

The Impact of the Time Elapsed between Cardio-Pulmonary Resuscitation Code Announcement and Start of Resuscitation

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Abstract

Background: Cardiopulmonary resuscitation is said to a series of measures that by artificial respiration and heart massage a person that is not breathing or has no heart rate is brought back to life. The critical maneuver can be performed without the need for any additional means and if done properly and in a timely manner will save the lives of many people from certain death. Timely and quick CPR in 4-6 minutes after cardiopulmonary arrest is of paramount importance and this time is called golden time. **Methods:** This is a cross-sectional, retrospective study, which is done in 2016 in Rahnmooon and Afshar hospitals with a sample of 149 people. Checklist was used to collect data. Collected data was analyzed using SPSS statistical software, T-TEST, ANOVA and descriptive tables and charts. **Results:** In this study, the relationship between the time of resuscitation code and CPR start with its results in Afshar and Rahnmooon hospitals was examined using T-TEST. It was shown that there is a significant correlation between the time of resuscitation code until the resuscitation start time, with patient age ($P = 0.04$). There is no significant relationship in term of gender, duration of resuscitation, kind of hospital, and underlying disease with result resuscitation. **Conclusion:** Given that, there was a significant relationship between the intervals of resuscitation code until beginning of resuscitation with age of patient, in strategic management of

cardiopulmonary resuscitation, it is better to derive the attention of resuscitation team to reduction of the golden time.

Keywords: Cardiopulmonary resuscitation, Hospital, Results of CPR, CPR code

Introduction

CPR is one of the greatest inventions in the history of medicine and is an immediate intervention to prevent death or to delay it in someone who suddenly suffered a cardiac arrest. (Crowe 7 et al, 2015) Cardiopulmonary resuscitation includes organized acts that are done in patients with pulmonary cardiac arrest. It is an attempt to activate blood circulation and breathing artificially at the point to supply enough oxygen for vital organs. It continues as long as the physiological activity of circulation system returns to normal (Bergum & et al, 2015) these measures include two components, basic life support (BLS) and advanced cardiac life support (ACLS) (Eisenberg, 2005). Nevertheless nearly 40 years have passed since the onset of cardiopulmonary resuscitation, the survival rate remains unavailable. These statistics vary from country to country. Conclusion Coronary arteries and cardiopulmonary resuscitation depend on the rapid actions and interventions of the medical team, especially fast defibrillation and effective cardiac massage and respiration aid (Chaves & et al, 2014). Despite the fact that several years have passed since the formation of the pulmonary cardiopulmonary resuscitation team in hospitals, the performance of these teams in hospitals is weak and worrying (KAVOSI & et al, 2013). In the United States, two million people die annually, causing 25% of these cases to be acute pathophysiology, that is, cases that occur before the age and in the absence of a sudden illness. Of these, about 250,000 people are undergoing cardiopulmonary resuscitation, many of them die, and many are suffering irreversible lesions. The goal of cardiopulmonary resuscitation is to reduce these deaths (Darvishpoor & Heshmati, 2016). the main and most important characteristic is CPR is value of the moments. For example, in the first 4 minutes CPR for cardiac arrest survival equals increased 250-fold increased and delay in it equals mortality even in the best medical centers in the world as (Movahedi & et al, 2016).

The ideal result of a resuscitation operation is 100% return chance of patients on life, but it should be noted that several

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factors are involved, including the underlying disease leading to cardiac arrest, cardiac arrest, time to start resuscitation of cardiac arrest, availability of qualified staff and required equipment and other issues (Sofi & et al, 1999).

In developed countries, the survival rate of cardiac arrest that occurs in the hospital and outside of it is respectively less than 30 percent and less than 10 percent. Rate of monitoring the heart, the presence of an anesthesiologist in CPR team, cardiopulmonary resuscitation during working hours, quick start of CPR, especially chest compressions and rapid intubation are of the factors that increase patient survival until discharge (Dabbagh & et al, 2010). Every year, 310 thousand deaths happens due to heart disease in emergency departments in the United States that 166,200 cases die to cardiac arrest (Nasiripour, Masoudi asl & Fathi, 2012).

According to the America Heart Association in 2006, quick start of cardiopulmonary resuscitation, defibrillation within 3 to 5 minutes after cardiac arrest, quick start of advanced life supports, increase survival and long-term outcome of patients to more than 50 percent in patients with witnessed cardiac arrest and initial rhythm of ventricular fibrillation. For every one-minute delay in defibrillation, survival decreases by 7 to 10 percent (Salari & et al, 2011).

Existence of CPR team in the hospital and quick start is of the most important factor in increasing the efficiency of in-hospital resuscitation. Monitoring and CCU do not increase the success rate. It seems that since monitoring of patients and the use of CCU are only for patients near death, thus they do not help in increasing the efficiency of cardiopulmonary resuscitation (Jaberi, Changizian & Mazlomzadeh, 2011).

Most hospitals have a resuscitation team to respond quickly and deftly to patients in need of CPR. Time is one of the most important factors for achieving success in this area, so that every minute of delay in starting CPR, 4% reduces patients' chances of survival. (Dehghani & et al, 2008)

In recent years, Cardiopulmonary resuscitation was taken into consideration in the hospital. However, the success rate of resuscitation in hospitals in Iran is not available. (Okazi & et al, 2014) The study was aims to determine the relationship between the interval of resuscitation code and CPR start with its results in Afshar and Rahnemoon hospitals in Yazd in 2016.

Method

This study was a descriptive - analytical, cross-sectional and retrospective one. The study population included all patients who received CPR in Afshar and Rahnemoon hospitals in Yazd in 2016.

The sampling method used in this research was the census. This method is one of the most accurate methods that subjects are selected by census. The number of samples in this study was equal to population (N=149).

Data was collected by the checklists based on scientific literature and textbooks prepared and approved by experts. Checklists

include demographic data (age, sex, duration of resuscitation) and, arrival of CPR team, CPR Code announcement time, the results of resuscitation (early success, failure), and problems during CPR and hospitalization and diagnosis of problems that are completed by code supervisor and researcher.

Checklists were a standard list of hospitals that had been taken from the Ministry of Health and the advisors and professors confirmed its validity and reliability. Collected data was analyzed using SPSS statistical software, T-TEST, ANOVA and descriptive tables and charts.

Findings

The study was done on 149 patients referred to hospitals of Afshar and Rahnemoon in Yazd. In Afshar Hospital 129 people and in Rahnemoon 20 people were studied using census method. 45 patients were females (30.2%) and 104 were men (69.8%).

Table 1- Statistical indicators for age, duration of CPR and interval of code announcement with the start of CPR.

variable	number	MIN	MAX	MEAN	SD
Age	142	25	91	64.91	15.8
Duration of CPR (min)	148	10	150	43.03	23.7
Interval of code announcement with the start of CPR	149	0	15	2.58	3.7

The mean and Standard deviation of age in the study group were 64.91 and 15.8, Duration of CPR were 43.3 and 23.7 and interval of code announcement with the start of CPR were 2.58 and 3.7, respectively.

Table 2- The relationship between interval of code announcement with the start of successful and unsuccessful CPR

Result	Number	Mean	SD	Result of Rest
yes	51	1.98	3.87	T=-1.44 P.Value=0.15
no	98	2.89	3.59	

The total number of cases in the group with successful and unsuccessful result were respectively 51 (34.2%) and 98 (65.8%). The mean and standard deviation of interval of code announcement with the start of CPR in minutes were respectively, 1.98 and 3.87 in the group with successful result and in the group with unsuccessful were 2.89 and 3.59, respectively. P.Value was 0.15 using T-TEST and reliability of 95%. It indicated no significant difference between the mean of interval of code announcement with the start of CPR in results of both successful and unsuccessful groups.

Table 3-Determining the relationship between interval of code announcement with the start of CPR and its results with age

Successful CPR	Age	Number	Mean	SD
Yes	Under 55	18	2.83	4.57
	50-70	21	1.19	2.18

	Over 70	10	1	3.16
	Total	49	1.75	3.46
No	Under 55	21	1.57	2.18
	50-70	32	2.94	3.73
	Over 70	40	3.55	3.91
	Total	93	2.89	3.58
Total	Under 55	39	2.15	3.5
	50-70	53	2.24	3.29
	Over 70	50	3.04	3.88
	Total	142	2.5	3.57

The mean and standard deviation of interval of code announcement with the start of CPR in successful resuscitation in patients aged less than 55 years were, 2.83, 4.57 respectively. Fifty to seventy years were 1.19, 2.18, and higher than 70 years were 1, 3.16 respectively. In the group with unsuccessful resuscitation in patients aged less than 55 years were 1.57, 2.18, in age group of fifty to seventy years were 2.93, 3.73, and in group higher than 70 years were 3.55, 3.9 respectively.

Using two-factor analysis of variance and with reliability of 95%, P.value was 0.04. It indicated a significant relationship between the two variables in terms of mean time of CPR code announcement and start of CPR. This means that there was a statistically significant difference between the mean time of CPR code announcement and start of CPR in different age groups according to their results (success - failure). By referring to the table and graphs it was determined that increase in interval time of CPR code announcement and start of CPR had no negative effect on the result in group less than 55 years, but this increase had negative effect in successful CPR in the age group above 70 years.

Table 4- Determining the relationship between interval of CPR code announcement with the start of CPR and its results with patient sex

Successful CPR	SEX	Number	Mean	SD
Yes	Male	35	2.02	3.66
	Female	16	1.87	4.42
	Total	51	1.98	3.87
No	Male	69	2.79	3.53
	Female	29	3.13	3.79
	Total	98	2.89	3.59
Total	Male	104	2.53	3.58
	Female	45	2.68	4.02
	Total	149	2.58	3.70

The mean and standard deviation interval of CPR code announcement with the start of CPR in group with successful resuscitation in men were 2.02, 3.66 respectively and in women were 1.87, 4.42 and in men in the group with unsuccessful resuscitation were 2.79 and 3.53 respectively, and for women were 3.13 and 3.79 respectively.

Using two-factor analysis of variance and with reliability of 95%P.value was 0.72. It indicated no significant relationship between the two variables in terms of mean time of CPR code

announcement and start of CPR. This means that there was no statistically significant difference between the mean time of CPR code announcement and start of CPR in different sex groups (male, female) according to their results (success - failure).

Table 5- Determining the relationship between interval of CPR code announcement with the start of CPR and its results with duration of CPR

Successful CPR	Duration of CPR	Number	Mean	SD
Yes	30 minutes and less	30	1.86	4.24
	Over 30min	20	2	3.4
	Total	50	1.92	3.89
No	30 minutes and less	29	3	3.33
	Over 30min	69	2.85	3.72
	Total	98	2.89	3.59
Total	30 minutes and less	59	2.42	3.83
	Over 30min	89	2.66	3.65
	Total	148	2.56	3.71

The mean and standard deviation interval of CPR code announcement with the start of CPR in group with successful resuscitation in group with 30 minutes and less than it were 1.86 and 4.2, and in group over 30 minutes were 2 and 3.4 respectively and in the group with unsuccessful CPR with 30 minutes and less than 30 minutes duration of CPR were 3, 3.33 and in group higher than thirty minutes the mean and standard deviation were 2.85 3.72 respectively. Patients with less than 30 minutes of CPR had more chances of survival.

Using two-factor analysis of variance and with reliability of 95%, P.value was 0.84. It indicated no significant relationship between the two variables in terms of mean time of CPR code announcement and start of CPR. This means that there was no statistically significant difference between the mean time of CPR code announcement and start of CPR in different duration of CPR groups according to their results (success - failure).

Discussion

The results showed significant relationship between interval of CPR code announcement and start of CPR and failure or success of CPR. The mean and standard deviation interval of CPR code announcement with the start of CPR in group with successful CPR were 1.98 and 1.86 respectively and in group with failure in CPR they were 2.89 and 3.59 respectively. Therefore, that shorter interval led to more chance in successful CPR, but this relation was not statistically significant. This study is in accordance with a result of a study by Dehaghi et al that showed that the interval (in minutes) of CPR code announcement with the start of CPR was 1.28 minutes in final successful resuscitation (discharge) and it was 2.16 minutes in patients who died(Dehghani 7 et al, 2008).

Girardi et al in their study demonstrated that rapid diagnose of patients with arrest, is the most important factor in result of CPR, Also in this study, it was shown that there is a significant correlation between interval of CPR code announcement with the start of CPR and its results with age of patient. However,increase in the interval between the announcement of the recovery code

and the onset of cardiopulmonary resuscitation in the age group of less than 55 years had no negative effect on the outcome of the resuscitation but the increase in the age group above 70 years could have negative results in successful CPR (Boba, 1995).

In the study by SeyyedHoseinMontazar et al, they showed that age, the time interval between cardiac arrest and the start of CPR, the time of cardiac arrest, CPR team skills today are effective in success or failure CPR(Montazar& et al, 2014). Schultz et al also concluded that the failure of resuscitation age over 60 years is effective in CPR failure and these studies verify the results of current study(Schultz& et al, 1996). Also, in a study by Borimnejad et al., It was concluded that trained and designated emergency personnel have improved event and survival. So CPR team training and continuing education for all nurses and residents should be considered. CPR team should be aware of up to date knowledge of CPR in order to decrease the mortality rate (Borimnejad& et al, 2008).

In this study, it was found that there is no relationship between interval of CPR code announcement and start of CPR, and it results with patients' sex and the success rate was higher in men than women. In a study by Jafarian also, final success rate in men was 11% and in women, it was 8%. In current study, this rate was higher in men than women (Jafarian, 2002). In research that was done by other researchers, there was no significant difference between the successful CPR and being men and women.

In the present study, it was also found that there is significant relation between interval of CPR code announcement and start of CPR, and its results with the duration of CPR; so that patients who had less than 30 minutes of CPR, had greater chances of survival, but this relationship was not statistically significant. Goodarzi et al showed that the CPR duration is the key factors in the success of CPR (Goodarzi& et al, 2015). Dabbagh et al in their study on 178 CPR patients in the emergency department of the University Hospitals of Ayatollah Taleghani (N=54) and ShahidModarres (N=124) concluded that after 24 hours of cardiac arrest, CPR was successful in only in 7 cases (13%) out of 54 patients in Taleghani hospital. From 124 cases of CPR in ShahidModarres hospital 33 (26.6%) was successful. Mean of duration CPR in first and second groups were respectively 44.2 ± 11.2 minutes and 44 ± 7.5 minutes(Dabbagh & et al, 2005)

Suggestions

Given the results of this research, the following suggestions are offered:

- Education and training during service (at work) to CPR team members, especially the newcomers.
- update information about CPR team members regarding changes in CPR techniques
- Having appropriate and working paging system.
- Regular calibration of electro-shock devices to ensure that it is working
- Sensitivity to the Golden time by CPR team members

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