

Success rate of cardiopulmonary resuscitation in the intensive care unit of an Iran's Army Air Force hospital in 2012

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ABSTRACT

Purpose: Cardiopulmonary resuscitation (CPR) is an important step for patient survival inside and outside the hospital. Therefore, the results of CPR can be effective in modifying the structure of this operation and in eliminating its shortcomings. The purpose of this study was to evaluate the success rate of CPR in intensive care unit of an Iran's Army Air Force hospital in 2012.

Materials and Methods: Different preset forms were used to collect data from the record of doctors and nurses' report. Then, these data were transferred into a questionnaire that had been prepared for this purpose. The success criteria of the CPR were the return of cardiac and vital signs recorded through electrocardiography monitoring and also peripheral and central pulse palpation and hemodynamic stability for 24 hours.

Results: From among 185 studied patients, 36.7% were women and 63.2% were men. CPR success rate was 17.2%. CPR success rates in men and younger patients were more prevalent. Among the diseases, patients diagnosed with cerebrovascular accident were reported to have the most success rates in resuscitation.

Conclusion: Although this study and other similar studies have reported higher success rates for resuscitation in men, in younger ages, and patients with a primary diagnosis of cerebrovascular accident irrespective of other factors, carrying out more precise studies is recommended, especially on the effects of intensity of problems and underlying diseases at the time of admission on the success rate of CPR.

Keywords: cardiopulmonary resuscitation; intensive care unit; cardiac arrest; Army hospital; cerebrovascular accident.

AMHSR 2014;12:122-126
www.journals.ajajums.ac.ir

INTRODUCTION

Cardiopulmonary resuscitation (CPR) is a set of actions in which two vital organs (heart and lungs) are worked on to be revived. In the past, CPR was performed through artificial respiration, pressure on the chest and sometimes physical painful stimuli. However, fundamental changes have occurred in the recent years in this area.

After cardiac arrest, faster CPR can revive the patient and reduce hospital stay in intensive care unit (ICU).¹ Therefore, ensuring successful operation in achieving

rehabilitation of heart and lungs can help in attaining the international standards.²

Many cases of cardiac and respiratory arrest can be revived with rapid CPR. However, for various reasons the survival rate of cardiopulmonary patients is very low.³ Today, resuscitation is done through two stages including life measures and advanced related measures with the use of drugs and modern tools.⁴ In developed countries, survival rates from cardiac arrest happening inside and outside the hospital are less than 30% and

10%, respectively.

In the United States, 335 thousand people suffer out-of-hospital cardiac arrest each year and it is estimated that a similar number of cardiac arrests occur during hospital stay.^{5,6} According to the American Heart Association in 2006, the rapid start of CPR and defibrillation within 3 to 5 minutes after cardiac arrest followed by immediate supports had increased the survival rate and had long-term effects in more than 50% of patients with cardiac arrest.⁷ For every one minute delay in doing defibrillation, 10.7% of survival rate decreases.

Other countries have reported this rate up to 21%. In a study, this rate was reported 16% in trauma patients.⁸ In another study it was reported 21% in children.⁹ This rate was reported zero in patients with cancer. Rate of heart monitoring, the presence of an experienced anesthetist in resuscitation team, CPR in office hours, the rapid start of CPR, especially fast chest compressions and intubation are factors that increase the rate of survival up to the discharge time.

Sudden death is a natural death in less than one hour of the onset of acute symptoms in a person that might have had an underlying disease known from before.^{10,11} Sudden deaths usually occur because of cardiac and respiratory arrests. The most common cause of sudden death is cardiovascular disease. Coronary artery disease covers 80% and cardiomyopathy covers from 10 to 15% of causes of deaths due to heart disease.¹² The incidence of sudden death in adults is 1 to 2 cases per 1000 people annually.¹³ To reduce mortality, improving the quality of CPR and investigating the associated factors with a positive effect have been of interest.¹⁴ Hence, the purpose of this study was to evaluate the success rate of CPR in ICU of an Iran's Army Air Force hospital in 2012.

MATERIALS AND METHODS

This was a descriptive cross-sectional study on 185 patients hospitalized in the intensive care unit of an Iran's Army Air Force hospital to evaluate the success rate of CPR. The success criteria of the CPR included the return of cardiac and vital signs recorded through electrocardiography monitoring and also peripheral and central pulse palpation and hemodynamic stability for 24 hours.

The data were collected via questionnaires requiring information on patient's name, case number, sex, age, cause of hospitalization and outcome of resuscitation. Other data were collected by different preset forms for the record of doctors and nurses' report. Regression test was used to analyze the data. The individuals participating

in CPR and coronary artery disease team constituted the study participants.

The measures taken for the patients were in accordance with the standards available in the valid sources of field of anesthesiology and latest CPR guidelines published by the American Heart Association in 2010, including external cardiac compressions, airway management, oxygen, adrenaline drugs, atropine, sodium bicarbonate, lidocaine, dopamine and dobutamine through the vein and electrocardiogram.¹⁵

RESULTS

From among 185 patients hospitalized in ICU of an Iran's Army Air Force hospital in 2012, 36.7% (68 persons) were women and 63.2% (117 persons) men. The average age of the patients was 64.1 years old. The oldest person was 94 years old and the youngest person was 17 years old (Figure 1).

Among the studied patients, 32 experienced successful cardiovascular resuscitation (17.2%) and 15 had an unsuccessful resuscitation (8.2%). Among the patients with successful resuscitation, there were 19 men (59.3%) and 13 women (40.7%). In the cases of unsuccessful CPR, there were 98 men (64%) and 55 women (36%). The average ages of patients with successful resuscitation and unsuccessful resuscitation were 58.1 and 65.4 years, respectively (Table).

Amongst the most common diseases of the studied patients which had led to hospital stay, 17.2% was cerebrovascular accident, 16.2% was sepsis, 12.4% was cancer and 7.02% was chronic renal failure. The most common reason for hospitalization among patients with successful CPR was suffering from cerebrovascular accident with 18.7%. This percentage was 18.9% for patients with unsuccessful CPR.

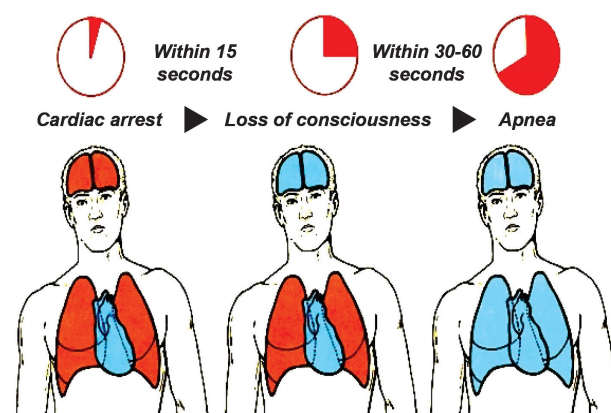


Figure 1. Frequency of successful and unsuccessful CPR according to gender.

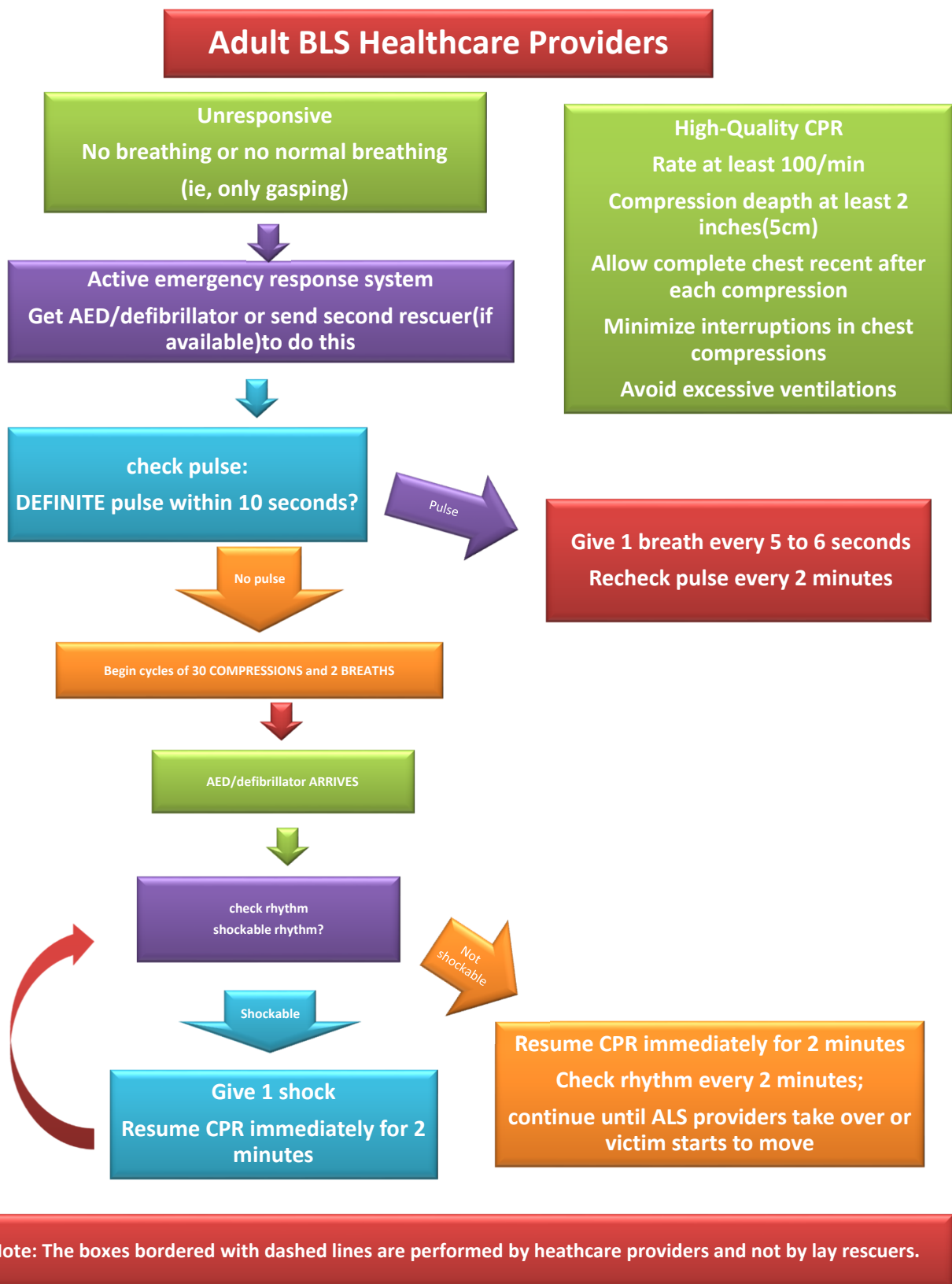


Figure 2. Post cardiac arrest care process (source: Peberdy MA, Callaway CW, Neumar RW, et al. Post cardiac arrest care: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*. 2010;122:S768-86).

Table. Frequency of successful and unsuccessful CPR according to gender.

CPR	Women	Men	Total	Percentage
Successful	13	19	32	16.2
Unsuccessful	55	98	153	82.8

Key: CPR, cardiopulmonary resuscitation.

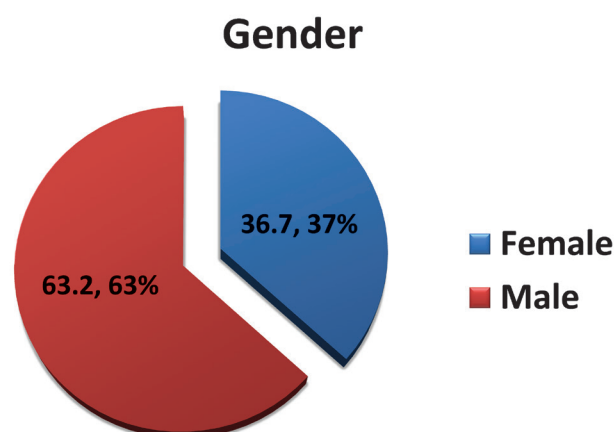


Figure 3. Process of cardiac arrest to apnea (source: Wenzel V, Krismer AC, Arntz HR, et al. A comparison of vasopressin and epinephrine for out of hospital cardiopulmonary resuscitation. *N Engl J Med.* 2004;350:105-113).

DISCUSSION

CPR is a process in which the necessary steps are taken to restore the heart and lungs activity. It includes a series of activities through which it is possible to return a group of patients with certain death to life, if there the required knowledge, equipment and drugs are available. The success rate of CPR depends on many factors including age, underlying disease, the time interval between the onset of cardiopulmonary arrest and CPR initiation and the preparation of participants in the resuscitation team. (Figure 2)

Cardiovascular diseases are a common cause of sudden death being in 80% of deaths. Cardiomyopathy covers from 10 to 15% of causes of death due to heart disease. The incidence of sudden death in adults is from 1 to 2 cases per 1000 people annually. To reduce mortality, improving the quality of resuscitation and investigating the factors with a positive effect of this trend have been of interest. Age is undoubtedly one of the factors determining the likelihood of success, and in this study it correlated with the ultimate resuscitation success. (Figure 3)

The speed of resuscitation out of hospital (i.e. onset of resuscitation, intubation rate, pace and speed of electric shock resuscitation teams) was the most important determinant of successful resuscitation. In a study by

Brindley and colleagues on in-hospital resuscitation, these factors were important causes.¹⁶ In our study, the rate of speed of the recovery and the rate of intubation were significant factors. However, the rate of recovery and the speed of the shock were not important. This finding seems to be because of the quality of revival.

In this study, the success rate of cardiopulmonary resuscitation was 17.2%. Higher resuscitation success rates in men have been reported. Other studies have reported from 8% to 16% success in terms of CPR inside the hospital while this percentage has been 21% in some other studies.¹⁷ The results of another study showed that the success rate of resuscitation in the intensive care unit was 3.3% while in other sectors it has been reported to be 14%.¹⁸

In a similar study in Iran University of Medical Sciences in 2000 on 150 patients who were undergoing CPR, the success rate was 10% and the ultimate success of CPR was higher for men than for women. The highest success rate was found in patients suffering drug toxicity while the lowest success rate was found in patients with trauma. In patients with cancer the success rate was zero. In this study, ultimate success was defined as a patient discharge from the hospital.¹⁹ In a different study, the success rate of CPR outside hospital was reported from 1.4% to 29%. It is interesting that the success rate in the small towns has been reported to be higher than the major cities.²⁰ Another study conducted among 302 patients undergoing CPR in Zanzan city, Iran, reported an initial success rate of 23.8% and a final success rate of 3.3%.²¹ In various studies, the young age of patients has increased the success rate of CPR.²² This has also been confirmed in our study since the mean age of patients with successful CPR has been lower.

CONCLUSION

Although this study and other similar studies report higher success rates of resuscitation in men, younger ages, and patients with a primary diagnosis of cerebrovascular accident irrespective of other factors, carrying out more precise studies is strongly recommended, including the effects of intensity of problems and underlying diseases at the time of admission on the success rate of CPR. Since the basic life support including airway opening maneuvers

and putting the patient in a proper situation can be trained and are very simple, it is possible to improve patients' health. In addition, some environmental conditions are preventable by CPR (foreign body aspiration and hypothermia) and becoming aware of these risks can reduce the number of those who are in need of CPR.

ACKNOWLEDGEMENTS

The authors express thankful regards to the Research Department of AJA University of Medical Sciences. They also thank the intensive care unit of Besat hospital. Last but not least, they express their gratitude to all the patients who cooperated in conducting this research.

CONFLICT OF INTEREST

None declared.

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Received June 2014

Accepted August 2014