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Original Article

Effect of home-based continuous care model on the quality of life of patients with myocardial infarction

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ABSTRACT

Background: Myocardial infarction is one of the most common types of cardiac diseases. Considering the necessity of self-care in these patients, continuous care model can be an appropriate framework for sensitizing patients to accept and continue health behaviors. Therefore, this study aimed to determine the effect of home-based continuous care model on the quality of life of patients with myocardial infarction.

Methods: A semi-experimental study was conducted among MI patients who were admitted to the cardiac care units (CCUs) of Ali ibn Abi Talib and Khatamolanbia teaching hospitals in Zahedan, Iran. Sixty patients were selected through the convenience sampling method, and then they were randomly allocated to two groups of intervention and control (n=30 each). The continuous care model was implemented in four stages of orientation, sensitization, control, and evaluation over a course of five 30 to 45-minute group sessions and through phone calls (a total of four phone calls, one per week). On the other hand, subjects of the control groups received the routine care. Data were collected using a demographic characteristics checklist and the Quality of Life after Myocardial Infarction questionnaire (QLMI) designed by McNew. The questionnaire was filled out at the three stages of before and after the sensitization and after the third stage of the continuous model. Data analysis was performed in SPSS, version 20, using independent t-test, Chi-square test, and repeated measures analysis of variance (ANOVA).

Results: We found no significant difference between the intervention and control groups regarding age, marital status, level of education, occupational status, and duration of disease diagnosis. However, the mean scores of emotional aspect (P=0.03), physical aspect (P=0.02), social aspect (P=0.01), and the total score (0.01) of quality of life significantly increased in the intervention group at the end of the sensitization stage. On the other hand, repeated measures ANOVA reflected significant changes in the quality of life score over time (P<0.001). Moreover, a significant difference was noted in the mean total score of quality of life after the sensitization stage based on time and group (P=0.01).

Conclusion: According to our results, the home-based continuous care model could change the quality of life of MI patients. Therefore, to promote the quality of life of MI patients, we recommend incorporating this model as a community-based approach in the health system.

1. Introduction

Myocardial infarction (MI) is a process that usually occurs due to acute obstruction of a coronary artery, and a sudden blockage of circulation and oxygen to the heart muscle. This condition is the outset of many cardiac defects that can cause readmission a long time after patient discharge.[1] Generally, MI is one of the most common cardiovascular diseases worldwide. In the United States, about one and a half million people develop acute MI each year, which is equivalent to one person every 20 seconds. The mortality rate of this disease is about 30%; nearly half of the deaths caused by acute MI occur in the first hour, and generally, when the patient has not yet reached a hospital.[2]

According to the global statistics, 6.7 million annual deaths are associated with coronary artery disease,[3] accounting for 26% and 16% of premature deaths in males and females, respectively.[4] Various factors are associated with the incidence of MI, including dyslipidemia, diabetes, hypertension, familial history, age, gender, and obesity.[5] Given the higher possibility of occurrence at an age when the individual has maximum social and individual activities, complications of this condition put patients under tremendous mental and social pressure, leading to their disability and lack of capability to work and perform daily activities, which in turn, incur great costs for societies.[6]

This disease is associated with many problems in patients, such as pain, changes in tissue circulation, activity intolerance, ineffective adaptation to the disease, severe psychosocial symptoms, loss of occupational safety, reduced activity and social communication, and dysfunctional interpersonal relationships and family roles, which essentially reduce the quality of life in these individuals.[7] Any type of chronic disease can affect the quality of life. In a research, Elis et al. (2010) stated that chronic diseases undermine physical, mental, social and economic aspects of quality of life due to their severity and long duration.[8]

In another study, Malderan et al. (2013) demonstrated that improving lifestyle and paying attention to the quality of life greatly increased the efficiency and independence of patients and enhanced effects of treatment.[9] Promotion of self-care behaviors can help patients control their own lives and adapt to complications of their disease, which will enhance the quality of life in these individuals.[10] MI-related self-care behaviors include compliance with the medication regimen prescribed by the treating physician, following a healthy lifestyle, having a healthy diet and adequate physical activity based on physician advice, controlling cardiovascular risk factors (e.g., hypertension, smoking, and stress), referring to a physician in case of disease complications, and performing timely testing.[11]

Various methods have been adopted to improve the quality of life in MI patients, including face-to-face educational interventions,[12] individual [13] and group [14] counseling sessions, rehabilitation and home-based care,[15] education using teach-back method,[16] and family-oriented empowering model,[17] which have had various effects on the quality of life of patients due to their specific features.

In this regard, the continuous care model, which was designed by Ahmadi for coronary artery disease patients,[18] has been applied by various studies.[19-21] However, this model has never been used to evaluate the quality of life of patients with MI. The mentioned model encompasses four stages of orientation, sensitization, control, and evaluation. In this model, the patient is recognized as a sustained and effective care agent in their own health process, continuous and permanent care is a regular process for effective communication, and the nurse is introduced as a provider of healthcare services who recognizes patients' needs and problems, sensitizes patients to continuously adopt health behaviors, and helps them improve their health.[22]

The main applications of the continuous care model include recognizing patients and their nature, understanding the potential and actual disease complications, encouraging acceptance of patients, promoting the self-care role, in other words, favorable health behaviors, engaging families, changing lifestyle, and identifying healthcare teams and social support systems.[18] Today, duration of patient hospitalization has decreased due to the advancement of diagnostic and treatment techniques. Patients are often discharged very sooner than expected with complicated medical regimens. Transfer to home after a cardiac arrest can be a stressful event for patients since patients receive insufficient knowledge about disease management during their short hospitalization period.[23]

In such conditions, one of the most common needs of patients is acquiring knowledge about their problem. They need to have sufficient information, which can be easily provided to them in a systematic manner. In general, lack of understanding of therapeutic recommendations might lead to incompliance. Patient education is one of the essential components of patient care in hospitals and communities since patients tend to gradually forget care principles after discharge despite receiving training at hospital.[24]

In-home patient education and follow-up is one of the suitable strategies for patients with chronic diseases since these services can provide more time and opportunity for education. On the other hand, it seems that education and follow-up of patients at home provides a situation where patients can more freely express their problems and needs and receive proper solutions after surviving the crises of the acute stage of the disease. Moreover, educating patients at home leads to face-to-face transfer of information from nurses providing an opportunity for patients to talk about their problems and needs in a safe environment.[25]

Despite the emphasis on in-home care and education in the health system's development plan, limited attention has been focused on the effect of in-home continuous care model. It should be noted that mere attention to prolonging the longevity of MI patients disregarding their quality of life and ability to adapt to the disease implies lack of attention to the welfare of these individuals. With this background in mind, this study aimed to determine the effect of in-home continuous care model on the quality of life of MI patients admitted to the teaching hospitals affiliated to Zahedan University of Medical Sciences, Zahedan, Iran, in 2017.

2. Methods

2.1. Design

A semi-experimental was conducted among patients with MI, who were admitted to the cardiac care units (CCUs) of Ali ibn Abi Talib and Khatamolanbia hospitals, Zahedan, Iran, in 2017.

2.2. Participants and settings

The sample size was estimated at 28 cases per group using the results obtained by Najafi et al. [12] at the confidence level of 95% and test power of 90%. However, 60 individuals were selected considering the possibility of sample attrition.

$$\frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\bar{X}_1 - \bar{X}_2)^2}$$

$Z_{1-\alpha/2}=1.96$, $\bar{X}_1=15.08$, $S_1=66.58$, $Z_{1-\beta}=1.28$, $S_2=9.63$, $\bar{X}_2=75.51$

2.3. Instruments

The subjects were selected by using the convenience sampling method and were randomly allocated to the intervention and control groups using the lottery method. The inclusion criteria were age 40-60 years, definitive diagnosis of MI in medical records, access at follow-up, literacy, lack of communication problems, no other underlying diseases (e.g., diabetes, hypertension, or hyperglycemia), and lack of participation in any other educational courses. On the other hand, the exclusion criteria were cardiac failure, acute diseases or the necessity of hospitalization, lack of participation in any of the educational sessions, and history of open heart surgery.

Data were collected by using a demographic characteristics checklist, which contained items on gender, level of education, family history of the disease, and occupation, and MacNew Heart Disease Health-related Quality of Life questionnaire to evaluate the quality of life in MI patients. This 27-item questionnaire has three mental (14 items), physical (12 items), and social (13 items) subscales, with some repetitive items in some of the subscales. The questionnaire is scored based on a seven-point Likert scale, and the response of participants determines their position on a scale ranging from "always" to "never". The score ranges of the emotional, physical, and social dimensions of questionnaire are 14-98, 12-84, and 13-91, respectively. The minimum and maximum total scores of this questionnaire are 27 and 189, respectively.

In this questionnaire, higher scores are indicative of better quality of life. The reliability of the tool was confirmed by Huffer and Bagheri at 0.73 [26] and 0.92,[14] respectively. Moreover, the tool was customized by Asadi Lari in 2003 among patients with MI, where the internal consistency of the mental, emotional, and physical subscales was confirmed at Cronbach's alpha of 0.92. Further, the social subscale and total scale were found reliable at Cronbach's alpha coefficients of 0.94 and 0.95, respectively.[27] In the present study, test-retest reliability of the questionnaire was established over a period of 10 days (0.74).

2.4. Data Collection

After receiving written approval from the CCU, the researcher presented to this unit for sampling. Prior to the implementation of the continuous care model, written informed consents were obtained from the patients.22 The intervention was performed during eight weeks, the quality of life questionnaire was filled out by both groups at three stages after the first step, as well as at the end of the fourth (after the second step) and eighth (after the third step) weeks.

The first step was orientation, which was implemented in the form of one 30-45-minute session in the presence of patients and their families in the hospital. While the meeting was held for both groups, they were different in terms of time, type of expectations, agenda since the main goal of this stage was to motivate the subjects in the control group to cooperate and complete the required data.

In addition to orientation and patient encouragement, the first session involved recommendations on the necessity of continuing and lack of termination of the treatment relationship (if possible) until the determined time, recognition of expectations of the patients and families, and agreement on a time for in-person visits and phone calls and how to communicate. Finally, a telephone number was given to the patients and their companions for future follow-ups. Following that, the first round of data collection was performed in both groups.

The second stage was sensitization performed after patient discharge. At this stage, four 30-45-minute sessions of care-related counseling were held (one session per week) in the patients' home by the researcher to sensitize and involve the patients and their families.

The issues discussed at this stage included self-care, knowledge about the disease (disease treatment, risk factors, and their control methods), stent care, teaching the proper dietary intake (the type of oil, salt intake limit, and weight control), drug regimen (importance of use of drugs and adjustment of consumption time), and teaching physical activities and their necessity (including number of times and duration and benefits of walking and going up the stairs). Moreover, an educational booklet was given to the patients to ensure sustained and accurate implementation of the program.

Overall, the first and second stages lasted a month and were followed by the second round of data collection (at the end of the fourth week and after pretest). At this stage, the participants filled out the questionnaire. To do so, the subjects were contacted and asked to refer to their respective hospitals. In case they were not able to present to the hospital, the questionnaire was sent to the patients' home.

The third stage (control) was conducted during four weeks (one telephone call per week) to encourage sustaining health behaviors and provide counseling in alignment with the patients' problems and needs. Encouraging patients to continue the program, guiding patients, and referring them to relevant specialists (if needed) were the main measures taken during the follow-up of patients at home. In addition, a phone number was provided for patients and their families to contact in case of any problems or questions and receive the necessary guidance. At the end of this stage (eighth week), the quality of life questionnaire was completed again by the two groups (Diagram 1).

At the fourth stage (evaluation), the care process and level of change in all the stages of continued care were evaluated by the researcher. To this end, the researcher assessed and monitored the patients' behaviors and the effect of the provided educations after the implementation of the sensitization process in order to detect the barriers or facilitators of problems or factors involved in the emergence of problems. In alignment with the ethical considerations, the educational booklets were distributed among the subjects of the control groups at the end of the evaluation stage.

2.5. Ethical considerations

After receiving written approval from the CCU, the researcher presented to this unit for sampling. Prior to the implementation of the continuous care model, written informed consents were obtained from the patients.

2.6. Statistical analysis

Data analysis was performed in SPSS, version 22, using descriptive and analytical statistics. Chi-square test was run to compare the demographic characteristics between the groups. Repeated measures ANOVA was performed for comparison of mean scores of quality of life pre- and post-intervention. Finally, Shapiro-Wilk test was carried out to confirm the normality of the data. P-value less than 0.05 was considered statistically significant.

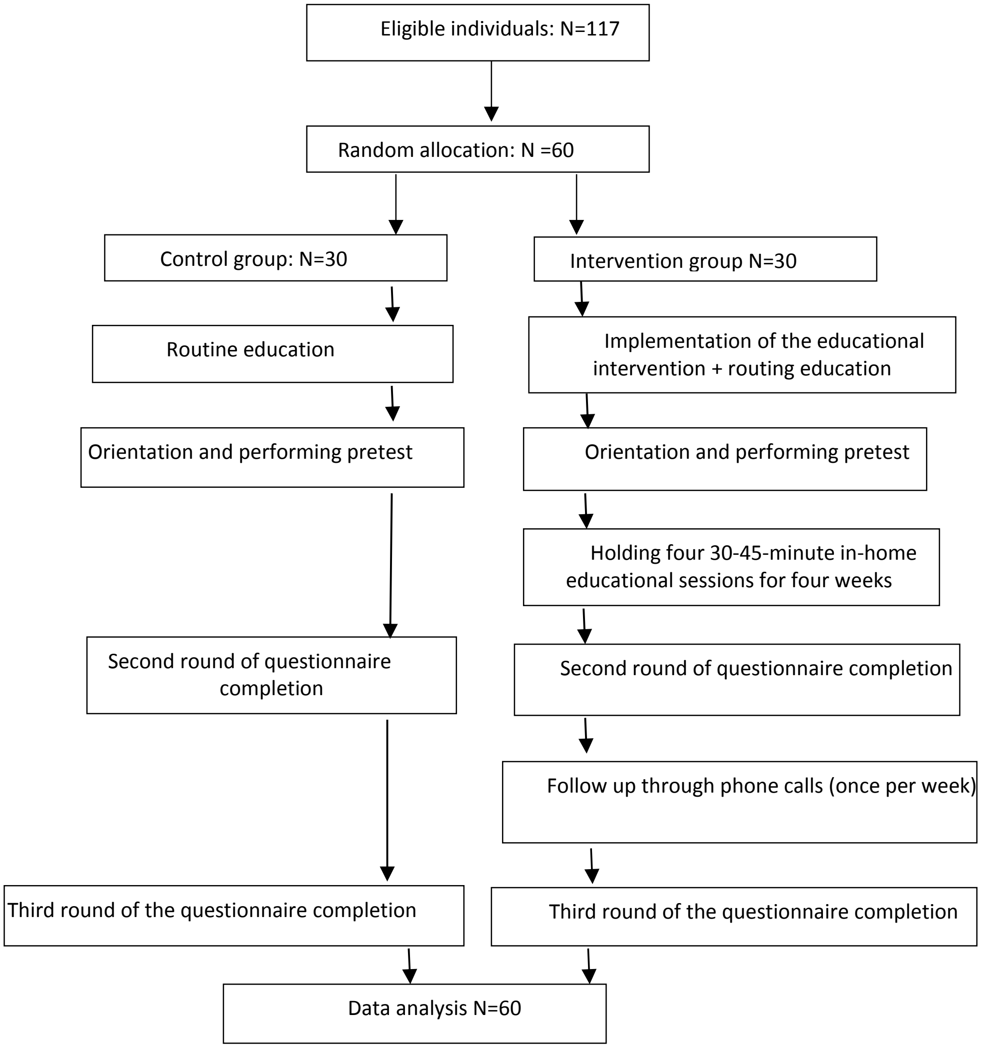

Diagram 1. Implementation stages

3. Results

Demographic characteristics are shown in Table 1. According to this table, no significant difference was observed between the intervention and control groups in terms of these variables. Before the intervention, the mean scores of different aspects of quality of life did not differ significantly between the two groups. In the second round of data collection, the mean scores of the emotional subscale were 57.53±8.24 and 52.63±9.67 in the intervention and control groups, respectively. Independent t-test demonstrated a significant difference in this regard (P=0.03).

Although the mean score of this subscale was higher in the intervention group in the third round of evaluation, compared to the control group, results of independent t-test indicated no significant difference between the groups in this respect (P=0.11). Comparison of the mean scores of the physical subscale in MI patients demonstrated that this score was higher in the control group (57.26±11.44) in the second stage of assessment, compared to the intervention group (46.60±12.74), and the test indicated a significant difference in this regard (P=0.01). However, in the third round of assessment, the mean score of the intervention group was significantly higher, compared to the control group (P=0.01).

In terms of the social subscale, the mean scores of the intervention and control groups one month after the intervention were 61±12.14 and 53.56±11.44, respectively, indicating a significant difference (P=0.01). At the third stage, while the mean score of this subscale was higher in the intervention group compared to the control group, no significant difference was reflected by the independent t-test (P=0.30).

In addition, comparison of the total scores of quality of life between the intervention and control groups one month after the implementation of the intervention demonstrated a significant difference (P=0.01). Even though the mean score of quality of life was higher in the intervention group two months after the intervention compared to the control group, this difference was not statistically significant (P=0.06; Table 2).

Repeated measures ANOVA revealed that changes in the quality of life scores were not similar in the two groups and that these changes were more pronounced in the intervention group, relative to the control group. Given the significant interaction between time and group (P=0.03), repeated measures ANOVA was performed one more time based on the two variables of time and group. Results were indicative of a significant difference between the mean scores of the second and third stages of the intervention and those of pretest (P<0.001).

Although in the intervention group the score of quality of life reduced in the third round of assessment, compared to the second stage, this difference was not statistically significant (P=0.25). In the control group, changes in the score of quality of life were not statistically significant at the three stages. It should be noted that comparison of the total score of quality of life between the groups at the end of the sensitization stage demonstrated a significant difference (P=0.01). At the third stage of measurement, the mean score of the intervention group was significantly higher, compared to the control group (P=0.06; Diagram 2).

Table 1. Demographic characteristics of myocardial infarction patients admitted to the cardiac care units of teaching hospitals of Ali ibn Abi Talib and Khatamolanbia of Zahedan in the intervention and control groups in 2017

		Intervention	**Control**	**Total**	**P**
Variable		**Frequency (%)**	**Frequency (%)**	**Frequency (%)**	
Gender	Female	18(60)	16(53.3)	34(56.7)	*0.79
	Male	12(40)	14(46.7)	26(43.3)	
Level of education	Elementary	11(36.7)	14(46.7)	25(41.65)	*0.2
	Junior high school	9(30)	9(30)	18(30)	
	Diploma	6(20)	6(20)	12(20)	
	BSc and higher	4(13.3)	1(3.3)	5(8.4)	
Family history of the disease	Yes	17(56.6)	17(56.6)	34(56.7)	*0.59
	No	13(43.3)	14(43.3)	26(43.3)	
Occupational status	Employee	6(20)	3(10)	9(15)	*0.48
	Self-employed	4(13.3)	8(26.7)	12(20)	
	Unemployed	6(20)	5(16.7)	11(18.3)	
	Housewife	14(30)	14(46.71)	28(46.7)	

* Chi-square

Table 2. Comparison of mean scores before, at the end of the sensitization stage, and at the end of the control stage in myocardial infarction patients admitted to cardiac care units of teaching hospitals of Ali ibn Abi Talib and Khatamolanbia hospitals in Zahedan in 2017 in the intervention and control group

		Variable	**Control**	
Variable	**Stage**	**Mean±SD**	**Mean±SD**	**P**
Emotional	Before intervention	50.73±10.47	52.23±8.02	0.53
	End of sensitization stage	57.53±10.47	52.63±9.67	0.03
	End of control stage	55.16±5.42	52.58±6.89	0.11
Physical	Pre-intervention	48.90±13.67	53.73±11.20	014
	End of sensitization stage	46.60±12.74	57.26±11.44	*0.02
	End of control stage	61.06±7.10	56.03±8.68	*0.01
Social	Before intervention	46.83±13.22	51.30±10.31	*0.15
	End of sensitization stage	61±12.14	53.56±11.44	*0.01
	End of control stage	57.30±7.98	55.03±8.78	*0.30
Total quality of life	Before intervention	146.46±35.28	157.26±28.38	*0.19
	End of the sensitization stage	183.13±31.87	163.46±30.20	*0.01
	End of the control stage	173.53±18.46	163.27±22.88	*0.06

* Independent t-test

Table 3. Results of repeated measures ANOVA about mean score of quality of life of patients with myocardial infarction admitted to the cardiac care units of teaching hospitals of Ali ibn Abi Talib and Khatamolanbia hospitals in Zahedan in 2017

Variable	**Sum of squares**	**Degree of freedom**	**Mean squares**	**F**	**Level of significance**	**Amount of impact**	**Test power**
Time	4785232.99	1	4785232.99	4244.81	<0.001	0.98	1
Group	1884.70	1	1884.70	1.672	0.2	0.028	0.24
Time*group	3134.34	1	3134.34	4.75	0.03	0.017	1
Error	64256.88	57	1127.31				

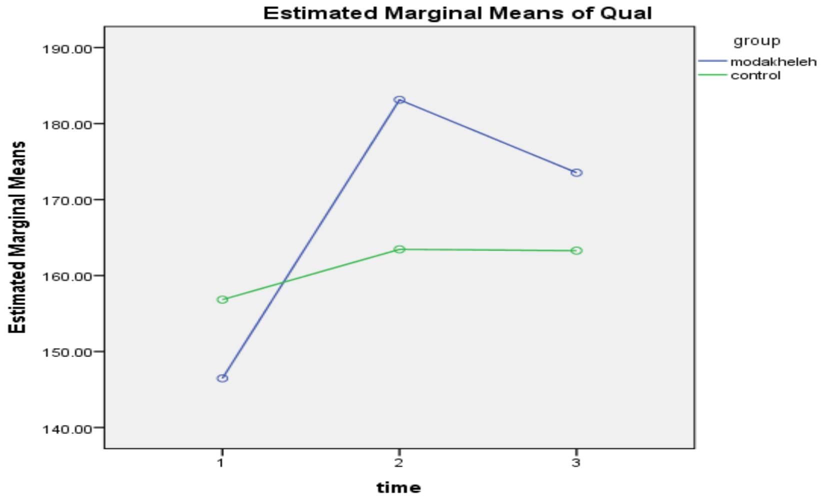

Diagram 2. Comparison of mean scores of quality of life of patients with myocardial infarction admitted to the cardiac care units in the intervention and control groups based on time in 2017

4. Discussion

According to the results of the present study, the implementation of home-based continuous care program significantly increased quality of life and its emotional, physical, and social aspects among the MI patients. This finding was supported by similar studies. Haghdoust and Sharmeh,[28, 29] Jokar [25], Daei[30], and Alavi Zerang [31] evaluated the effect of continuous care model on the quality of life of patients after coronary artery bypass graft (CABG), patients with chronic obstructive pulmonary disease, patients undergoing angioplasty surgery, and patients with heart failure, respectively, all of whom demonstrated the positive impact of the program on patients' quality of life.

Zareh Shoraki et al. (2017) reported an increase in quality of life score of cardiac patients after three months of care and four follow-up sessions.[32] Further, Iavazzo et al. (2011) reported that the remote follow up of cardiac patients increased their quality of life. Similar to the present study, there were improvements in the physical and social aspects of subjects' quality of life in the mentioned study.[33] In a meta-analysis, Knox et al. (2017) introduced remote patient management as an effective solution to improve the quality of life of patients diagnosed with cardiac failure.[34]

In a research by Furuya and Mata (2013), telephone follow-up led to positive statistical changes in the level of dependent variables to the quality of life, including physical and mental performance, self-care and blood lipid level.[35] However, results obtained by Tofighian et al.[36] and Khankeh et al.[37] revealed that individual counseling and the continuous care model had no significant impact on the quality of life of patients. This discrepancy might be due to different intervention methods.

In this study, no significant changes were observed in the quality of life and its dimensions in the subjects of the control group at the three assessment stages. After hospital discharge, patients will gradually forget the trained medical recommendations, and inappropriate healthcare behaviors increase in case of lack of in-home follow-up.[38] Since the principles of this model are based on focus on all factors affecting disease control, patient's sensitization, and family involvement in follow-up and education, this research was able to show a favorable effect on the quality of life of patients as the most significant indicator of disease control.

In terms of the dimensions of quality of life, there was an increase in mean scores of physical, emotional, and social aspects at the end of the intervention, which was higher than the control group. In this regard, our findings are in congruence with the results obtained by Baghaei et al. (2015) and Yekeh Falah et al.[39, 40] In the mentioned research, implementation of the continuous care program increased the mean scores of physical, mental, and social aspects of quality of life in patients with cardiac failure. Results of other studies on other groups of patients, such as multiple sclerosis patients,[41, 42] dialysis patients,[43, 44] and pregnant women,[45] demonstrated that application of this model had a positive impact on the quality of life of patients in aspects of social performance, emotions, mental health, and stress and anxiety. Although there was a difference between the target population of the present research and those of recent studies, results were similar and indicative of the positive effect of the continuous care model on the quality of life of patients.

Studies performed in other countries have also reported the effect of home-based continuous care on the quality of life. In this regard, Wenrowang et al. (2012) and Dalleck et al. (2011) marked that the implementation of home-based rehabilitation program resulted in positive changes in the risk factors for the disease (e.g., hypertension, triglyceride, and cholesterol), leading to improved quality of life in physical and mental aspects of intervention groups.[46, 47] In a systematic review, Hasnain et al. (2010) compared the effect of home-based rehabilitation with rehabilitation in a cardiac rehabilitation center, showing that both methods had an equal level of impact on the improvement of clinical condition and health-related quality of life of patients with MI.[48]

In a research by Smith et al., no significant difference was observed between study groups in the domains of physical performance, general health, social function, and limitation of physical role after the implementation of a rehabilitation program.[49] On the other hand, Lourenco et al. believed that mere execution of an interventional strategy had no effect on increasing the health-related quality of life of patients, and there was a need for on-going educational programs to obtain favorable results.[50]

In the present study, while the mean scores of the social and emotional dimensions of quality of life were higher the intervention group at the end of the care program, compared to the control group, this difference was not statistically significant, which is consistent with the results obtained by Stromberg et al., who designed a computer-based educational intervention.[51] However, our findings are not in line with the results obtained by Khayam Nekooei et al., who reported increased scores of quality of life in all aspects in their test group.[38]

Since the quality of life of MI patients decreases after discharge and the received recommendations are forgotten over time, regular implementation of a modern home-based care program can be beneficial. Today, change in the healthcare system has led to receiving more in-home professional care services after hospital discharge. The in-home care provided by nurses can prevent and reduce readmissions and decrease hospital-related costs.[20] The lack of consistency among some study results could be attributed to the use of diverse quality of life assessment tools, populations, and intervention methods.

One of the advantages of the present study was the evaluation of changes in the quality of life at three stages and the use of a community-based approach in the implementation of the patient care program since continuous care as an accessible intervention was approved by the patients and could be implemented in the real-life situations. On the other hand, this model highlights the community-based role of nurses. It seems that application of this strategic method in the healthcare system can boost the provision of health services to the society. Therefore, it is suggested that the home-based continuous care model be considered as an easily-implemented intervention with positive effects on the treatment process of cardiac patients.

Some of the limitations of the current study include uncontrollable variables, including prior knowledge and experience of the patients, attitude of the patients toward the model and its details, and emotional and mental states and cultural backgrounds of the patients and their families, which affected their learning performance, interests, and motivations, in a way that the researcher faced some difficulties in a few cases.

5. Conclusion

According to the results of the current research, home-based continuous care program increased the quality of life in MI patients. In addition, research was indicative of the effective role of nurses in providing in-home care services, lack of which is currently noticeable. Therefore, it is suggested to incorporate this model as a community-based approach in the health system to improve the quality of life of MI patients.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

Fatieh Kerman Saravi: design, participation in data analysis and final confirmation of article, Ali Navidian: cooperation in the design and analysis of data, Ebrahim Ebrahimi Tabas: cooperation in project design, participation in writing the article, Sekineh Ghaderi: cooperation in project design, data collection, and preparation of the first draft, Mehdi Zirak: participation in data analysis and writing the article.

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