

Effect of Palliative Care on Quality of Life and Survival after Cardiopulmonary Resuscitation: A Systematic Review

Abstract

Background: Cardiac and respiratory arrest is reversible through immediate cardiopulmonary resuscitation (CPR). However, survival after CPR is very low for various reasons. This systematic review study was conducted to assess the effect of palliative care on quality of life and survival after CPR. **Methods:** In the present meta-analysis and systematic review study, two researchers independently searched Google Scholar and MagIran, MedLib, IranMedex, SID, and PubMed for articles published during 1994–2016 and containing a number of relevant keywords and their Medical Subject Headings (MeSH) combinations. A total of 156 articles were initially extracted. **Results:** The success of initial resuscitation was reported to be much higher than the success of secondary resuscitation (survival until discharge). Moreover, the early detection of cardiac arrest, a high-quality CPR, immediate defibrillation, and effective postresuscitation care improved short- and long-term outcomes in these patients and significantly affected their quality of life after CPR. Most survivors of CPR can have a reasonable quality of life if they are given proper follow-up and persistent treatment. **Conclusions:** Concerns about the low quality of life after CPR are therefore not a worthy reason to end the efforts taken for the victims of cardiac arrest. More comprehensive education programs and facilities are required for the resuscitation of patients and the provision of post-CPR intensive care.

Keywords: *Cardiopulmonary resuscitation, palliative care, postcardiopulmonary resuscitation survival, quality of life*

Introduction

Cardiac arrest is a sudden failure in the pumping function of the heart.^[1-3] It may occur inside or outside the hospital and is among the leading causes of mortality throughout the world.^[4-8] About 350,000–450,000 cases of cardiac arrest are annually recorded in the United States and Canada.^[9] Moreover, the condition is responsible for 700,000 deaths in Europe each year.^[10] Cardiopulmonary resuscitation (CPR) is among the key medical procedures used in casualties of accidents and disasters. When applied within the first 4–6 min and before brain death, basic CPR can reestablish blood flow and increase the chance of survival by two to four times.^[11,12] Using CPR as a general skill is an innovative advancement in medical sciences. Since it is a rapid and immediate intervention for preventing death due to sudden cardiopulmonary arrest, public training on CPR is recommended in many countries.^[13,14] CPR actually aims to revive blood flow to patients' vital body

organs, such as the heart and lungs, and thus improve their survival.^[15] Palliative care is fundamentally an approach that is expected to enhance patients' and their families members' quality of life with emphasis on relief of pain and suffering through an early diagnosis, an appropriate assessment, treating pain and physical, psychological, or spiritual concerns.^[16] Self-care is a part of palliative care.^[17] Self-care measures play an essential role in the management of patients with chronic disease. The involvement of these patients in self-care programs helps them change their behaviors toward a healthy lifestyle and increase their own quality of life.^[17,18] In a comprehensive definition, quality of life is a precise general and detailed perception of physical, mental, and social health under a particular person's circumstances.^[12-14,18,19] Enhancing patients' quality of life should be considered as the main objective of medical interventions.^[13]

Health-related quality of life reflects the effects of the disease and its treatment on patients' perspectives and experiences.^[16] A poor quality of life is associated with

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deterioration of the disease, a lower survival, longer hospital stay, and reduced functioning.^[19,20] Quality of life is one of the main components in the evaluation of treatment efficacy.^[21,22] CPR is considered successful when the patient survives with an acceptable quality of life. Quality of life involves different physical and psychosocial aspects of an individual's life which are all affected by CPR. Unfortunately, all the technological advances and efforts devoted to CPR survival after cardiac and respiratory arrest have not visibly improved.^[23]

The outcomes of cardiac arrest within the hospital are likely better than the outcomes of arrests outside the hospital.^[24] Although major advances in the implementation of CPR have been made in the recent decades, few interventions have been developed to improve care and enhance the quality of life in patients after CPR. Many countries lack a clear guideline for the follow-up of patients and the improvement of their quality of life after CPR. Moreover, few studies have examined the outcomes of CPR and the quality of life in patients after this medical intervention. This systematic review study was done with the aim of the effect of palliative care on quality of life and survival after CPR.

Methods

Search strategy

This study was reported based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).^[17] As stated by PRISMA, search, article selection, qualitative evaluation of the selected articles, and data extraction were performed independently by two researchers. To find relevant studies, Google Scholar and MagIran, MedLib, IranMedex, SID, and PubMed databases were searched for a number of keywords, that is, CPR, post-CPR survival, quality of life, and systematic review, and their combinations were made using AND and OR Boolean operators which were found in Medical Subject Headings (MeSH) [Figure 1].

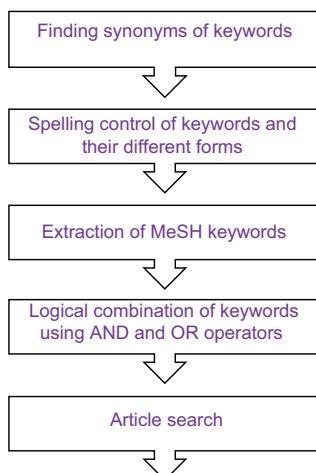


Figure 1: Search strategy

Inclusion and exclusion criteria

The studies that assessed patients' quality of life after CPR were included. Studies with insufficient data or poor quality, studies unrelated to the title investigated, studies without random samples, and studies that investigated patients' quality of life before CPR were excluded. The studies were screened based on the inclusion and exclusion criteria and the eligible studies were finally analyzed.

Study selection

The quality of articles was assessed using the Strengthening the Reporting of Observational studies in Epidemiology (STROB) checklist.^[22] This checklist contains 22 items covering different sections of a report. The scores of the checklist vary between 0 and 44. Each item is given a particular score with more important items having higher scores.

The initial search yielded 161 articles. Of these, 70 articles were excluded after reviewing their titles and abstracts, respectively. The full texts of the 44 remaining articles were reviewed and 33 articles were excluded due to incomplete data and poor quality. Eventually, 11 eligible articles entered the analysis [Figure 2].

Data extraction

Data extraction form was developed during the extraction of data from the selected articles. Two researchers independently performed data extraction and a third researcher revised the extracted data. This minimized the amount of reporting error.

Results

Literature search results

A total of 11 articles with a pooled sample size of 3893 were analyzed. These studies were published between 1994 and 2016.

The properties of the studies are listed in Table 1.

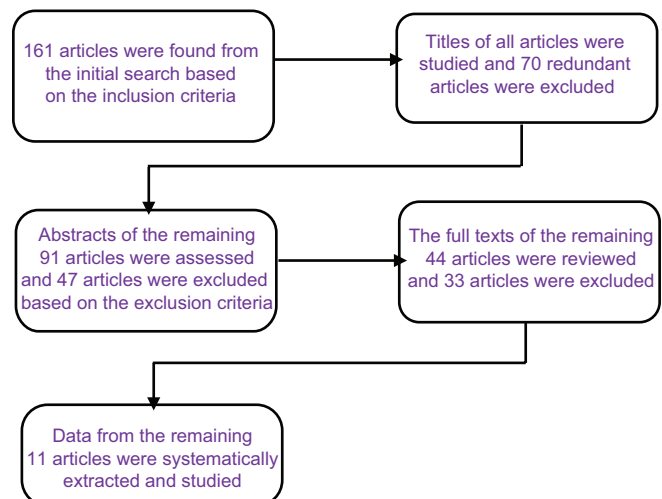


Figure 2: Flow diagram of study selection process

Table 1: Characteristics of studies qualified for systematic review

References	Author	Year	Country	Type of study	Sample size	Title	Results
[25]	Miranda	1994	The Netherlands	Case-control	977	QOL after cardiopulmonary resuscitation	CPR was performed in 4.8% of the patients; QOL did not correlate with severity of illness on admission, length of stay, or consumption of resources in the ICU
[26]	De vos <i>et al.</i>	1999	The Netherlands	Cohort study	827	QOL after cardiopulmonary resuscitation	Of 827 resuscitations, 101 survivals, 75% leading independent lives, 0.17% with cognitive impairment and 16% with depression
[27]	Peters and Boyde	2004	Australia	Cohort study	158	Improving survival after in-hospital cardiac arrest: the Australian experience	Of 128 resuscitations, initial restoration in 54% and discharge in 32% Of the shockable patients, initial restoration in 76% and discharge in 57%
[28]	Salari <i>et al.</i>	2010	Iran	Cross-sectional study	250	Survival rate and outcomes of cardiopulmonary resuscitation	64.4% unsuccessful CPRs, 28.4% of cases were successful in short-term, 7.2% of studied cases had long-term survival after resuscitation procedure
[29]	Goodarzi <i>et al.</i>	2013	Iran	Prospective study	320	Study of survival rate after CPR in hospitals of Kermanshah in 2013	The initial success rate of cardiopulmonary resuscitation was equal to 15.3%, while the ultimate success rate was 10.6%; the 6-month success rate after resuscitation was 8.78% than those who were discharged alive
[30]	Moulaert <i>et al.</i>	2014	The Netherlands	Clinical trial	185	Early neurologically focused follow-up after cardiac arrest improves QOL at 1 year: a randomized controlled trial	Interventions' focus on cognitive impairment increased recovery and QOL in the cases compared with the controls
[31]	Sehatazadeh	2004-2014	Iran	Systematic review	-	Cardiopulmonary resuscitation in patients with terminal illness: an evidence-based analysis	Patients with cancer have lower survival rates following CPR than patients with conditions other than cancer, and patients with cancer who receive CPR in intensive care units have one-fifth the rate of survival to discharge of patients with cancer who receive CPR in general wards
[32]	Kim <i>et al.</i>	2005-2013	Ireland	Retrospective observational study	282	Neurological evaluation after CPR	Of 84 resuscitated patients, 36 with optimal and 48 with poor brain function 6 months after resuscitation, reduced 2014 brain function in all the patients

Contd...

Table 1: Contd...

References	Author	Year	Country	Type of study	Sample size	Title	Results
[33]	Movahedi <i>et al.</i>	2015	Iran	Descriptive and analytical study	80	24-h survival rate and its determinants in patients with successful cardiopulmonary resuscitation in Ghaem Hospital of Mashhad	In 45 patients (56.2%) return of spontaneous circulation was achieved; the rate of 24-h survival was in 30 patients in whom cardiopulmonary resuscitation was successful
[34]	Alizadeh <i>et al.</i>	2016	Iran	Descriptive and analytic study	891	The evaluation of the resuscitation results and its associated factors	41.1% of resuscitation was successful and 58/9% was unsuccessful; the mean and standard deviation time of resuscitation were 28.80 and 12.6 min
[35]	Mansouri <i>et al.</i>	2017	Iran	Cross-sectional study	211	Evaluation of the performance of CPR team, Shahid Chamran Hospital, Isfahan, Iran, in 2015	Unless time between cardiac arrest and apply of first shock, there was no significant relationship between other criteria and 1-month survival after primary successful CPR ($P=0.010$)

CPR=Cardiopulmonary resuscitation, QOL=Quality of life, ICU=Intensive care unit

The success of initial resuscitation was reported to be much higher than the success of secondary resuscitation (survival until discharge). Moreover, early detection of cardiac arrest, a high-quality CPR, immediate defibrillation, and effective postresuscitation care improved short- and long-term outcomes in these patients and significantly affected their quality of life after CPR.

Based on a review of the literature, 335,000 Americans experience cardiac arrest out of the hospital each year. A similar number of arrests also occur during hospitalization.^[36] In a prospective study in Croatia, 120 cases of cardiac arrest were recorded among 32,861 hospitalized patients. Of these, 96 received CPR and 22% were discharged from the hospital.^[37] The National Institutes of Health in the United States reported the initial success of CPR as 44% and the survival rate until discharge as 17%. This rate is equal to 16% in the United Kingdom.^[22] In Iran, however, the mortality rate after CPR exceeds 90% and the rate of survival until discharge is less than 7%.^[27]

The prevalence of cardiac arrests occurring outside the hospital in adults and treated as a medical emergency is 62 per 100,000 per year and 75%–85% of the cardiac arrests have an initial cardiac cause. There is a significant disparity in the reported rates of out-of-hospital cardiac arrest and its outcomes in different regions. In Europe, the rate of survival until hospital discharge is estimated as 8% in these patients. Evidence suggests increased survival rates mainly due to greater efforts made for performing CPR.^[38] In the United Kingdom, coronary heart disease (CHD) causes sudden death in 21% of men and 12% of women.^[39] In

Iran, 74,555 of all deaths, i. e. 35.89% of all deaths in the country, are caused by CHD.^[27]

Given the small number of patients who survive after CPR, it is essential to address the determinants of survival in these patients, ensure their proper follow-up and care, and attempt to resolve their problems. Patients' survival depends significantly on their conditions before the CPR. It appears that the number of people who survive after CPR and get discharged from the hospital is much less than the presumed rates. Roben *et al.* assessed the quality of life after cardiac and respiratory arrest in hospitals in Australia. Of the 750 beds examined, survival until discharge was reported in only 10 patients (20%). Early detection of cardiac arrest, immediate basic life support, use of semi-automatic defibrillators, and availability of resuscitation devices were reported as some of the measures affecting survival after CPR. Being controlled or monitored before the cardiac arrest, the interval between cardiac arrest and the arrival of the resuscitation team, being hospitalized in the evening shift, and an initial shockable rhythm were the four dependent variables involved in the restoration of spontaneous blood circulation and initial resuscitation.^[40]

Goodarzi *et al.* reported the initial, ultimate, and 6-month success of CPR as 15.3%, 10.6%, and 12.8%, respectively.^[29] An initial shockable rhythm, the timing of the first shock after checking the patient's rhythm, the interval between the cardiac arrest and the arrival of the resuscitation team, being controlled at the time of the cardiac arrest, and persistent monitoring after CPR were some of the main factors involved in the initial success of CPR. According

to the findings of Salari *et al.*, 64% of the cases of CPR were unsuccessful and resulted in death of the patients and 28% were successful in the short term. Only 7.2% of the patients had a long-term survival and were eventually discharged from the hospital. Of these, 2.8% continued to have a functioning brain. They proposed poor quality of post-CPR care as an important link in the chain of survival and reported low CPR survival to be attributed to lack of personnel and equipment for regular care and constant monitoring of post-CPR care.^[28] Compared with other patients, those with cancer have a lower rate of survival after CPR, and the rate of survival in patients with cancer who get CPR in intensive care units (ICUs) is 80% less than the rate in patients with cancer who undergo CPR at general hospital wards.^[31] Furthermore, patients' conditions in the ICU, an initial shockable rhythm, and the length of CPR were reported as variables associated with survival until discharge. Therefore, continuous training and the use of advanced equipment are the main factors involved in patients' survival after CPR. Compared with patients with kidney disease, cancer, hemorrhage, or infection, patients with heart disease seem to have a better prognosis and a longer survival after resuscitation. Other studies have also highlighted a higher rate of hospital discharge in patients with heart disease compared with other patients. In fact, none of the resuscitated patients with cancer, kidney disease, hemorrhage, or infection were discharged from the hospital.^[41]

The results from Kim *et al.*'s study indicate that 6 months after resuscitation in neurological patients, nearly all the surviving patients lacked an optimal brain function.^[32] In a study by de Vos *et al.*, 5 patients went into a vegetative state and 51 others died during the first days after discharge. Most survivors (75%) led nondependent lives and 16% showed symptoms of depression in the tests. The findings indicated that although CPR was considered an unsuccessful measure, when successful, it was associated with a high-quality life in patients below 70 years of age.^[26] These findings contradicted with the results of Kim *et al.* who found better results in cerebral evaluation 1 month after CPR than that performed 6 months after CPR. Nolan reported that despite their possible cognitive and psychological problems, patients discharged from the hospital after cardiac arrest enjoyed a generally good quality of life.^[37]

In a study in Iran, only 2.8% of patients who were discharged from the hospital after resuscitation had optimal brain function.^[28] Nichol *et al.* showed that an increased duration of resuscitation reduced the quality of life. Moreover, patients who were resuscitated in the emergency department or ICU had a better prognosis compared with those who were resuscitated in general departments.^[42] Although some studies rated the quality of life in the survivors of CPR as acceptable or good,^[43] others documented experiences of pain and suffering

to have negative effects on the quality of life in CPR survivors compared with other patients.^[44] Nevertheless, some other studies identified no differences in this regard.^[45] Veronique *et al.* showed that early initiation of rehabilitation interventions improved the patients' quality of life and cognitive and emotional functioning and led to lower anxiety levels compared with the administration of routine hospital care. In the former case, the patients could return to work and social life more quickly. According to this study, an emphasis on the patients' cognitive impairment and the focus of interventions on improving cerebral cognitive function in the early stages of the patients' rehabilitation caused a faster recovery compared with the controls.^[30] Other studies have also confirmed the findings of this study.^[46]

Discussion

Many systematic reviews and meta-analyses have evaluated the quality of life of patients with cancer,^[42] diabetes,^[43] and cardiac diseases^[44] in Iran. The present systematic review aimed to assess post-CPR quality of life of patients.

Overall, the results of this study are cause for concern, as only a small number of patients were discharged from the hospital after resuscitation, and of this small number, even fewer had an optimal quality of life. Although the survival of patients after cardiac arrest has also been low in many other studies, further studies need to be conducted on the outcomes of CPR and the quality of life in patients after this medical intervention. Different factors, including lack of the required facilities in hospitals, poor skills of the medical personnel in emergency departments, lack of interdepartmental coordination, and nonstandard medical emergency centers and relevant units, reduce the survival rate of patients after cardiac arrest. However, a number of measures such as general training on the basics of CPR, reducing the response time of emergency medical centers, better equipment of ambulances, continuing training in advanced CPR for medical personnel, and forming a cohesive group for performing CPR can improve the efficiency of CPR and increase the survival rate of the patients. Although survival is low after CPR, most survivors continue to have a reasonable quality of life if they receive proper treatment and follow-up.^[26] Many patients are left alone to themselves after the initial success of CPR and care providers fail to continue the initial sensitivity they show at the time of CPR. This negligence is one of the major causes of the high mortality rate in patients undergoing CPR. Moreover, many patients do not survive the hospital at all. Concerns about the low quality of life are not enough reason to end the efforts taken for the victims of cardiac arrest.^[30] According to the results of Goodarzi *et al.*, there are no significant differences in the initial success of CPR between different age groups. However, the success rate was found to be lower in the night shift than in the morning and evening

shifts. Moreover, although the risk of death was 1.04 times higher in men than in women, no statistically significant relationships were observed between gender and the initial success rate or between gender and the final outcome of CPR. The authors suggested fair distribution of health personnel between all three shifts, better management plans for improving CPR and its outcomes, and ensuring a more careful follow-up of the patients after CPR as methods to increase the success rate of CPR.^[29]

Most mental disorders, including depression, anxiety, and post-traumatic stress disorder, are highly prevalent in patients recently discharged from ICUs. Such problems may affect their ability to perform daily activities and participate in the community. Psychological problems, cognitive dysfunction, and problems in daily functioning among survivors of CPR are associated with a reduced quality of life.^[47] In a study in Amsterdam, the Netherlands, de Vos *et al.* investigated the characteristics of patients before, during, and after CPR and examined the effects of CPR on patients' quality of life, cognitive function, depression, and dependency 3 months after discharge. From a total of 827 resuscitated patients, 12% survived and were followed up. Of these, 89% participated in the study. Most of the survivors (75%) lived independent lives, 17% were cognitively damaged, and 16% showed symptoms of depression. The researchers found the quality of life to be affected by four factors including the reason for hospital admission, age before resuscitation, a prolonged arrest, and coma after resuscitation. The quality of life was poorer in survivors after resuscitation compared with the control group of older adults but better than the control group of patients experiencing stroke.^[26]

Differences in the types and times of neurological evaluations in previous studies make a concise and specific conclusion impossible. It is generally accepted that long-term evaluations should be postponed by at least 6 months and preferably up to 1 year after a cardiac arrest. Studies on long-term neurological outcomes have generally reported a good outcome in more than 85% of the patients. The general definition of brain function grade II is "disabled but independent" and includes patients with hemiplegia, convulsions, and permanent changes in memory. However, this classification system provides only a raw estimate of neurological outcomes, and studies that use more sensitive tests of memory and cognition have detected mild cognitive impairment in most survivors of cardiac arrest.^[32,37] Further efforts are needed to identify effective strategies that can help improve survival and quality of life after CPR. Despite the advances in treatment processes and medical equipment, the prognosis and outcomes of CPR are still poor in patients with sudden cardiac and respiratory arrest as well as in diabetics or liver failure.^[45-47] Nonetheless, the formation of evaluation committees for CPR can be a helpful step in understanding the reason for this disparity in different centers.

Conclusions

Considering the results of this study showed CPR leads to an increase in the quality of life and survival of patients, developing palliative care and improving the available facilities for both CPR and intensive post-CPR care in hospitals in Iran are necessary steps. As heart disease is a lifelong condition that affects different aspects of a patient's life, the empowerment of these patients and the improvement of their quality of life are essential. Efforts should, therefore, be made to enhance the care and follow-up of patients after CPR. Moreover, a greater emphasis should be placed on this group. To facilitate the better follow-up of the patients, localized evidence-based guidelines need to be developed based on the local medical teams' performance in post-CPR care.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Reynolds JC, Frisch A, Rittenberger JC, Callaway CW. Duration of resuscitation efforts and functional outcome after out-of-hospital cardiac arrest: When should we change to novel therapies? *Circulation* 2013;128:2488-94.
2. Meaney PA, Bobrow BJ, Mancini ME, Christenson J, de Caen AR, Bhanji F, *et al.* Cardiopulmonary resuscitation quality: Improving cardiac resuscitation outcomes both inside and outside the hospital: A consensus statement from the American Heart Association. *Circulation* 2013;128:417-35.
3. Perkins GD, Olasveengen TM, Maconochie I, Soar J, Wyllie J, Greif R, *et al.* European Resuscitation Council guidelines for resuscitation: 2017 update. *Resuscitation* 2018;123:43-50.
4. Hasselqvist-Ax I, Riva G, Herlitz J, Rosenqvist M, Hollenberg J, Nordberg P, *et al.* Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. *New England J Med* 2015;372:2307-15.
5. Morrison LJ, Neumar RW, Zimmerman JL, Link MS, Newby LK, McMullan Jr PW, *et al.* Strategies for improving survival after in-hospital cardiac arrest in the United States: 2013 consensus recommendations: A consensus statement from the American Heart Association. *Circulation* 2013;127:1538-63.
6. Daya MR, Schmicker RH, Zive DM, Rea TD, Nichol G, Buick JE, *et al.* Out-of-hospital cardiac arrest survival improving over time: results from the Resuscitation Outcomes Consortium (ROC). *Resuscitation*. 2015;91:108-15.
7. Rossetti AO, Oddo M, Logroscino G, Kaplan PW. Prognostication after cardiac arrest and hypothermia: A prospective study. *Ann Neurology* 2010;67:301-7.
8. Ramírez J, Orini M, Mincholé A, Monasterio V, Cygankiewicz I, de Luna AB, *et al.* Sudden cardiac death and pump failure death prediction in chronic heart failure by combining ECG and clinical markers in an integrated risk model. *PLoS One* 2017;12:e0186152.
9. ECC Committee, Subcommittees and Task Forces of the

- American Heart Association 2005 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation* 2005;112:IV1-203.
10. Koster RW, Baubin MA, Bossaert LL, Caballero A, Cassan P, Castrén M, *et al.* European resuscitation council guidelines for resuscitation 2010 section 2. Adult basic life support and use of automated external defibrillators. *Resuscitation* 2010;81:1277-92.
 11. Saffari M, Amini N, Pakpour AH, Sanaeinasab H. Assessment the medical sciences students knowledge and skill about basic cardiopulmonary resuscitation (CPR) in accidents and disasters. *Iran J Health Educ Health Promot* 2013;1:41-50.
 12. Noghabi AAA, Zandi M, Mehran A, Alavian SM, Dehkordi AH. The effect of education on quality of life in patients under interferon therapy. *Hepatitis Monthly* 2010;10:218.
 13. Hayakawa M, Gando S, Okamoto H, Asai Y, Uegaki S, Makise H, *et al.* Shortening of cardiopulmonary resuscitation time before the defibrillation worsens the outcome in out-of-hospital VF patients. *Am J Emerg Med* 2009;27:470-4.
 14. Montazar SH, Amooei M, Sheyoei M, Bahari M. Results of CPR and contributing factor in emergency department of sari imam Khomeini hospital, 2011-2013. *J Mazandaran Univ Med Sci* 2014;24:53-8.
 15. Jafarian A. Evaluation of succesful cardiopulmonary resuscitation (CPR) rate in Haftom Teer Hospital. *Razi J Med Sci* 2002;9:327-31.
 16. Shrivastava SR, Shrivastava PS, Ramasamy J. Palliative care: An integral component of human right to health. *Int J Prev Med* 2016;7:15.
 17. Mardani HM, Borimnejad L, Seyedfatemi N, Tahmasebi M. Interpretation of palliative care concept, its barriers and facilitators using meta-synthesis. *Mod Care J* 2014;11:316-29.
 18. Gheshlagh RG, Parizad N, Ghalenoee M, Dalvand S, Baghi V, Najafi F, *et al.* Psychometric features of the persian version of self-efficacy tool for patients with hypertension. *Int Cardiovascular Res J* 2018;12:50-6.
 19. Ahimastos AA, Walker PJ, Askew C, Leicht A, Pappas E, Blombery P, *et al.* Effect of ramipril on walking times and quality of life among patients with peripheral artery disease and intermittent claudication: A randomized controlled trial. *JAMA* 2013;309:453-60.
 20. Goodman H, Firouzi A, Banya W, Lau-Walker M, Cowie MR. Illness perception, self-care behaviour and quality of life of heart failure patients: A longitudinal questionnaire survey. *Int J Nurs Stud* 2013;50:945-53.
 21. Hassanpour-Dehkordi A, Jalali A. Effect of progressive muscle relaxation on the fatigue and quality of life among Iranian aging persons. *Acta Medica Iranica* 2016;54:430-6.
 22. Solati K, Mousavi M, Kheiri S, Hasanpour-Dehkordi A. The effectiveness of mindfulness-based cognitive therapy on psychological symptoms and quality of life in systemic lupus erythematosus patients: A randomized controlled trial. *Oman Med J* 2017;32:378.
 23. Israelsson J, Lilja G, Bremer A, Stevenson-Ågren J, Årestedt K. Post cardiac arrest care and follow-up in Sweden – A national web-survey. *BMC Nurs* 2016;15:1.
 24. Meaney PA, Nadkarni VM, Kern KB, Indik JH, Halperin HR, Berg RA. Rhythms and outcomes of adult in-hospital cardiac arrest. *Crit Care Med* 2010;38:101-8.
 25. Miranda DR. Quality of life after cardiopulmonary resuscitation. *Chest* 1994;106:524-30.
 26. de Vos R, de Haes HC, Koster RW, de Haan RJ. Quality of survival after cardiopulmonary resuscitation. *Arch Intern Med* 1999;159:249-54.
 27. Peters R, Boyde M. Improving survival after in-hospital cardiac arrest: The Australian experience. *Am J Crit Care* 2007;16:240-6.
 28. Salari A, Mohammadnejad E, Vanaki Z, Ahmadi F. Survival rate and outcomes of cardiopulmonary resuscitation. *Iran J Crit Care Nurs* 2010;3:45-9.
 29. Goodarzi A, Jalali A, Almasi A, Naderipour A, Kalhorii RP, Khodadadi A, *et al.* Study of survival rate after cardiopulmonary resuscitation (CPR) in hospitals of Kermanshah in 2013. *Glob J Health Sci* 2014;7:52-8.
 30. Moulart VR, van Heugten CM, Winkens B, Bakx WG, de Krom MC, Gorgels TP, *et al.* Early neurologically-focused follow-up after cardiac arrest improves quality of life at one year: A randomised controlled trial. *Int J Cardiol* 2015;193:8-16.
 31. Sehatzadeh S. Cardiopulmonary resuscitation in patients with terminal illness: An evidence-based analysis. *Ont Health Technol Assess Ser* 2014;14:1-38.
 32. Kim YJ, Ahn S, Sohn CH, Seo DW, Lee YS, Lee JH, *et al.* Long-term neurological outcomes in patients after out-of-hospital cardiac arrest. *Resuscitation* 2016;101:1-5.
 33. Movahedi A, Kavosi A, Behnam H, Mohammadi G, Mehrad Majd H, Malekzadeh J. 24 hour survival rate and its determinants in patients with successful cardiopulmonary resuscitation in Ghaem Hospital of Mashhad. *J Neyshabur Univ Med Sci* 2015;3:56-63.
 34. Alizadeh M, Mousavi Movahed M, Sadredini S, Mostafavi A, Fathi M. The evaluation of the resuscitation results and its associated factors. *Tehran Univ Med J* 2016;74:640-4.
 35. Mansouri M, Masoumi G, Emami SA, Mahmoudi F, Shokrani A. Evaluation of the performance of cardiopulmonary resuscitation (CPR) team, Shahid Chamran Hospital, Isfahan, Iran, in 2015. *J Isfahan Med Schl* 2017;35:406-11.
 36. Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, *et al.* Harmonizing the metabolic syndrome: A joint interim statement of the International Diabetes Federation Task Force on epidemiology and prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the study of obesity. *Circulation* 2009;120:1640-5.
 37. Bellomo R, Goldsmith D, Uchino S, Buckmaster J, Hart GK, Opdam H, *et al.* A prospective before-and-after trial of a medical emergency team. *Med J Aust* 2003;179:283-7.
 38. Atwood C, Eisenberg MS, Herlitz J, Rea TD. Incidence of EMS-treated out-of-hospital cardiac arrest in Europe. *Resuscitation* 2005;67:75-80.
 39. Dolatabadi A, Setayesh A, Zare M, Hosseinejad A, Bozorgi F, Farsi D. Descriptive analysis of contributing factors in outcomes of emergency department CPRs. *Crit Care* 2005;9:302.
 40. Nolan JP, Soar J, Perkins GD. Cardiopulmonary resuscitation. *Bmj* 2012;345:e6122.
 41. Brindley PG, Markland DM, Mayers I, Kutsogiannis DJ. Predictors of survival following in-hospital adult cardiopulmonary resuscitation. *CMAJ* 2002;167:343-8.
 42. Nichol G, Stiell IG, Hebert P, Wells GA, Vandemheen K, Laupacis A, *et al.* What is the quality of life for survivors of cardiac arrest? A prospective study. *Acad Emerg Med* 1999;6:95-102.
 43. Elliott VJ, Rodgers DL, Brett SJ. Systematic review of quality of life and other patient-centred outcomes after cardiac arrest survival. *Resuscitation* 2011;82:247-56.
 44. Graf J, Mühlhoff C, Doig GS, Reinartz S, Bode K, Dujardin R,

- et al.* Health care costs, long-term survival, and quality of life following Intensive Care Unit admission after cardiac arrest. *Crit Care* 2008;12:R92.
45. Smith K, Bernard S. Quality of life after cardiac arrest: How and when to assess outcomes after hospital discharge? *Resuscitation* 2014;85:1127-8.
46. Ratcovich H, Sadjadih G, Andersson HB, Frydland M, Wiberg S, Dridi NP, *et al.* The effect of Ticagrelor administered through a nasogastric tube to COMAtose patients undergoing acute percutaneous coronary intervention: The TICOMA study. *EuroIntervention* 2017;12:1782-8.
47. Moolaert VR, Wachelder EM, Verbunt JA, Wade DT, van Heugten CM. Determinants of quality of life in survivors of cardiac arrest. *J Rehabil Med* 2010;42:553-8.