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Successful application of acute cardiopulmonary resuscitation

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ABSTRACT

Objective: To compare the quality and correct the deficiencies of cardiopulmonary resuscitation (CPR) procedures performed in patients who developed cardiopulmonary arrest before or after Emergency Department admission.
Methods: This study was conducted on patients who were applied CPR at Şişli Etfal Training and Research and Research Hospital, Emergency Department between 01 January 2012 and 31 December 2012. *Chi*-square and Mann–Whitney *U* test were used to compare the patients' data. The study data were analyzed in SPSS 18.0 software package. A *P* value less than 0.05 was considered statistically significant.
Results: A total of 155 patients who were applied CPR were included in the analysis. Among the study patients, seventy eight (50.3%) were brought to Emergency Department after developing cardiopulmonary arrest while 77 (49.7%) developed cardiopulmonary arrest at Emergency Department. The mean age of the study population was (66 ± 16) years and 64% of the patients were male. The initial rhythms of the CPR-applied patients were different ($P < 0.05$). There were no significant differences between the groups with respect to the treatment protocols or CPR responses ($P > 0.05$). The CPR response time was longer in ED ($P < 0.05$). The survival rate was lower in the trauma patients who developed cardiopulmonary arrest at ED ($P < 0.05$).
Conclusions: The scientific data obtained in this study suggest that an early response and therapy improves outcomes in CPR procedure.

1. Introduction

Cardiopulmonary arrest is defined as sudden cessation of respiration and cardiac activity[1]. Cardiopulmonary resuscitation (CPR) is composed of establishing an effective airway, providing adequate ventilation, and delivering cardiac massages with appropriate medical and equipment support[2]. The CPR procedure is considered successful when the goal of obtaining a regular pulse and a decent blood pressure is achieved. A successful CPR is an intense professional satisfaction for the physician while it is invaluable for the patient and relatives.

The idea that death can be reversed has long drawn attention of humans and different techniques have been tried to achieve that goal. The first CPR procedure was performed by Kowenhoun in 1960 since when updated guidelines have been published every 5 years to correct deficiencies in the science of CPR[3]. Finally, a CPR guideline published in 2010 brought about radical changes in that field[4].

We aimed to compare the CPR procedures and treatment protocols in patients who developed before or during Emergency Department (ED) admission in an attempt to overcome our deficiencies in that field.

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2. Materials and methods

This prospective study was approved by the local ethics committee and conducted on 155 patients who were applied CPR at Şişli Etfal Training and Research Hospital, Emergency Medicine Clinic between 01 January 2012 and 31 December 2012.

Interventions that were carried out on 155 patients at ED were scrutinized in the light of the current guidelines. Age, sex, duration of basic life support, rhythms at cardiopulmonary arrest onset, trauma history, CPR duration, time to CPR response in CPR responders, medications used during CPR effort, the number of defibrillations if performed, final diagnoses, and outcomes of CPR procedures were compared in this evaluation.

The study data were presented as the patient number (*n*), percentage (%), and arithmetic mean ± SD. The patients were divided into 2 groups as those who developed cardiopulmonary arrest at ED and those who developed cardiopulmonary arrest prior to ED admission. The groups were compared with χ^2 for categoric variables and with Mann–Whitney *U* test for continuous variables. The study data were analyzed in SPSS 18.00 for Windows software package. A patient's value less than 0.05 was considered statistically significant.

3. Results

A total of 155 patients who were applied CPR were included in this study. Among the study population, 78 (50.3%) were brought to ED after cardiopulmonary arrest, while 77 (49.7%) developed cardiopulmonary arrest at ED. The demographic properties by the groups were summarized in Table 1. The mean age of the population was (66 ± 16) years and 64% of the patients were male. There were no significant differences between the groups with respect to age and sex (*P* > 0.05).

The average duration of ED transport was 15 min. The mean duration of CPR application was 32 min. A total of 49 (31.6%) patients responded to CPR, of whom 28 developed cardiopulmonary arrest prior to ED admission and 21 developed cardiopulmonary arrest during ED stay. The mean time to CPR response was 12.5 min in the patients who were already in cardiopulmonary arrest at the time of ED admission and 18.8 min in those who developed cardiopulmonary arrest during ED stay. No significant differences were found between the groups with regard to the time to ED admission, mean CPR duration, and the rate of CPR response (*P* > 0.05). The time to CPR response was significantly greater in the group that developed cardiopulmonary arrest at ED (*P* < 0.05). Adrenalin was the most commonly administered drug (98.1%) followed by dopamine (25.8%) during CPR. The groups did not significantly differ with respect to the administered therapy during CPR (*P* > 0.05). Forty-three patients who responded to CPR efforts re-developed cardiopulmonary arrest that did not respond to CPR. As a result, 5 patients were discharged. There were no significant differences between both groups with respect to the time to recurrent CPR and discharge rate (*P* > 0.05) (Table 1).

The most common cause of cardiopulmonary arrest was asystole in both groups. The cardiopulmonary arrest rhythms of the two groups were summarized in Table 2. There was a significant difference between the two groups with respect to the cardiopulmonary arrest rhythms (*P* < 0.05). No significant differences existed between the two groups with respect to the outcomes of the interventions against asystole, pulseless electrical activity, and pulseless ventricular tachycardia (*P* > 0.05).

Table 1

Demographic variables and differences between the patient clinics with respect to the CPR application.

Parameters		Patients who developed cardiopulmonary arrest before ED arrival (*n* = 78)		Patients who developed cardiopulmonary arrest during ED stay (*n* = 77)		*P*
		Number	Percentage (%)	Number	Percentage (%)	
Age		68.2 ± 13.8		64.0 ± 18.2		0.304*
Sex	Male	50	64.1	49	63.6	0.952**
	Female	28	35.9	28	36.1	
Time to ED arrival		14.3 ± 7.7		15.3 ± 10.4		0.814*
Initial rhythm	Asystole	46	59.0	61	79.2	
	Pulseless electrical activity	8	10.3	9	11.7	0.009**
	Ventricular fibrillation	20	25.6	6	7.8	
	Pulseless ventricular tachycardia	4	5.1	1	1.3	
CPR duration		32.7 ± 20.5		31.2 ± 15.3		0.800*
CPR response (+)		28	35.9	21	27.3	0.248**
Time to favorable CPR response (if any)		12.5 ± 7.2		18.8 ± 6.8		0.003*
	Adrenalin	76	97.4	76	98.7	0.567**
	Amiodarone	18	23.1	13	16.9	0.335**
Medications used during CPR effort	Lidocaine	0	0.0	1	1.3	0.313**
	Magnesium	1	1.3	3	3.9	0.305**
	NAHCO3	19	24.4	11	14.3	0.112**
	Calcium	1	1.3	2	2.6	0.552**
	Dopamine	18	23.1	22	28.6	0.434**
	Dobutamine	0	0.0	1	1.3	0.313**
Defibrillation		23	29.5	22	28.6	0.900**
The number of defibrillations		2.5 ± 1.3		3.4 ± 2.0		0.121**
Outcome	Died	21	87.5	23	92.0	0.603**
	Survived	3	12.5	2	8.0	
Died after day	Median	1		1		0.979*

*: Mann–Whitney *U* test; **: χ^2 test; Value was expressed as mean ± SD.