is one of the predictor factors for poor outcomes following resuscitation. In addition, there are no data that address the knowledge of medical sciences` students regarding CPR in this special circumstance which may affect their future clinical practice. **Aims and objectives:** the aim of the study was to determine knowledge regarding cardiopulmonary resuscitation (CPR) of pregnant women among Iranian medical sciences` students during internship. **Study Design:** This was a cross sectional study. **Setting:** This study was conducted at hospitals affiliated with Tehran University of Medical Sciences (TUMS, Tehran, Iran). **Materials and Methods:** 350 medical sciences` students of both sexes, during the internship, and with tendency to participate in the study recruited between January and May 2018 with consecutive sampling. The eleven question- questionnaire evaluated four areas of knowledge as follows: (1) the need for left uterine displacement (LUD); (2) current advanced cardiac life support (ACLS); physiologic changes during pregnancy (PHYS); and recommendation to preform cesarean delivery for pregnant women (> 20 gestation`s week) after 4 to 5 minutes of unsuccessful resuscitation following cardiac arrest (5CD). A score of 100 % was considered as perfect score. **Statistics:** Descriptive statistics and statistical test were used to describe and analyze data with SPSS software version 16. Data presented as mean (SD) in percentage. A P-value less than 0.05 was considered as statistically significant. **Results:** At the end of the study, 304/350 medical sciences` students (40.8 % medicine, and 59.2% non- medicine) with mean age of 23.98 (2.01) completed the study. Knowledge score for four areas of LUD, ACLS, PHYS, and 5CD were 24.34 (25.68), 32.56 (33.87), 36.51 (26.96), 18.75 (28.32) percentage, respectively. In addition, medical students had significantly higher knowledge regarding LUD (P<0.0001), and 5CD (P=0.001) compared with non- medical students. While, knowledge regarding ACLS among non- medical students was higher than medical students (P<0.0001). In contrast, there was no significant difference between the two groups on knowledge regarding PHYS (P=0.143). **Conclusion:** Knowledge regarding CPR of pregnant women was inadequate among Iranian medical sciences` students during internship in TUMS. Thus, there is need to be improved by ACLS training, especially for pregnant women.

Keywords: Students, Internship, Knowledge, Pregnancy, Cardiopulmonary Resuscitation, Cross-Sectional Study, Iran.

INTRODUCTION

Cardiac arrest occurs in 1:12,000 pregnant women admitted for delivery. And hemorrhage, cardiac failure, amniotic fluid embolism, and sepsis are the most important causes of arrest ^[1].

Management of cardiac arrest in pregnancy is very difficult ^[2] and needs the awareness of interdisciplinary medical team regarding maternal physiologic changes and ACLS algorithm in pregnancy ^[3]. Thus, appropriate treatments can be applied as a result of this awareness and maternal and fetus lives may be rescued ^[4].

When a cardiac arrest occurs in a pregnant woman, the fetus must always be considered due to dependency of fetal survival to maternal live. Thus, initial cardiopulmonary resuscitation (CPR) efforts should be performed by focusing on saving of pregnant mother ^[5]. In this complicated situation, key

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interventions that increase maternal and fetal survival are starting prompt and effective cardiac compression, using a defibrillator with appropriate rhythms, alleviate aortocaval compression, maintaining the airway patency, and quickly performing perimortem cesarean delivery (PMCD) [6]. Timely resuscitation results in survival rates of 58%. In contrast, any delay is associated with maternal death. In addition, higher survival rate is seen following Inpatient arrests compared with arrest in out of hospital settings [6].

Desirable outcomes of resuscitation depend on the cardiac arrest etiology, understanding of the physiological effects of pregnancy on resuscitative efforts and the application of the latest principles of ACLS [7]. In addition, lack of equipment, lack of knowledge, and lack of team work have been reported as the major factors affecting CPR of pregnant women from the perspective of anesthesiologists [8].

According to our knowledge, no data are present, which addresses the knowledge of medical sciences` students regarding this issue. As medical sciences` students are future clinical staffs which their knowledge affect their clinical practice in exposure of pregnant woman with cardiac arrest, we evaluated the knowledge regarding cardiopulmonary resuscitation of pregnant women among Iranian medical sciences` students during internship.

MATERIAL AND METHODS

This was a cross sectional study at Tehran University of Medical Sciences (TUMS, Tehran, Iran). In this study, 350 medical sciences` students at Imam Khomeini, Shariati, Amir Alam, and Farabi hospitals affiliated with TUMS were included in the study via consecutive sampling. Recruitment was occurred between January and May 2018. This study was performed in accordance with the declaration of Helsinki and orally informed consent was obtained from all students before study participation.

Sample size was calculated by the following formula [9], and mean and standard deviation (SD) of 21.51 (9.39) for overall score of knowledge through a pilot study conducted among 30 medical sciences` students during their internship at TUMS. Thus, by considering significance level of 5 %, $Z_{1-\alpha/2}$ of 1.96, d of 7 % of the knowledge mean, the sample size was 293 and by considering non- response rate of 15%, the final sample size was 350.

$$n = \frac{(z_{1-\alpha/2})^2 s^2}{d^2}$$

In the current study, medical sciences` students who were during internship at one of the hospitals affiliated with TUMS, and had tendency to participate in the study were included regardless of ethnicity, socioeconomic status, and field of study. Thus, students without tendency to continue the study, and incomplete questionnaires were excluded.

Following variables were considered in the analysis; age, sex, filed of study, and score average. Knowledge regarding CPR of pregnant women was evaluated by a questionnaire which was used in the Cohen`s *et al* study in 2008. It was a self- administered questionnaire with 12 multiple choice questions (MCQs) that participants can choose one correct answer from 5 options for each question. The questionnaire evaluated four areas of knowledge as follows: (1) the need for left uterine displacement (LUD) [question 1, 3, 6 and 9]; (2) current advanced cardiac life support (ACLS) [question 2 and 10]; physiologic changes during pregnancy (PHYS) [question 7, 8 and 12]; and recommendation to preform cesarean delivery for pregnant

women (> 20 gestation`s week) after 4 to 5 minutes of unsuccessful resuscitation following cardiac arrest (5CD) [question 4 and 5] [10]. In order to be used in our setting, it was translated to Farsi language by Forward- backward translation approach. The content validity was approved by two experts and Cronbach`s alpha was 0.552. According to Cohen`s *et. al* study in 2008, question 11 was removed because of disagreement between the obstetrician and anesthesiologist regarding the correct answer. Thus, a score of 100 % was considered as perfect score [10]. To collect data, the study investigator asked eligible participants to complete the questionnaire up to 60 minute and remained present in order to answer participants` questions and collect completed questionnaires.

Statistical analysis

Descriptive statistics such as mean, standard deviation (SD), frequency, and partial frequency percent were used to describe demographic characteristics of the study population. Overall and four areas of knowledge scores have been presented as mean \pm standard deviation as a percentage. Field of study was recoded in order to divide medical sciences students into two groups of medical and non- medical (e.g. nursing, surgical technology, and anaesthetic nursing) students. Then, scores of knowledge were compared by independent sample t- test between the two groups. Statistical analysis was carried out by SPSS software version 16. P-Value less than 0.05 was considered statistically significant.

RESULTS

In this study, 304/ 350 medical sciences` students (40.8 % medicine, and 59.2% non- medicine) during the internship in TUMS completed the test (response rate of 86.86 %).

Demographic characteristics of medical sciences` students participated in the study have been indicated in table 1. According to the table 1, the most of the participants were female, and were in the nursing field of study.

Table 1: Demographic characteristics of study population

Variables		Frequency (%) n=304
Age (year) [Mean(SD*)]		23.98 (2.01)
Sex	Male	112 (36.80)
	Female	192 (63.20)
Field of study	Medicine	124 (40.80)
	Nursing	152 (50.00)
	Surgical technology nursing	13 (4.30)
	Anaesthetic nursing	15 (4.90)
Average (score) [Mean(SD)]		16.49 (1.35)

*Standard deviation

The overall and four areas of knowledge score among study population has been shown in table 2. Although an overall score of knowledge was not adequate between the two groups of medical sciences` students, the overall score was higher among medical students compared with non- medical ones. Out of four areas of knowledge, medical sciences` students had significantly higher knowledge regarding LUD, and 5CD compared with non- medical students. While, knowledge regarding ACLS among non- medical students was higher than medical ones. In contrast, there was no significant difference between the two groups regarding knowledge on PHYS (Table 2).

Table 2: Overall and four areas of knowledge score among study population

Areas of knowledge Mean (SD) (%)	Total n=304	Field of study		P- value
		Medicine n=124	None- medicine n=180	
Overall	28.14 (15.23)	32.91 (14.87)	24.84 (14.62)	<0.0001*
LUD	24.34 (25.68)	36.29 (24.97)	16.11 (22.82)	<0.0001*
ACLS	32.56 (33.87)	24.19 (28.14)	38.33 (36.27)	<0.0001*
PHYS	36.51 (26.96)	39.24 (32.38)	34.62 (22.38)	0.143
5CD	18.75 (28.32)	25.40 (30.90)	14.16 (25.49)	0.001*

LUD, left uterine displacement; ACLS, advanced cardiac life support algorithm; PHYS, physiologic changes of pregnancy; and 5CD, cesarean delivery after 5 minute of unsuccessful resuscitation

*Statistically significant (P<0.05)

DISCUSSION

In this observational study, we revealed an inadequate knowledge regarding CPR of pregnant women among Iranian medical sciences' students during internship. Although previous studies did not evaluate knowledge of medical sciences' students regarding this issue, insufficient knowledge regarding basic life support (BLS) / CPR was indicated among medical sciences students, too [11-14]. In addition to our findings among Iranian medical sciences' students, according to a review study in 2016, medical staffs also have poor knowledge of CPR in pregnancy [15]. Thus, our results are consistent with previous studies among medical staffs [8, 10, 16, 17]. Although the results of previous studies were similar to ours, their study population was medical specialists including anesthesiologists, obstetrician, and emergency medicine physicians, and clinical staffs such as midwives. In addition, the knowledge measures except in the Cohen's *et al.* study was different from our study. Thus, further studies are needed to approve our results in order to plan for their knowledge improvement.

In this study, one of the areas of knowledge was LUD that it was not adequate among medical sciences' students. Knowledge on LUD was not perfect among specialists studied in the Cohen's *et al* study, too [10]. According to American Heart Association (AHA) scientific statement in 2015, all pregnant women with cardiac arrest should be placed in supine position, and manual LUD should be performed in order to alleviate aortocaval compression during resuscitation [18]. Another area of knowledge evaluated in this study was ACLS algorithm, especially medication dosage during resuscitation that was imperfect in the present study, which was consistent with Cohen's *et al* study in 2008 [10]. Although the pharmacology of medications may affect by physiologic changes in pregnancy, usual medications and doses should be used in cardiac arrest during pregnancy because of lack of scientific evidence [18]. In addition, PHYS area of knowledge was inadequate among study participants, which was imperfect among specialists studied in the Cohen's *et al* study in 2008, too [10]. Physiologic changes in pregnancy are increased edema, friability of the oropharyngeal mucosa, and acidity of gastric contents that makes airway control difficult, technically [18]. Thus, awareness of these changes is essential for optimum management of the airway. The last area of knowledge was 5CD. This area of knowledge was imperfect similar to Cohen's *et al* study [10]. In order to optimize mother and fetus condition, cesarean delivery may be the best way which should be performed at the site of cardiac arrest [18].

In conclusion, knowledge of Iranian medical sciences' students regarding CPR in pregnancy was not perfect. Although all students take the courses of ACLS and CPR before beginning their internship, we suspect that resuscitation of pregnant women is not discussed through a specific educational program for undergraduate student as future clinical staffs. Therefore, despite the rarity of this condition, ACLS for pregnant women must be taught and evaluated through regular intervals in order to improve both maternal and fetal survival.

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Conflict of interest

The authors declare that there is no conflict of interest.

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