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Research Article

Continuous Care Model and the Self-Management in Post-Myocardial Infarction Patients: A Randomized Controlled Trial

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Abstract

Background: Self-management after myocardial infarction is fundamental to effective medical treatment.
Objectives: The current study aimed to investigate the effects of applying the continuous care model on self-management of a sample of Iranian patients with post-myocardial infarction.
Methods: Sixty hospitalized patients were randomly allocated into control (n = 30) and intervention (n = 30) groups. Before the intervention and at the end of it, self-management of both groups was evaluated by chronic disease self-management questionnaire. The continuous care model was performed for the intervention group for three months. The data were analyzed by SPSS version 16. In addition to descriptive statistical tests, Chi-square, the exact Fisher, Willcoxon and Mann-Whitney, and analysis of covariance (ANCOVA) tests were used. The significant level was set at $P < 0.05$.
Results: There was no significant difference between the two groups in terms of sub-dimensions of self-management scores before the intervention ($P > 0.05$). At the end of the intervention, in all self-management sub-dimensions expect for shortness of breath, the status of intervention group improved significantly more than that of the control group ($P < 0.005$). Moreover, mean of changes in all sub-dimensions of self-management showed no significant difference, but fatigue and health care utilization between the two groups had significant difference.
Conclusions: The continuous care model can be considered as a useful tool to improve patients' self-management after myocardial infarction.

Keywords: Myocardial Infarction, Nursing Models, Self-Management

1. Background

With an estimated 17.5 million deaths annually, cardiovascular diseases (CVDs) are considered as the main cause of death and disability worldwide (1). Of these, myocardial infarction (MI), as the life-threatening manifestation of ischemic heart disease (IHD), is a necrosis of myocardial tissue due to reduced blood supply to the heart muscle (2). In a study using national registry data, Ahmadi et al. (3) reported that in Iran, the rates for crude MI incidence and age-standardized MI incidence were 64.9 and 73.3 per 100,000 respectively.

MI can lead to some degrees of heart failure or potentially fatal cardiac arrhythmias, both during the acute phase and in the months and years following the event (4). Furthermore, patients with MI often experience fatigue, impairments in physical activity (5), depression (6), and sexual dysfunction (7) as long effects of having MI. All of these symptoms can result in a low quality of life. Research suggests that to experience fewer symptoms and ensure effective medical treatment after MI, adherence to self-care and lifestyle modification are necessary (8). Nevertheless, a considerable number of patients do not reach treatment goals because it is difficult to change health behaviors, a fact which relies on specific self-management skills (9).

Generally, post-MI patients have to live with long-term conditions. These conditions and symptoms cannot be cured currently but can be managed through medication, therapy and lifestyle modification.

Today, care system has changed its focus from disease treatment to improving patients' self-management skills to control chronic conditions (10). As a fundamental part of chronic care, self-management is defined as an individual's ability to manage symptoms, treatments, lifestyle changes, control physical, mental and psychological problems, and have a desirable life along with a chronic problem. Patients with improved self-management abilities can properly monitor problems related to their disease every day, try to find solutions and discuss them with healthcare providers (9, 11).

Nurses can play an effective role to improve self-management skills of patients with diseases that have life-long effects. Application of a reasonably selected nursing model may be useful to improve patients' self-management skills.

In Iran, the continuous care model (CCM), developed by Ahmadi (12), focuses on the effective, interactive, and balanced roles of the nurse, the patient, and the patient's family. The main purpose of the CCM is to design a program that can effectively influence patients' attitude toward the disease, increase acceptance of treatment, and lead to proper performance for continuous care. This program is expected to be beneficial to control the disease and its potential complications (13-15).

A review of literature showed that the application of this model resulted in decreased hospital readmission rate, decreased blood lipid concentrations, increased adherence to diet regimen, and quality of life in patients with coronary artery disease (16). Furthermore, the model improved the quality of life of various patients including kidney transplant recipients (17), patients with coronary artery bypass graft surgery (18) and patients diabetes (19). The application of this model is associated with reducing cardiovascular risk factors and improving lifestyle among patients with MI (13).

Since the CCM helps to establish and maintain a continuous and dynamic care relationship between the nurse and the patient, it is expected to improve post-MI patients' self-management practices.

2. Objectives

The current study aimed to investigate the effects of applying the CCM on post-MI patients' self-management.

3. Methods

The participants in this randomized controlled trial included post-MI patients admitted to the coronary care unit (CCU) of Vali-Asr hospital affiliated to Birjand University of Medical Sciences (BUMS), Iran, in 2014.

3.1. Participants

With due consideration of similar studies (20) (α = 0.05, β = 0.1, M1 = 3.35, M2 = 4.06, S1 = 0.76, S2 = 0.44), the sample size of 70 (35 participants for the intervention group and 35 for the control group) was planned to accommodate an attrition rate of up to 15%.

A convenience sampling method was used. Accordingly, a list was prepared including the patients admitted for the first MI to the coronary care unit (CCU) of Vali-Asr hospital affiliated to BUMS. This hospital is the main and referral hospital for cardiac cases in Southern Khorasan province. There are more than 297 active beds and 15 different wards in this state hospital. Patients admitted to this hospital during the past 3 - 6 months were examined. Then, patients who met the inclusion criteria were contacted. Inclusion criteria were as follows: 1) Age below 75 years, 2) A minimum literacy level of primary school, 3) Access to telephone, 4) MI for the first time with no previous history of cardiovascular surgery or percutaneous coronary intervention, 5) Lack of mobility-limiting conditions, sustained arrhythmias or a disease inhibiting self-care. Exclusion criteria consisted of individuals with an occurrence of any condition contradictory to the inclusion criteria (for example, undergoing a cardiovascular surgery during the period of the study). If the patients themselves or their close relatives were employed in healthcare organizations, they were excluded.

It is noteworthy that out of the selected 70 persons, two patients from the intervention group attended only two sessions of education, and three did not refer to the research site to complete questionnaires. In addition, five patients in the control group did not complete questionnaires at the end of the study. Therefore, data belonging to these patients were excluded, leaving 60 individuals (n = 30 in each group) for final analysis.

3.2. Measurements

Demographic data were collected through a demographic form and patient's self-management was measured by chronic disease self-management scale (CDSMS) developed by Lorig et al. CDSMS is composed of six dimensions: general health, symptoms, physical activities, confidence in physical activities, daily activities and medical care (21).

The general health dimension consisted of one item on a 5-point Likert scale with a score ranging from 1 - 5 (1 = excellent, 5 = poor).

The symptoms dimension included the sub-dimension of health distress and three numerical analogue scales for various feelings including fatigue, shortness of breath and pain. Health distress included four items on a 6-point Likert scale with a score range of 0 - 5 from 0 = never to 5 = always (with minimum score of zero and maximum score of 20). On the three numerical analogue scales, participants obtained a minimum score of 0 and a maximum of 10.

The physical activities dimension included six items on a 5-point Likert scale (from 0 = never to 4 = more than three times a week). The minimum score obtained by respondents in this dimension was zero, while the maximum score was 24.

The dimension of confidence in physical activities included six items concerning management of chronic conditions on a 10-point Likert scale with a score range of 1 = "I'm not sure at all" to 10 = "I'm completely sure". The score in this dimension ranged from 0 to 60.

The daily activities dimension had four items concerning social activities limitations on a 5-point Likert scale from 0 = very little to 4 = very much (with minimum score of zero and maximum score of 16).

The medical care dimension consisted of two sub-dimensions: communication with physicians and health care utilization. Communication with physicians had three items which evaluated the patient's interactional relationship with the physician during treatment on a 6-point Likert scale from 0 = never to 5 = always (with minimum score of zero and maximum score of 15). Health care utilization had four items which assessed the number of times a patient used health care organizations such as hospitals. Higher scores indicated greater number of health care utilization by participants.

Given the wording of the statements in the sub-dimensions, only in physical activity, confidence, and sub-dimensions of communications with physicians, a higher score indicated higher self-management ability. For the rest of the sub-dimensions of the applied scale, a lower score suggested a better self-management condition.

In the current study, the scale was first translated into Persian and then back-translated into English by two proficient translators. The scale back-translated into English was compared with the original scale in terms of content. Afterwards, the content validity of the Persian version of the scale was verified by 10 nursing and midwifery faculty members in a nursing and midwifery college in Iran.

The reliability of the CDSMS was determined by calculating Cronbach's alpha. Satisfactory Cronbach's alpha values were found for all CDSMS dimensions (ranging from 0.79 to 0.89).

3.3. Intervention

Upon introduction of the study and statement of the purposes, the patients provided informed consents and completed the demographics form and CDSMS in both groups. Then, the CCM was presented to the participants in the intervention group for three months, while the participants in the control group received the routine treatment.

The CCM consists of four stages: (1) orientation, (2) sensitization, (3) control and (4) evaluation (14, 15, 17, 18).

During the orientation stage, a 30-minute session was held in which the patient, the researcher, and a family member of the patient involved in caring were familiarized with each other. Also, mutual expectations and the continuation of the care relationship were clarified. Creating motivation in clients regarding the requirements of continuous care was one of the essential aims at this stage.

At the sensitization stage, the purpose was to involve the patient and his/her family in caring for continuous care behaviors to emerge; this stage was concurrent with the orientation stage. The major activity performed for the patients included participation of the patient and his/her family member in counseling and group discussion sessions. During these sessions, the emerged problems and needs of the patients were recognized. Patients and their family members were then sensitized about the problems and were motivated to apply the solutions offered to them. To hold the sessions, patients in the intervention group were divided into three 9-member sub-groups and one 8-member sub-group. The sessions were held twice a week and started by presentation of materials by the researcher using slides and lecture and proceeded by group discussion around the presented materials, discovering the patients' problems and needs, and giving counselling on these problems. Topics discussed in the sessions are presented in Table 1. At the end of each session, an educational pamphlet was given to the patients, and they were asked to answer a set of questions about topics presented in the previous sessions. The content of the educational sessions and pamphlets were previously confirmed by two cardiologists. The orientation and sensitization stages were performed during the first three weeks of the CCM application.

In the control stage, the continuation of care was checked. At this stage, the counseling sessions on continuous care were assured by phone calls considering the patients' care needs. Furthermore, checklists completed by the participants were assessed with the aim to recognize new caring problems. Generally, nine weeks were allocated to the control stage. In case the patient had a problem which was not in the scope of the researchers' expertise, she/he was referred to a specialist of the related problem.

Finally, although the evaluation is mentioned as the fourth stage in the CCM, it was carried out all through the model stages. This stage principally aimed to evaluate the quality of process of care and judge the self-management behaviors of participants. Comparison of the completed forms by participants was a useful tool to evaluate the quality of continuous care in the study.

At the end of the 12th week, CDSMSs were completed under similar circumstances but at different times by the groups.

3.4. Ethical Considerations

The current study proposal was approved by research and ethical committees of BUMS (ethical code: 1393-04-01).

Table 1. Stages of Applying the CCM on Patients With MI

Stages of The CCM	Stages		
Orientation			Introduction of the patient, the researcher and a family member of the patient to each other; elaboration on limitations and expectations; description of stages and benefits of involvement in the CCM
Sensitization	1st week	Session 1	Pathophysiology, symptoms and risk factors of MI
		Session 2	Diagnosis and complications of MI, importance of common prescribed drugs, drugs storage
	2nd week	Session 3	Physical activity
		Session 4	Nutritional regiment, importance of regular visiting of the physician
	3rd week	Session 5	Control of modifiable risk-factors such as weight, blood pressure and smoking
		Session 6	Stress, depression and sexual affairs
Control	Examination of checklists	Contact via phone 1	15 days after intervention
		Contact via phone 2	30 days after intervention
		Contact via phone 3	45 days after intervention
Evaluation	All stages of the model		

Abbreviations: CCM, continuous care model; MI, myocardial infarction.

The patients were verbally provided with the details of the study. In addition, a written consent was obtained from them. The patients were informed that they could withdraw from the study at any time they wished. At the end of the study period, the content of the instructional sessions presented to the intervention group were prepared as pamphlets and given to the control Group members.

3.5. Statistical Analysis

The obtained data were analyzed by SPSS version 16. Demographic characteristics of the intervention and control groups were compared using Chi-square and exact Fisher tests. The Mann-Whitney U test was applied to compare self-management sub-dimensions in the two groups before intervention. This test was also applied to compare the age means of the groups.

The Wilcoxon test was used to determine if there were any statistically significant differences between mean scores of self-management sub-dimensions before and after intervention in the intervention and control groups. Finally, including age as a covariate, an analysis of covariance (ANCOVA) was applied to compare the two groups in terms of their mean scores of self-management sub-dimensions after intervention. The significant level was set at $P < 0.05$.

4. Results

The demographic characteristics of the participants are displayed in Table 2. There was no significant difference between the two groups in terms of gender, marital status, education, and the time passed since MI diagnosis. Although the participants were randomly allocated to intervention and control groups, the age means of the groups were significantly different ($P = 0.01$). The age means in the control and intervention groups were 60 ± 10.36 and 54.63 ± 6.67 years, respectively.

According to Table 3, there was no significant difference between the two groups in terms of sub-dimensions of self-management scores before the intervention ($P > 0.05$).

After intervention, there was a significant improvement in all sub-dimensions of self-management in the intervention group ($P < 0.05$). In the control group, a significant deterioration in communication with physicians, confidence about doing things, physical activities, and general health sub-dimensions was observed ($P < 0.05$). However, fatigue improved significantly in the control group ($P = 0.03$) (Table 4).

A significant difference was found regarding age between the two groups before intervention ($P = 0.02$). Thus, ANCOVA was used to examine the effectiveness of the CCM on sub-dimensions of self-management, while controlling the age as covariate. As displayed in Table 5, the ANCOVA results indicated significant differences in all self-management sub-dimensions between the two groups after intervention. In the intervention group, all sub-dimensions of self-management but shortness of breath significantly improved ($P < 0.05$).

Table 2. Comparison of General Characteristics Between the Intervention and Control Groups Before the Intervention (n = 60)[a]

Variable	Control Group	Total	Intervention Group	P Value
Gender				0.78
Female	10 (33.3)	19 (31.66)	9 (30)	
Male	20 (66.7)			
Age, y		41 (68.33)	21 (70)	0.02
≤ 50	10 (33.3)	7 (23.3)	17 (28.3)	
51 - 55	11 (36.7)	4 (13.3)	15 (25)	
> 55	9 (30)	19 (63.3)	28 (46.7)	
Marital status				0.3
Married	27 (90)	29 (96.7)	56 (93.3)	
Deceased spouse	3 (10)	1 (3.3)	4 (7.6)	
Level of education				0.13
Elementary school	15 (50)	8 (26.7)	23 (38.3)	
Secondary or high school	10 (33)	17 (56.7)	27 (45)	
Associate or above	5 (16.7)	5 (16.7)	10 (16.7)	
Time passed since MI diagnosis, mo				0.89
3	9 (30)	7 (23.3)	16 (26.7)	
4	5 (16.7)	5 (16.7)	10 (16.7)	
5	4 (13.3)	6 (20)	10 (16.7)	
6	12 (40)	12 (40)	24 (40)	

Abbreviation: AMI, myocardial infarction.
[a] Values arte expressed as No. (%).

Table 3. Comparison of Self-Management Dub-Dimensions in Intervention and Control Groups Before Applying the CCM (Continuous Care Model) (n = 60)

Self-Management (Sub-Dimensions)	Control Group	Intervention Group	P value
General health	2.4 ± 0.62	2.3 ± 0.53	0.41
Health distress	5 ± 5.32	4.76 ± 4.63	0.86
Fatigue	5.17 ± 3.29	3.77 ± 3.17	0.09
Shortness of breath	3.03 ± 3.51	2.43 ± 3.08	0.77
Pain	3.47 ± 3.69	3.07 ± 3.17	0.83
Physical activities	3.96 ± 3.76	5.13 ± 3.62	0.12
Confidence about doing things	32.6 ± 12.68	32.5 ± 9.68	0.64
Daily activities	4.2 ± 4.61	4.36 ± 3.44	0.61
Communication with physicians	5.86 ± 3.93	7.13 ± 2.93	0.09
Health care utilization	7.13 ± 6.02	5.93 ± 4.74	0.72

5. Discussion

Self-management plays a vital role in having a desirable life along with chronic conditions. The current study aimed to investigate the effects of applying the CCM on the self-management of post-MI patients.

The literature review showed no study to have evaluated the effect of the CCM on self-management of post-MI patients. Therefore, the results of the study were compared with those of studies that had some common features with the model. The results indicated that the CCM led to improved self-management of all sub-dimensions among participants in the intervention group. In the current study, in addition to the educational program, a nine-week follow-up was carried out and patients received counseling with regard to newly emerged problems.

Furthermore, these improvements can be attributed in part to other features of the CCM such as the relatively long follow-up period. Aliasgharpour et al. found that applying self-management program and one-month follow-up on 30 patients with epilepsy enhanced their self-management more than that of the control group (22). In

Table 4. Changes in Self-Management Sub-Dimensions in the Intervention and Control Groups[a]

Self-Management (Sub-Dimensions)	Before Intervention	After Intervention	P Value
General health			
Intervention	2.3 ± 0.53	1.8 ± 0.55	0.007
Control	2.4 ± 0.62	2.83 ± 0.98	0.03
Health distress			
Intervention	4.76 ± 4.63	2.23 ± 2.75	< 0.001
Control	5 ± 5.32	5.03 ± 5.33	0.6
Fatigue			
Intervention	3.77 ± 3.17	1.56 ± 2.09	< 0.001
Control	5.17 ± 3.29	3.53 ± 2.76	0.03
Shortnessof breath			
Intervention	2.43 ± 3.08	1.3 ± 2.21	0.006
Control	3.03 ± 3.51	2.76 ± 3.55	0.31
Pain			
Intervention	3.07 ± 3.17	1.66 ± 2.36	0.005
Control	3.47 ± 3.69	3.93 ± 3.54	0.19
Physical activities			
Intervention	5.13 ± 3.62	6.73 ± 2.97	< 0.001
Control	3.96 ± 3.76	2.83 ± 3.53	0.001
Confidence about doing things			
Intervention	32.5 ± 9.68	40.36 ± 7.99	< 0.001
Control	32.6 ± 12.68	28 ± 11.6	< 0.001
Daily activities			
Intervention	4.36 ± 3.44	1.46 ± 2.35	< 0.001
Control	4.2 ± 4.61	3.93 ± 2.76	0.71
Communicationwithphysicians			
Intervention	7.13 ± 2.93	8.63 ± 3.36	0.003
Control	5.86 ± 3.93	4.23 ± 3.78	0.001
Health care utilization			
Intervention	5.93±4.74	4.36±2.38	0.03
Control	7.13±6.02	6.3±3.95	0.7

[a] Values arte expressed as mean ± SD.

Table 5. Comparing Mean Scores of Self-Management Sub-Dimensions After Adjustment for Age in Intervention and Control Groups After Intervention

Self-Management Sub-Dimensions	Control Group	Intervention Group	F	P Value
General health	2.83 ± 0.98	1.8 ± 0.55	18.86	< 0.001
Health distress	5.03 ± 5.33	2.23 ± 2.75	7.007	0.01
Fatigue	3.93 ± 2.76	1.56 ± 2.09	10.38	0.02
Shortness of breath	2.76 ± 3.55	1.3 ± 2.21	2.21	0.14
Pain	3.93 ± 3.54	1.66 ± 2.36	6.91	0.01
Physical activities	2.83 ± 3.53	6.73 ± 2.97	15.13	< 0.001
Confidence in physical activity	28 ± 11.6	40.36 ± 7.99	18.5	< 0.001
Daily activities	3.93 ± 3.25	1.46 ± 2.35	8.27	0.006
Communication with physicians	4.23 ± 3.78	8.63 ± 3.36	17.93	< 0.001
Health care utilization	6.3 ± 3.95	4.36 ± 2.38	4.27	0.04

the study by Lorig et al. the self-management program implemented on patients with type 2 diabetes was followed up from six to eighteen months periods showed improved self-management in health distress dimension (23).

Contrary to the present study was that of the Perneger et al. where self-management program was conducted on 131 patients with asthma who were reassessed after six months; it revealed that despite improving a few self-management skills, patients' health and functional status did not improve. Small sample size and low participation rate were indicated as possible factors reducing the benefits of the educational program in the study by Perneger et al. (24).

As for the difference between the current study results and those of Perneger et al. it is noteworthy that the nature of diseases such as asthma is different from that of MI. For example, symptoms such as dyspnea in asthma may lead to some limitations in daily life activities of these patients which can drastically affect their self-management abilities. On the other hand, in the study by Perneger et al. only patients, but not their family members, were involved (24). However, in the current study, a family member was also involved in the implementation of the model. In disease prevention and treatment processes, family-centered caring is essential. Involvement of family members in caring is linked with positive outcomes such as increased patients' quality of life (25).

Mean of changes in sub-dimensions of fatigue and health care utilization in the two groups were not statistically significant. In fact, fatigue significantly reduced in the control group after intervention. In the study by Alse'n et al., self-reported fatigue decreased from four months to two years after MI (26). These researchers believed that fatigue can vary from time to time and the patients' response may depend on when the question is answered. On the other hand, one can argue that the length of follow-up period in the present study may have failed to capture program benefits on the use of health care utilization. To investigate the effects of the CCM on health care utilization, future studies with longer follow-up periods are needed.

Some studies suggest that implementing educational programs can result in decreased hospital readmission times. Shojaee et al. found that including patients with congestive heart failure in educational programs along with telephone follow-ups may lead to decreased readmission times among the patients (27). It is evident that the nature and complications of MI are different from those of heart failure. MI is usually considered as a threatening condition by patients (28). Thus, it is expected that upon experiencing post-MI symptoms or their aggravation, patients sense a threat and promptly seek medical care at healthcare organizations such as hospitals.

It is noteworthy that the previous knowledge, preference, experiences and cultural context of participants in the current study could influence their performance in (non-)compliance with the CCM. These factors could not be controlled by the researchers. Educational pamphlets were used in the current study, thus only literate patients were selected. Therefore, the findings can be generalized to illiterate patients only with caution.

The current study was conducted on patients admitted to one hospital affiliated to Birjand University of Medical Sciences, which may limit generalizability of the findings. Future multi-site researches can remove this limitation. Furthermore, data on participants' self-management were collected only using a self-reported scale. It seems that the use of multiple sources to data collection (e g, asking physicians about their patients' conditions) can lead to more accurate conclusions.

Future research can be directed to evaluate the effect of the CCM on other variables such as treatment regimen compliance among patients after MI.

5.1. Conclusions

Significant improvements in post-MI patients' self-management were observed after applying the continuous care model in the current study. Thus, this model can be considered as a useful framework to guide post-MI patients to enhance their self-management potentials.

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Footnote

Authors' Contribution: Omolbanin Akbari: performing the intervention and contributing to prepare the initial draft; Seyyed Abolfazl Vagharseyyedin: conceiving the idea for the study, design and supervising the research, performing data analysis and preparing the manuscript; Toba Kazemi: supervising the study; Bahareh Zarei: preparing initial draft and manuscript.

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