

Original Paper

Predictors of Long-term Survival After Cardiopulmonary Resuscitation



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ABSTRACT

Introduction: Survival after cardiac arrest is one of the most important issues related to the safety and quality of patient care, and unexpected events such as failure to follow guidelines can endanger the patient's safety.

Objective: This study aimed to determine the long-term survival after cardiopulmonary resuscitation and its predictors in patients with cardiac arrest.

Materials and Methods: In this retrospective study, individual, disease-related, and 3-day follow-up-related factors were monitored after the Cardiopulmonary Resuscitation (CPR) in all patients with long-term survival after Cardiac Arrest (CA) who were discharged from the hospital between 2016 and 2019. Patients' survival or death after CPR was followed up by telephone interviews. The patient's survival time after discharge was calculated until the interview day. The obtained data were analyzed by the Kaplan-Meier and Cox regression tests.

Results: Out of 1565 CPR cases (both In-Hospital Cardiac Arrest [IHCA] and Out-of-Hospital Cardiac Arrest [OHCA]), 667 were successful, of which 156 patients had long-term survival. The Mean±SD of the survival time for patients was 30.98±1.78 months. Significant variables in associations with long-term survival were old age (>60 y) (HR=1.811, 95%CI;1.019-3.218, P=0.043), initial asystole rhythm (HR=4.199, 95%CI;2.129-8.282, P=0.001), Ventricular Tachycardia (VT) (HR=2.315, 95%CI;1.171-4.576, P=0.016), connection to mechanical ventilator (HR=1.992, 95%CI;1.229-3.229, P=0.005), cardiovascular disease (HR=1.795, 95%CI;1.111-2.901, P=0.017), and abnormal SpO₂ (HR=2.447, 95%CI;1.507-3.972, P=0.001). Multivariate analysis also showed that asystole rhythm (P=0.001), VT (P=0.052), and prolonged duration of CPR (>20 min) (P=0.043) significantly increase the risk of death.

Conclusion: The major predictors in this study were age, initial rhythm, connection to a mechanical ventilator, CPR duration, cardiovascular disease, and SpO₂ monitoring. Therefore, introducing post-resuscitation care protocols and conducting training programs and further studies are warranted.

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Highlights

- Sudden cardiac arrest is the third leading cause of death in industrialized countries.
- Post-resuscitation care will play an essential role in the long-term survival of patients after cardiac arrest.
- The major predictor factors in this study were age, initial rhythm, connection to a mechanical ventilator, cardiopulmonary resuscitation duration, and SpO₂ monitoring to check the oxygen level in pulse oximetry.

Plain Language Summary

Post-resuscitation care is an essential link in the resuscitation chain according to the guidelines of the American Heart Association in 2015. In many countries, post-resuscitation care has no place in specialist hospitals. There are many differences between hospitals regarding the availability and type of resuscitation care and clinical outcomes. For a good outcome after cardiopulmonary resuscitation, it is necessary to implement post-resuscitation care guidelines continuously in the hospital. Post-resuscitation care plays an essential role in increasing the patient's long-term survival. In this study, a total of 147 patients were discharged from the hospital after cardiac arrest. These patients were evaluated for demographic characteristics, disease-related factors, and care factors, and their survival time after discharge was assessed. The result showed that age, initial rhythm, connection to a mechanical ventilator, cardiopulmonary resuscitation duration, no cardiovascular disease, and SpO₂ monitoring were associated with long-term survival. Therefore, introducing post-resuscitation care protocols and conducting training programs can be effective.

Introduction

Sudden cardiac arrest is the third leading cause of death in industrialized countries [1]. Each year, over 630000 cases of Cardiac Arrest (CA) are reported in the United States, of whom 12% are Out-of-Hospital Cardiac Arrest (OHCA) patients and 24.8% In-Hospital Cardiac Arrest (IHCA) patients who survive and discharge from the hospitals [2]. In one of the teaching and medical hospitals of Guilan Province, Iran, among those who survived from IHCA, 30% had short-term survival, and 11% of patients were discharged with good brain conditions [3]. Survived people may experience Post-Cardiac Arrest Syndrome (PCAS), which is a pathological process caused by the Restoration of Spontaneous Circulation (ROSC) [4]. This syndrome can be accompanied by brain injury, heart disorders, recurrent ischemic injuries of the nervous system, and inflammatory responses [5]. Survival after CA is one of the most important issues related to the patients' safety and quality of care, and unanticipated events such as failure to follow guidelines may endanger patients' safety [6].

The relationship between guideline-based post-resuscitation care and the survival and functional status of patients after CA has already been emphasized [7]. As CA affects multiple systems, successful post-cardiac arrest care is one of the most effective treatment programs [8].

Post-resuscitation care is an important link in the resuscitation chain and plays a prominent role in prolonging patients' 24-hour survival. The care should be tailored to the patient's needs and include (a) identification and treatment of the cause of CA, (b) airway and ventilation management, (c) hemodynamic management, (d) targeted temperature management or therapeutic hypothermia, (e) glycemic control, and (f) seizure management [9]. Studies reveal that initial treatments for hypertension, oxygen saturation, carbon dioxide pressure, glucose level, and temperature are associated with good clinical outcomes in patients with PCAS. The inadequate level of each indicator reduces the patient's survival or leads to adverse outcomes [4, 7]. Hypertension has been identified as an independent and predictive factor for survival among patients who survived CA [10]. Also, hyperglycemia in CA survivors is associated with increased mortality and poor neurological outcomes [11]. However, a comparative study with precise-matched control group - (4-6 mmol / L or 72-108 mg/L) with (6-8 mmol / L or 108-144 mg/dL) - on OHCA resuscitated patients reported no deaths within 30 days [12].

In many countries, post-resuscitation care is not provided in specialized hospitals, and there are many differences between hospitals in terms of availability and type of post-resuscitation care as well as clinical outcomes [13]. A study in Australia identified some of the shortcomings in post-resuscitation care provided by health-

care staff in comparison to the guideline-recommended care, the most important of which were deficiencies of oxygenation, temperature management, and blood pressure control [7]. Also, Ford et al. reported that post-resuscitation care was an influencing factor in patients' survival. When the healthcare providers do not follow guidelines, it may lead to significant complications after resuscitation [14].

This study aimed to determine the long-term survival after cardiopulmonary resuscitation and its predictors in patients with cardiac arrest in a specialized heart center, which is the referral center of the Province.

Materials and Methods

This analytic study is based on a retrospective survey of the records of all patients who successfully resuscitated after CA in a large referral heart center in Rasht City, Iran, between 2016 and 2019.

Patients over 18 years with long-term survival (long-term survival means the patient survived for at least 24 hours or more after CPR [15]) and patients who survived at least three days after cardiac arrest and were discharged alive were selected as the samples of this study and examined in terms of clinical and demographic characteristics and the follow-ups within three days of resuscitation. The patients who died in the hospital after three days and were not discharged were not included in the study sample.

The data collection instrument consisted of two parts. The first part collected the demographic information and clinical data, which were extracted from patients' records. These data included date of admission, date of cardiac arrest, date of discharge, sex, and location of CA, pre-arrest consciousness, CPR duration, initial rhythm, and history of CA during the same hospitalization, history of an underlying disease, final diagnosis, and connection to a mechanical ventilator, death after discharge, and survival period after discharge. The second part of the extracted data comprised the information about the time between post-resuscitation monitoring and discharge in 4 areas of blood pressure monitoring, temperature monitoring, blood glucose monitoring, and oxygenation index. Care measures in four areas of post-resuscitation care guidelines of blood pressure monitoring status (Systolic Blood Pressure [SBP] and Mean Arterial Blood Pressure [MAP]), pulse oximetry saturation (SpO_2), Blood Sugar (BS), and temperature were extracted from care guidelines [8, 16] and recorded in a prepared checklist.

To determine the instrument validity, 5 faculty members of the country's medical universities examined the instrument. They were experienced in cardiopulmonary resuscitation. Afterward, the instrument was given back to two experienced professors in the field of cardiopulmonary resuscitation. Also, to ensure the recording of the variables in the file, 60 CPR files were randomly reviewed for the preliminary study.

Initially, we reviewed the medical records of 1565 patients who received CPR between 2016 and 2019. Cases with a successful CPR were separated from the failed ones, which were 667 cases. In this retrospective study, individual, disease-related, and 3-day follow-up-related factors were monitored after the CPR in all patients with long-term survival after CA. After reviewing the medical records of these patients, their contact numbers were noted from the medical records and followed up by telephone interviews. Their survival time after discharge was assessed. If the patient died after discharge, the date of death was asked of their family, and the duration of survival until the date of death was calculated.

In this study, continuous variables were expressed as Mean \pm SD and categorical variables as frequency (percentage). The survival probability was calculated using the Kaplan-Meier test and compared with the log-rank test. Furthermore, simple and multiple Cox proportional hazard models were performed to estimate the crude and adjusted Hazard Ratios (HR) and their 95% confidence intervals. Statistical analysis was done with SPSS software v. 16 for Windows (SPSS Inc., Chicago, IL, USA), and the level of significance was set at 0.05.

Results

Among 667 successful CPRs, 156 were patients with long-term survival (8 patients died in the hospital despite having more than 24 hours of survival and were not included in the study). One patient was also not included due to a distorted contact number. Successful telephone calls were made to 147 patients, and the research instrument was completed.

The Mean \pm SD and median survival times of the patients were 30.98 \pm 1.78 and 34.70 months (Figure 1). One-, two-, and three-year survival rates were 72.1%, 61.4%, and 49.9%, respectively. A total of 67 patients (45.6%) died after discharge, and 80 patients (54.4%) survived to the end of the study.

Of 147 patients with cardiac arrest who survived to discharge, 89 (60.5%) were men, and 58 (39.5%)

Table 1. Demographics and disease-related factors among patients with successful cardiopulmonary resuscitation (n=147)

Variables		No(%)
Age (y)	≤60	47(32)
	>60	100(67)
Sex	Male	89(60.5)
	Female	58 (39.5)
Location of cardiac arrest	In the hospital	87(59.2)
	Out of the hospital	60(40.8)
Medical diagnosis	ACS	6(4.1)
	CAD	14(9.5)
	CHB	7(4.8)
	HF	60(40.8)
	MI	43(29.3)
	Other	17(11.6)
Level of conscience before arrest	Conscious	86(58.5)
	Semi-conscious and deep coma	61(41.5)
Initial rhythm	VF	50(34)
	VT	57(38.8)
	Asystole	40(27.2)
Re arrest	No	122(83)
	Yes	25(17)
Connect to a mechanical ventilator after CPR	No	98(66.7)
	Yes	49(33.3)
CPR duration (min)	< 15	86(58.5)
	15-20	45(30.6)
	> 20	16(10.9)
Past medical history	No	17(11.6)
	Yes	130(88.4)

ACS: Acute Coronary Syndrome; CAD: Coronary Artery Disease; CHB: Complete Heart Block; HF: Heart Failure; MI: Myocardial Infarction; VF: Ventricular Fibrillation; VT: Ventricular Tachycardia; CPR: Cardiopulmonary Resuscitation.

were women. The Mean±SD age of the patients was 66.13±14.26. Of them, 47 patients (32%) were under 60 years old (Table 1).

Most samples (98%) had a temperature above 36°C, and the number of patients with abnormal blood sugar was higher than the number of patients with normal blood sugar. During the first, second, and third days after resuscitation, 27.9%, 32%, and 32% of the samples, respectively, had normal blood sugar levels (80-140 mg/dL). Systolic blood pressure was above 90 mm Hg in the majority of patients. About 16.3%, 15.6%, and 10.2% of

the samples had systolic blood pressure lower than 90 mm Hg in the first, second, and third days after resuscitation, respectively. Also, 40.8%, 44.2%, and 46.9% of the samples had normal mean arterial blood pressure (65-80 mm Hg) in the first, second, and third days after resuscitation, respectively. Finally, 58.5%, 78.2%, and 85.7% of the samples had normal SpO₂ (94%-98%) in the first, second, and third days after resuscitation, respectively.

The Mean±SD values of temperature, blood sugar, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and pulse oximetry saturation dur-

Table 2. Survival time after cardiopulmonary resuscitation comparison based on log rank test

Variables		Survival Time, Mean \pm SD	P*
Age (y)	≤ 60	35.66 \pm 2.88	0.039
	> 60	28.38 \pm 2.15	
Sex	Male	32.92 \pm 2.24	0.170
	Female	27.67 \pm 2.79	
Location	In the hospital	31.46 \pm 2.30	0.705
	Out of the hospital	29.50 \pm 2.77	
Level of conscience before arrest	Conscious	32.20 \pm 2.24	0.259
	Semi-conscious and deep coma	28.05 \pm 2.89	
Initial rhythm	VF	40.29 \pm 2.46	0.001
	VT	29.27 \pm 2.81	
	Asystole	20.48 \pm 3.21	
Re-arrest	No	31.63 \pm 1.94	0.352
	Yes	25.91 \pm 3.82	
Connect to a mechanical ventilator after CPR	No	34.37 \pm 2.12	0.004
	Yes	24.21 \pm 2.99	
CPR duration (min)	< 15	32.35 \pm 2.30	0.304
	15-20	29.74 \pm 3.17	
	> 20	26.95 \pm 1.89	
Past medical history	No	36.37 \pm 3.84	0.116
	Yes	29.95 \pm 1.89	
Cardiovascular disease	No	34.26 \pm 2.20	0.015
	Yes	25.83 \pm 2.78	
Diabetes	No	33.12 \pm 2.22	0.063
	Yes	26.07 \pm 2.75	
Hypertension	No	30.71 \pm 2.94	0.967
	Yes	30.93 \pm 2.19	
BS (80-140 mg/dl)	No	28.27 \pm 2.50	0.386
	Yes	31.85 \pm 3.09	
SBP (< 90 mm Hg)	No	31.79 \pm 2.36	0.782
	Yes	24.46 \pm 6.39	
MAP (65-80 mm Hg)	No	30.79 \pm 2.36	0.966
	Yes	31.15 \pm 2.65	
SPO ₂ (94-98%)	No	20.77 \pm 2.85	0.001
	Yes	35.25 \pm 2.06	

* Kaplan–Meier test.

VF: Ventricular Fibrillation; VT: Ventricular Tachycardia; CPR: Cardiopulmonary Resuscitation; BS: Blood Sugar; SBP: Systolic Blood Pressure; MAP: Mean Arterial Pressure; SPO₂: pulse oximetry saturation.

ing the three days after resuscitation were estimated respectively at $36.82 \pm 0.17^\circ\text{C}$, 179.58 ± 73.43 mg/dL, 114.37 ± 18.27 mm Hg, 69.34 ± 9.68 mm Hg, 84.29 ± 12.11 mm Hg, and $94.47 \pm 2.85\%$.

The log-rank test revealed that the survival time of patients under 60 years was significantly longer than those over 60 years ($P=0.039$, log-rank statistics=4.269) (Figure 2). Survival time was significantly longer in patients with an initial Ventricular Fibrillation rhythm than those with an initial Ventricular Tachycardia (VT) or asystole rhythm ($P=0.001$, log-rank statistics=19.878) (Figure 3). Subjects who were not connected to a mechanical ventilator after CPR had a significantly longer survival time than those connected to a mechanical ventilator ($P=0.004$, log-rank statistics=8.191) (Figure 4). People without cardiovascular disease had significantly longer survival than people with cardiovascular disease ($P=0.015$, log-rank statistics=5.923) (Figure 5). The mean survival time was longer in people without hypertension and diabetes, but the difference was not significant.

Although the monitored blood glucose and blood pressure showed relationships with long-term survival, the associations were not statistically significant. Regarding SpO_2 monitoring (Figure 6), results showed that the patients with normal SpO_2 (94-98%) within three days after resuscitation had significantly longer survival than those with abnormal ($P=0.001$, log rank statistics=14.090) Comparison mean of survival time based on study variables showed in Table 2.

The analysis of Cox proportional hazards model showed that age (>60 y) ($\text{HR}=1.811$, 95%CI; 1.019-3.218, $P=0.043$), initial asystole rhythm ($\text{HR}=4.199$, 95%CI; 2.129-8.282, $P=0.001$), VT ($\text{HR}=2.315$, 95%CI; 1.171-4.576, $P=0.016$), connection to a mechanical ventilator ($\text{HR}=1.992$, 95%CI; 1.229-3.229, $P=0.005$), and abnormal SpO_2 ($\text{HR}=2.447$, 95%CI; 1.507-3.972, $P=0.001$) had significant relationships with patients' survival. So that the older age, initial asystole rhythm, VT, connection to

a mechanical ventilator and abnormal SpO_2 were associated with lower long-term survival.

Multivariate analysis showed that asystole rhythm ($\text{HR}=5.128$, 95%CI; 1.917-13.716, $P=0.001$), VT ($\text{HR}=2.728$, 95%CI; 0.991-7.509, $P=0.052$), and the duration of resuscitation (>20 min) ($\text{HR}=3.168$, 95%CI; 1.037-9.683, $P=0.043$) had significant relationships with patients' survival (Table 3).

Discussion

In our study, most of the samples were men over 60 years old. Many studies have considered old age a significant factor in long-term survival [2, 17]. A systematic review reported that the risk of death after CA was lower in women than men [18]. A study provided a justification for the observed differences. It stated that in the event of an OHCA, women are less likely to be resuscitated by their companions than men, which may lead to lower survival rates for women [19].

Our study showed that a systole heart rhythm is associated with patients' survival. The initial rhythm was the best predictor of patients' survival. Also, compared to VF, pulseless electrical activity was associated with shorter survival times [20]. Another study reported that a lower probability of survival at discharge was associated with the recurrence of CA [21].

Our study revealed that CPR duration (>20 min) was a risk factor for patients' survival. Another study in Iran demonstrated that CPR is an influential factor in a patient's survival [22]. In another study, CPR duration between 10 and 15 minutes was considered a significant factor in patients' survival. However, the effect of CPR duration on survival was challenging to evaluate due to its variability from patient to patient [23].

Our observations align with other investigators who reported that underlying diseases such as diabetes, car-

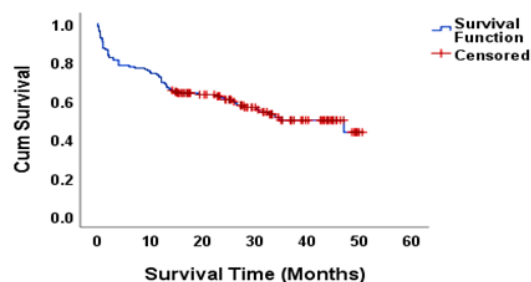


Figure 1. Survival times of patients with cardiac arrest

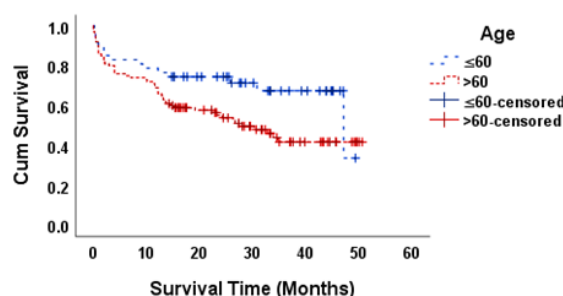


Figure 2. Survival curves of patients with cardiac arrest in terms of age

Table 3. Related factors to risk of death after cardiopulmonary resuscitation by cox regression

Variables		Simple Cox Regression Model		Multiple Cox Regression Model	
		HR (95% CI)	P	HR (95% CI)	P
Age, y	≤ 60	1		1	
	> 60	1.811 (1.019-3.218)	0.043	1.405 (0.569-3.471)	0.461
Sex	Male	1		1	
	Female	1.398 (0.862-2.267)	0.174	1.063 (0.511-2.211)	0.869
Location	In the hospital	1		1	
	Out of the hospital	1.098 (0.675-1.786)	0.706	1.032 (2.373-0.449)	0.941
Level of conscience before arrest	Conscious	1		1	
	Semi-conscious and deep coma	1.318 (0.813-2.137)	0.263	0.752 (0.334-1.694)	0.492
Initial rhythm	VF	1		1	
	VT	2.315 (1.171-4.576)	0.016	2.728 (0.991-7.509)	0.052
	Asystole	4.199 (2.129-8.282)	0.001	5.128 (1.917-13.716)	0.001
Re arrest	No	1		1	
	Yes	1.331 (0.725-2.443)	0.356	1.336 (0.558-3.197)	0.515
Connect to a mechanical ventilator after CPR	No	1		1	
	Yes	1.992 (1.229-3.229)	0.005	0.676 (0.167-2.728)	0.582
CPR duration (min)	< 15	1		1	
	15-20	1.273 (0.749-2.163)	0.373	1.954 (0.851-4.490)	0.114
	> 20	1.686 (0.831-3.419)	0.148	3.168 (1.037-9.683)	0.043
Past medical history	No	1		1	
	Yes	2.196 (0.798-6.037)	0.128	4.170 (0.461-37.730)	0.204
BS (80-140 mg/dL)	No	1.272 (0.736-2.198)	0.389	1.123 (0.460-2.741)	0.799
	Yes	1		1	
SBP (<90 mm Hg)	No	0.850 (0.267-2.707)	0.783	0.996 (0.162-6.139)	0.996
	Yes	1		1	
MAP (65-80 mm Hg)	No	1.011 (0.624-1.637)	0.966	0.678 (0.323-1.423)	0.304
	Yes	1		1	
SPO ₂ (94%-98%)	No	2.447 (1.507-3.972)	0.001	2.154 (0.840-5.510)	0.111
	Yes	1		1	

HR: Hazard Ratio; CI: Confidence Interval; VF: Ventricular Fibrillation; VT: Ventricular Tachycardia; CPR: Cardiopulmonary Resuscitation; BS: Blood Sugar; SBP: Systolic Blood Pressure; MAP: Mean Arterial Pressure; SPO₂: pulse oximetry saturation.

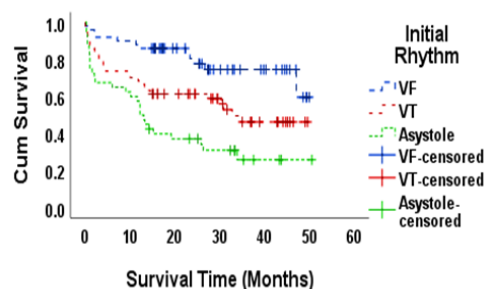


Figure 3. Survival curves of patients with cardiac arrest in terms of initial rhythm

diovascular diseases, and hypertension were effective in patients' survival [24, 25]. Of note, a study evaluated the association of hypertension with survival rate after CA in adults and identified its changes according to the patient's age [26]. However, a study showed that even though patients with cardiovascular diseases are a high-risk group, there was no significant difference in the survival rate between the patients with and without heart disease [27]. It seems that factors such as biological differences, access to health care, or other factors may affect the survival of patients in the long term.

Temperature above 36°C was reported in most of our study samples. A recent meta-analysis reported that temperature management reduces mortality and significantly reduces poor neurological outcomes [28]. Due to observed consistency in our study, the temperature variable was omitted in the Kaplan Meier, log-rank, and Cox regression analyses.

We considered a blood sugar range of 80-140 mg/dL based on care guidelines [8, 16]. The data showed that the number of patients who lacked normal blood sugar was higher than those with normal blood sugar. Following CPR, a cascade of metabolic disorders frequently occurs, which requires careful monitoring and management. Hence, diagnosis and appropriate response to severe metabolic disorders, especially the prevention

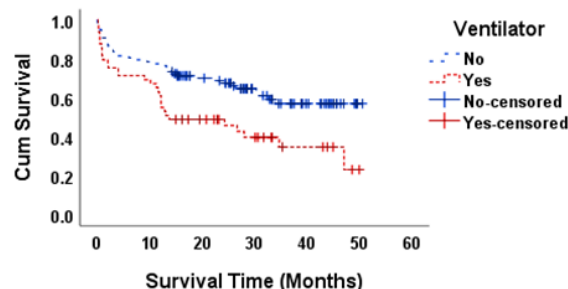


Figure 4. Survival curves of patients with cardiac arrest in terms of connection to a mechanical ventilator

of hypoglycemia and hyperglycemia, are essential [29]. Some reports have described the relationships between the increase in mean blood sugar during the first 96 hours after admission and mortality rates and neurological dysfunctions [11, 30].

A search on care guidelines reveals that systolic pressure below 90 mm Hg is an influential factor in recovery after CA [8, 16]. But in our study, most subjects had a systolic pressure above 90 mm Hg. Our study is in line with a systematic review on the association between blood pressure and patients' outcomes following CA. By examining 13150 patients, the researchers suggested that higher blood pressure ameliorated neurological outcomes after CA [31]. Our results were in contrast to Roberts' finding [32]. However, another study reported no association between MAP above 90 mm Hg and neurological outcomes at the time of discharge [33]. Patients are often hemodynamically unstable after ROSC, and their management could be a challenge. Following CPR, an optimal hemodynamic should maintain adequate cerebral and coronary perfusion pressure and blood flow to the other vital organs. Based on the current guidelines, the main goal of hemodynamic management is to prevent hypotension and maintain a systolic blood pressure of at least 90 mm Hg or a mean arterial pressure of 65 mm Hg after resuscitation [9].

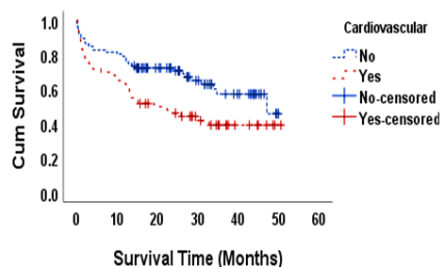


Figure 5. Survival curves of patients with cardiac arrest based on a history of cardiovascular disease

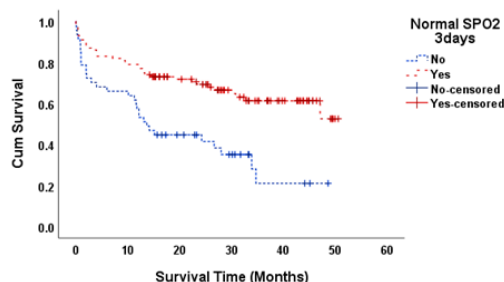


Figure 6. Survival curves of patients with cardiac arrest in terms of normal spo₂ (94-98%) during three days after resuscitation

One systematic review study concluded that hyperoxia in adults with CA was associated with lower mortality rates during CA but higher mortality rates after CA [34]. Another study reported that high or low SpO₂ might be associated with poor outcomes after CA [35]. After ROSC, hyperoxemia during the reperfusion phase with 100% oxygen increases brain lipid peroxidation and may cause metabolic dysfunction and neurological degeneration [9]. Besides, excess oxygen leads to increased damage to the myocardium, recurrent myocardial infarction, and larger infarctions within 6 months, as hypoxemia induces cerebral vasoconstriction and reduces cerebral blood flow [16].

Conclusion

Our results showed that different factors are influential in the long-term survival of patients after CA. We believe that differences in the observed results and factors predicting long-term survival may stem from differences in demographic, disease-related factors, the complex nature of CA and its affecting factors, various care services provided by healthcare providers, differences in healthcare providers' knowledge on the subject of post-resuscitation care, treatment policies in different countries, ethnic and demographic differences, and sample size. Therefore, raising sufficient awareness, including the necessary training for medical staff in post-resuscitation care, especially in the field of hypothermia, maintaining this knowledge, and establishing a recovery ward for patients after cardiac arrest and further investigating in this topic can be effective.

The generalization of our results is limited in two respects. First, the research was a retrospective study, and data were extracted from medical records, so the personnel recording the information might make mistakes. Besides, although the study was performed in a referral center, multicenter studies could be more helpful.

Ethical Considerations

Compliance with ethical guidelines

This research was approved by the Research Ethics Committee of Guilan University of Medical Sciences (ID: IR.GUMS.REC.2019.496). Official permission of the hospital administration was acquired for accessing patients' medical files. The study purpose was explained to the subjects at the beginning of the telephone interview, and the patient's oral consent was obtained.

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This study was extracted from the Master thesis of the first author, Department of Nursing, School of Nursing and Midwifery, , Guilan University of Medical Sciences, Rasht, Iran (registration number: 97283).

Authors' contributions

Conceptualization and supervision: Fatemeh Jafaraghaee; Investigation: Parivash Nazarpour and Fatemeh Jafaraghaei; Formal analysis: Parivash Nazarpour and Saman Maroufizadeh; Methodology, funding acquisition, resources, and writing - original draft: All authors; Writing - review, and editing: Fatemeh Jafaraghaee and Mohammad Taghi Moghadamnia.

Conflict of interest

The authors declared no conflict of interest.

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