Success Rate of Cardiopulmonary Resuscitation and Related Factors in Emergency Department of a Private Hospital in Mashhad

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Abstract

Background and Aims: Most deaths occur unpredictably and outside health care facilities; however, they could be prevented by Cardiopulmonary Resuscitation (CPR) technique. Moreover, the success rate of this procedure is affected by many factors. Therefore, this study aimed to evaluate CPR outcomes and determine the associated factors.

Materials and Methods: This descriptive retrospective study was conducted in 2018 in a private hospital in Mashhad. The study participants were selected through Census, and all the patients who underwent CPR were included in the study. However, those who had signs of death and/ or those with incomplete medical records were excluded from the study. Moreover, data were provided through the Statistics, Medical Records, as well as Quality Improvement units.

Results: In this study, 394 medical records were evaluated, out of which 224 (56.9%) and 170 (43.1%) belonged to male and female patients, respectively. In total, 96 (24.4%) cases of successful and 298(75.6%) cases of unsuccessful CPR were recorded. It should be mentioned that there was a significant correlation between the patient's age and successful CPR (P=0.011).

Conclusion: Results of the study revealed that the success rate of CPR has a positive relationship with the younger age patients, shorter CPR duration, and the lack of a non-cardiac underlying disease.

Keywords: Cardiopulmonary Resuscitation, Cardiovascular diseases, Success rate

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1. Introduction

Emergency Medical Services (EMS) is one of the most important aspects of treatment which plays a crucial and significant role in the survival of the patient through the provision of correct and immediate measures. Attempts to improve the quality of emergency services require a proper understanding of the current situation and a review of emergency department problems. Cardiopulmonary resuscitation (CPR) is one of the most important and common medical and nursing interventions which is provided by the CPR team in various hospitals.

It should be noted that CPR as a general skill, is one of the greatest innovations in the history of medicine, and also an immediate interventional procedure is taken by experienced persons to prevent death in individuals who undergo sudden cardiac arrest (1).

The CPR was first introduced by Covenhoven in 1960 as an external cardiac massage (1,2). The rescue breathing in CPR allows oxygenated blood to circulate through the vital organs, such as the heart, brain, and lungs (3).

Every year around half a million Americans experience cardiac arrest, out of which 290,000 and 210,000 cases are reported out-of-hospital and in-hospital, respectively. The mortality rate of out-of-hospital CPR is about 90%, and the resuscitated patients are more likely to have neurological complications (4). Although 50 years have passed since the invention of CPR, the survival rates are still low. Moreover, most of the resuscitated patients through successful CPR require intensive care (2,5).

The highest percentage of successful CPR has been statistically evident in subjects who received Basic Life Support within the first 4 min and Advanced Cardiovascular Life Support (ACLS) 8 min after cardiac arrest. All the measures in relation to CPR must be taken as immediately and as quickly as possible, since the risk of heart failure and brain damage will be increased even within a few minutes.

According to the investigations, variousfactors, including age, underlying diseases, the reason for referring to the hospital, the time between the onset of cardiorespiratory arrest and initiation of CPR, and the use of a defibrillator affect CPR (1, 2, 6). Some factors, such as age and gender are not controllable; however, some other factors, including immediate initiation ofresuscitation, timely use of electric shock, drug interventions, knowledge

level, and experience of the CPR team can be controlled and may be associated with the increased chance of the patient's survival (7,10).

It is morally and economically necessary to evaluate the factors that affect the success or failure of CPR and to provide appropriate and scientific solutions to reduce the barriers to successful resuscitation (2). Therefore, this study aimed to evaluate CPR outcomes and determine the associated factors.

2. Materials and Methods

Study setting: This descriptive retrospective study was conducted in the Emergency Department of a Private Hospital in Mashhad, from the beginning of 2018 until the beginning of 2019.

Sampling: The study population was collected through census due to the relatively small number of CPR cases in the initial referral to EMS. Moreover, a non-probability sampling technique was employed to collect the study participants.

Inclusion criteria: All 394 cases who underwent CPR were included in the study due to the quantitative limitation of the statistical population.

Exclusion criteria: Those patients with signs of death and/or those with incomplete medical records were excluded from the study. The patients or their families, who didn't give thee consent to participate in the study, were supposed to be excluded (no subject refused to have his/her medical record studied).

Study outcomes: Initially, medical records of the patients who had experienced CPR were obtained. Moreover, data from the hospital Statistics and Quality Improvement units were also requested to include all possible cases. The relevant information about the patients was collected by an inquiry from their companions, EMS staff, nurses, and emergency physicians. Finally, the data regarding the factors affecting CPR were collected. These included such information as age, gender, shift work when CPR was performed (day/night), successful and/or unsuccessful CPR.

Data analysis: Data were analyzed in SPSS software (version 21) through Student's t-test and chi-square test for continuous and categorical data, respectively, and reported by descriptive characteristics of frequency (%) or mean±SD. A p-value less than 0.05 was consideredstatistically significant.

3. Results

Out of 394 cases in this study, 96 (24.4%) and 298 cases (75.6%) had successful and unsuccessful PCR (Table 1). It is worth mentioning that the majority of resuscitation cases (n=224, 56.9%) in this study were male. The total number of CPR cases in the day shift (from 7 a.m. to 7 p.m.) and night shift (from7 p.m. to 7 a.m.) in the emergency department was equal (198 cases per shift).

The mean age in the successful and unsuccessful resuscitation groups were 61.6 and 65.3 years, respectively, which was indicative of a significant relationship between the age of the patients and resuscitation outcomes (P=0.011; Table 2).

Meanwhile, out of all the successful CPR cases (n=96) in the study, 55 cases (57.3%) were performed on the night shift and 41 cases (42.7%) were performed on the day shift (P=0.724; Table 2).

4. Discussion

The success rate of CPR in this study was 24.4%, which was indicative of a lower success rate compared to those reported in the studies conducted by Montazar (25.4%), Jafarian (29.3%), and Nasirpour (32%). However, this success rate of CPR was higher compared to those reported in a study conducted in Kashan (58.9%) in which out of a total number of 206 cases of CPR, the survival rate was obtained at 19.9%. In the same line, in a study conducted in Nicosia hospital, out of a total number of 69 cases of CPR, 14.5% survived to discharge (1, 3, 13, 16, 17). The results of the present study indicated that there is a significant negative relationship between the age of the patient and CPR outcomes. It should be mentioned that this result is consistent with the results of most previous studies (3, 7).

In the current study, most CPR cases were in the seventh decade of their life, which was consistent with other studies (2, 11, 12), and maybe attributed to increased underlying diseases and natural physiological changes of the body due to old age. In the present study, the most common primary cause of resuscitation is cardiovascular diseases, which is consistent with previous studies (2) and can be attributed to the close association between cardiovascular diseases and patients' survival.

In this study, the rate of CPR in patients who were transferred to the emergency department during the night shift (57.3) was higher compared to those transferred

Table 1. Characteristics of the participants

		n	%
Sex	male	224	56.9
	female	170	43.1
Success of resuscitation	successful	96	24.4
	unsuccessful	298	75.6
Shift	Day	198	50
	Night	198	50

Table 2. Successful resuscitation differences in terms of working hifts and age o f the patients

		N/Mean	%/SD	P
Successful resuscitation	Day shift	41	57.3	0.724
	Night shift	55	42.7	
Age	successful resuscitation	61.6	0.9	0.011
	unsuccessful resuscitation	65.3	0.7	

during the day shift (42.7).

It is suggested that this matter be investigated further in order to find the factors that increase the success rate of CPR during the night shift. This matter can be attributed to the number of patients referring to the emergency department during the night shift.

Therefore, based on the aforementioned results, it is suggested that physicians and nurses should receive CPR training, the resuscitation team be carefully monitored, and all the departments be equipped with modern equipment and facilities. Meanwhile, due to the lack of reporting and recording of relevant data on the initiation or the lack of pre-hospital CPR and the type of initial cardiac arrest rhythm, the above results cannot be investigated in this study, and further research is needed with a separate research design. Considering the significant relationship between age and success rate of CPR, the primary etiology, and resuscitation duration in this study, it can be concluded that the reduction of cardiovascular diseases, as the main cause of resuscitation, can lead to a decreased rate of mortality. Moreover, based on the obtained results, the success rate of CPR is positively associated with the earlier initiation of resuscitation, the highly equipped hospital departments, and the expertise of the medical staff.

5. Conclusion

The result of the study indicated that the success rate of CPR depends on several different factors, such as demographic characteristics of the patient, the underlying cause of CPR, duration of resuscitation, and time of on-scene resuscitation. Therefore, it can be concluded that paying attention to the aforementioned factors and finding other factors associated with CPR outcomes can lead to the achievement of better results.

Acknowledgments

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