Cardiopulmonary resuscitation knowledge among nursing students: a questionnaire study

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Abstract

Objective: Nurses are usually first witnesses to in-hospital sudden cardiac arrests. Training of nurses has an impact on the efficiency and outcome of cardiopulmonary resuscitation (CPR), and thus, assessment of CPR knowledge among undergraduate nurses is very important to improve training program.

Methods: The questionnaire comprised of three parts about CPR knowledge: the first dealing with general questions to understand the importance of CPR in clinical practice; the second comprising the main goal and accuracy of CPR intervention; and the last consisting of questions targeting the indications, methods, and effectiveness of CPR. Descriptive statistics and multiple response analyses were done by IBM SPSS version 20.

Results: The students had good knowledge about the importance of CPR in clinical practice and stood average in knowing its indications and effectiveness. The mean score was 64.62±17.84 out of 100 points. While only 11% of them were completely aware about the universal compression ventilation ratio, 16.2% were aware of the current compression depth. In addition, 21.8% of participants have only indicated the order of CPR being compression, airway, and breathing.

Conclusion: Knowledge of CPR is good among the nursing students. However, skills of CPR have to be improved by current training programs at regular intervals. Their knowledge and practical approach have to be updated with the current guidelines in CPR.

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Keywords: sudden cardiac arrest, cardiopulmonary resuscitation, future nurses, training programs

Introduction

Sudden cardiac arrest (SCA) is a medical emergency. If not treated immediately, it causes sudden cardiac death. With fast and appropriate medical care, survival is possible. SCA is classified as in-hospital and out-of-hospital. Cardiopulmonary resuscitation (CPR) is an evolving lifesaving technique of modern medicine that comprises a series of lifesaving actions that improve the survival rates following SCAs (1).

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 event. Hence, CPR is said to be a skill for all people (2, 3). Quality of life is also found to be better for victims who immediately receive bystander CPR even in the absence of professional assistance. 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 CPR is delayed (4).

Because of the nature of their profession, nurses spend significant time alongside patients and are often the first to realize in-hospital SCAs. Thus, they are the ones who respond by providing CPR (5). Although their contribution to effective CPR is crucial, either individually or as a member of a rapid response team, studies have often detected that they have average knowledge and poor skills in light of international guidelines and recommendations (6, 7). Training programs in CPR would make a significant contribution to the elimination of nurses' anxiety and an increase in their self-confidence. As a result, effectiveness in dealing with a SCA individually or as members of a team could also be improved.

At present, our questionnaire study, which is compatible with the 2010 American Heart Association (AHA) Guidelines and its 2015 update for CPR and Emergency Cardiovascular, is first to highlight awareness among nursing students in Turkey (8).

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Methods

The questionnaire was first conducted among medical students in the Kasturba Medical College (KMC), Manipal, Karnataka, India (9). It had been designed according to 2010 AHA guidelines (8, 10). Although there is a minor 2015 update (11) after the institutional ethical approval, we did not change the questionnaire (Questionnaire 1) because its statements are current according to the new guidelines. In our study, randomly selected 401 probationer nursing students from other colleges (98.5%) or faculties (1.5%) had completed the Turkish version of questionnaire from October 2015 to January 2016. The questionnaire comprised of three parts, first one dealing with general questions in regard to 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: correct scores received positive points whether the questions were written in a negative manner or not, and the incorrect questions received no points.

Data entry, scores, descriptive statistics were done using IBM SPSS version 20. Mean and standard deviations were used to present raw scores and other quantitative variables. Percentages were calculated and presented as either intervals of the scores or common categorical variables. Spearman correlations coefficient was evaluated to see relationship between scores. P values less than 0.05 were accepted as significant.

Results

Total number of questions answered correctly in each category was counted and scored. In all categories, there was a highly significantly associated, and moderate and highly significantly correlated to each other in the same direction ($p<0.001$).

The mean score was 25.2±6.96 for 39 questions. It was estimated as 64.62±17.84 out of 100 points. Total scores are converted into percentages and divided into pre-fixed grades as follows: >80 as excellent (18.3%), 60–80 good (47.5%), and <60 poor (34.2%).

In the first section of the questionnaire, percentage of responders to the general statements regarding the importance of CPR in clinical practice was described in Table 1. Mean score was 84±24.05; 71.8% was excellent (>80) although 17% (60–80) and 11.3% (<60) was moderate and poor, respectively. The scores in 12th class were significantly better than those in 11th class (5.1% vs. 13.3% for <60 points; 7.7% vs. 19.4% for 60–80 points; 87.2% vs. 67.3% for >80 points, respectively; p=0.002). Negatively framed question A6 "CPR was harmful" was intelligently understated by 80.3% of students. However, 9.0% of them differed by saying "did not know," and 10.7% was unfortunately accepted the statement (Table 1).

In the second section of the questionnaire, only 59.4% students rightly answered 5 to all options under "purpose of CPR" question as correct (Fig. 1). Although 5 years has elapsed after 2010 AHA guidelines in which ABC was converted in to CAB for all age groups except newborns, 78.3% of nursing students indicated mainly ABC for the current order of CPR (versus% 21.8 of those indicated CAB). Unfortunately, only 21.8% were aware of the current upgraded order of CPR intervention, being C-A-B from previous A-B-C. When we asked about the "universal compression-to-ventilation ratio" in different age groups, only 69.6% of students partially answered in a correct manner (Fig. 2). Regarding the depth of chest compression only 33.2% of them answered all the options as correct (Fig. 3).

In the third section of the questionnaire, percentage of responders to the statements regarding the indications, methods, and effectiveness of (CPR) was stated in Table 2. Mean score was 65.01±18.81; 28.5% was excellent, 36% and 35.5% was moderate and poor, respectively. These scores in 12th class were significantly better than those in 11th class (17.9% vs. 40.5% for <60 points; 42.3% vs. 34.6% for 60–80 points; 39.7% vs. 24.9% for >80 points, respectively; p=0.001).

Discussion

The estimated total score of CPR knowledge among nursing students was very good in our study. However, the score of awareness of CPR was better than the score of skills of CPR. In a specific analysis, it was found that both their knowledge and practical approach were not up to date with the current guidelines of CPR.

Return to a prior quality of life and functional state of health is the ultimate aim of CPR and post-CPR care. High-quality CPR is the cornerstone of first aid and emergency medical care that can optimize outcomes beyond return of spontaneous circulation. It is very important that all adults in a community know CPR to save lives in out-of-hospital SCAs. At least the doctors, nurses and paramedical staff should be instructed to complete CPR courses, as they are routinely facing life-threatening situations, and the knowledge of CPR will be definitely useful especially in-hospital SCAs (7). Our findings of CPR knowledge among nursing students are very important to plan new CPR courses for these health care professionals to improve the outcome of SCAs in which an effective CPR must be performed immediately to save many lives.

We believe that victims of SCAs could have been saved to some extent with an increase in CPR knowledge of health care professionals. The World Health Organization (WHO) estimates that 17 million people died in 2008 from cardiopulmonary diseases. It is believed that more than 100.000 people have out-of-hospital SCAs annually, and only less than 1% could survive in Turkey. The survival rate of out-of-hospital SCAs differs among systems of emergency care in various countries, with some systems reporting more than fivefold higher survival rates than others. Ad-

The questionnaire 1

A. General questions to know the importance of cardiopulmonary resuscitation (CPR) in clinical practice (This section contains questions that have multiple correct answers)				
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 lifesaving 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 cardiopulmonary resuscitation (CPR) intervention. This study includes both correct and incorrect statements. This section contains questions that have multiple correct answers. Kindly note √			
1) The purpose of cardiopulmonary resuscitation (CPR):			
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 cardiopulmonary resuscitation (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) [ ]		

C. Indications, Methods and Effectiveness of Cardiopulmonary Resuscitation (This section contains questions that have multiple correct answers)				
1	CPR is an emergency procedure which is attempted in an effort to return life in cardiac arrest	T	F	DK
2	It has to be attempted always inside of a hospital not outside	T	F	DK
3	CPR is generally only effective if performed within 6–7 minutes of the stoppage of blood flow to vital organs	T	F	DK
4	Artificial respirations are more appropriate than CPR, if a person is not breathing but has palpable pulse (i.e., respiratory arrest)	T	F	DK
5	On average, 85–90% of people who receive CPR survive if conducted by experienced personnel	T	F	DK
6	The brain may sustain damage after blood flow has been stopped for about 4 mins and irreversible damage after about 7 mins	T	F	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	T	F	DK
8	If blood flow ceases for>10 hrs, virtually all cells of the body die	T	F	DK
9	CPR is generally continued until the person regains return of spontaneous circulation or is declared dead	T	F	DK
10	Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or “perfusing” heart rhythm	T	F	DK
11	Compression-only CPR by the lay public is recommended to an adult having cardiac arrest out of hospital	T	F	DK
12	The survival rate is very high if immediate CPR is done followed by defibrillation within 3–5 minutes of sudden cardiac arrest	T	F	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	T	F	DK
14	It is always better to be calm and contented while conducting CPR rather than look frightened	T	F	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	T	F	DK

CPR - cardiopulmonary resuscitation; DK - do not know; F - false; N - no; T - true; Y - yes

Table 1. Percentage of responders to the general statements regarding the importance of cardiopulmonary resuscitation in clinical practice

No.	Statement	Yes (%)	No (%)	Don't know (%)
1	I am aware about importance of CPR in clinical practice	88.50	3.00	8.50
2	According to me, knowledge about correct CPR procedure is mandatory to all health care professionals, and it should be made compulsory	92.50	2.80	4.70
3	I believe CPR is a basic emergency need for the betterment of mankind and health status	85.80	6.50	7.70
4	I would like to participate in CPR awareness programs and have lifesaving experience	84.80	5.80	9.40
5	I believe CPR procedures are arduous, unethical, incorrect and purely inhuman	10.30	78.50	11.20
6	Rather than being beneficial, it is more harmful to the patients	9.00	80.30	10.70
7	Conducting CPR is simply a waste of man power and time	10.30	79.50	10.20
8	Teaching and mastering CPR intervention should be made mandatory to all medical undergraduates	78.50	7.00	14.50

CPR - cardiopulmonary resuscitation

Table 2. Percentage of responders to the statements regarding the indications, methods and effectiveness of cardiopulmonary resuscitation

No.	Statement	True (%)	False (%)	Don't know (%)
1	CPR is an emergency procedure which is attempted in an effort to return life in cardiac arrest	94.50	0.80	4.70
2	It has to be attempted always inside of a hospital not outside	21.80	67.00	11.20
3	CPR is generally only effective if performed within 6–7 minutes of the stoppage of blood flow to vital organs	61.20	15.80	23.00
4	Artificial respirations are more appropriate than CPR, if a person is not breathing but has palpable pulse (i.e., respiratory arrest)	66.50	9.50	25.00
5	On average, 85–90% of people who receive CPR survive if conducted by experienced personnel	64.80	7.50	27.70
6	The brain may sustain damage after blood flow has been stopped for about 4 mins and irreversible damage after about 7 mins	68.50	7.80	23.70
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	37.30	22.50	40.20
8	If blood flow ceases for>10 hrs, virtually all cells of the body die	65.3	12.5	22.2
9	CPR is generally continued until the person regains return of spontaneous circulation or is declared dead	80.00	5.00	15.00
10	Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or "perfusing" heart rhythm	88.80	2.50	8.70
11	Compression-only CPR by the lay public is recommended to an adult having cardiac arrest out of hospital	56.00	22.50	21.50
12	The survival rate is very high if immediate CPR is done followed by defibrillation within 3–5 minutes of sudden cardiac arrest	74.20	10.50	15.30
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	45.50	13.30	41.20
14	It is always better to be calm and contented while conducting CPR rather than look frightened	79.70	13.80	6.50
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	55.50	13.80	30.70

CPR - cardiopulmonary resuscitation

ministering a fast standard CPR or even just hands-only-CPR in victims older than 12 years of age before a medical team arrives can improve the chances of survival up to 10 percent. Automated external defibrillators (AEDs) contribute to standard CPR and also demonstrated a more excellent survival from out-of-hospital SCAs even with AED-only approach without performing CPR (12). Contribution of an AED to CPR procedure within 1–2 minutes increases survival rate up to 60% (13).

The knowledge of CPR plays a vital role in the final outcome of acute emergency situations. Therefore, many studies have also previously investigated awareness and experiences of CPR in health care professionals (14–20). Thus, the knowledge and experiences of CPR were examined in 61 medical students with whom 9 (14.7%) had taken CPR course, and 52 (85.3%) students had not attended any CPR course. Awareness of basic life support was present in 66.6% students, but skills

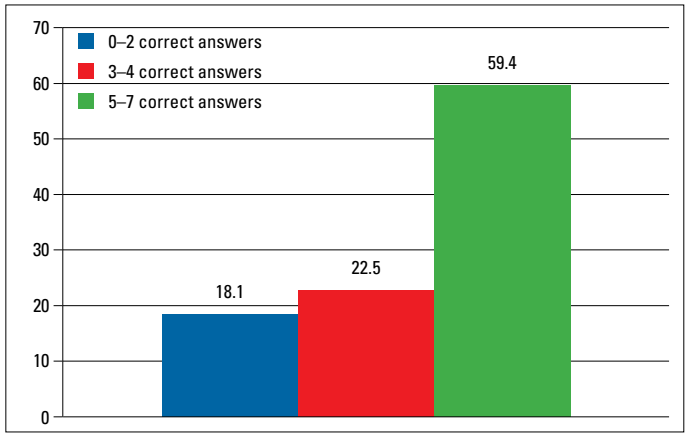

Figure 1. Percentage of correct answers to statements for purpose of cardiopulmonary resuscitation

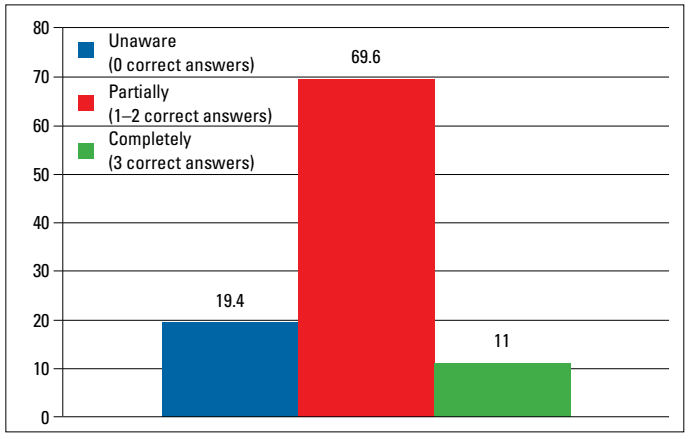

Figure 2. Percentage of correct answers to statements for universal compression-ventilation ration

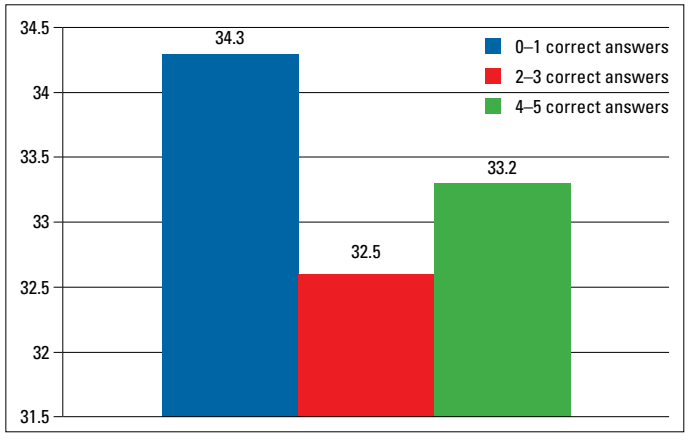

Figure 3. Percentage of correct answers to statements regarding chest compressions

were found in 18% only. In another study, the knowledge and experience about CPR was found generally poor in medical and dental students, despite that all of them were mostly aware of the importance of CPR. Out of all the students interviewed, 45% believe that CPR training should be a mandatory graduation requirement.

From the results obtained of this questionnaire study, we found that nursing students had excellent knowledge about the importance and purpose of CPR. However, majority of them had an average score regarding accuracy of CPR and effectiveness of CPR. We have suggested that students should be encouraged to learn and to practice CPR procedural techniques beyond theoretical CPR training alone. The permanent training program in basic life support and advanced life support resulted in important increments in the level of knowledge and skill of nursing professionals (20–24).

A new mobile phone application of nearby rescue (ayaklı cankurtaran), which could be downloaded from www.nearbyrescue.com/org/net, will contribute to unskilled witnesses of SCAs. When the mobile application of nearby rescue is activated, first of all it calls 1-1-2 immediately in Turkey. At the same time, the application searches for nearest first aiders and an available AED. Then it sends a GPS (Global Positioning System) location of the victim to them within a few seconds for early CPR and defibrillation. Its contribution to the survival of out-of-hospital SCAs will be analyzed and declared in near future.

Study limitations

There are some limitations in our study. First, we have mostly regarded these empty statements under the estimation "do not know" when a statement is not indicated by participants. Second, we disregarded to analyze the score of these students with respect to scores of students attending nursing colleges because only six students declared that they are attending a nursing university. Finally, our conclusion might not represent nursing students from the whole city of Istanbul because our analysis was from a limited number of nursing colleges or university.

Conclusion

This questionnaire survey demonstrated that up-to-date CPR skills in nursing students were insufficient, which could be improved by well-designed certified training programs. At least, certified programs training basic skills of CPR should be a mandatory component in the all health-associated fields like medical, paramedical, and nursing colleges and faculties. From this study, we suggest that all members of our community and especially health care professionals should join CPR training programs.

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