

Examination of the Effectiveness of Education Based on Collaborative Care Model in Improving Health-Promoting Behaviors of Patients with Heart Failure

Abstract

Introduction: Heart failure is a life-threatening condition and one of the most common cardiovascular diseases. Health promoting behaviors have an essential role in empowering patients to engage in health behaviors. The main goal of the present study was to examine the effectiveness of education based on collaborative care model in improving health-promoting behaviors of patients with heart failure.

Methods: This was a randomized clinical trial. The sample included a total of 60 patients with heart failure who were selected using a convenience sampling method, and randomly and equally divided into two groups of experimental and control. The data was gathered using the demographic questionnaire and the Health-Promoting Lifestyle Profile II. For three months, the experimental group received the education based on collaborative care model, and the control group received routine training. The data was analyzed using descriptive and inferential statistics. All analyses were performed using SPSS, version 21.

Results: There was no significant difference between the experimental and control groups in demographic variables. Before the intervention, no difference was found between the two groups in the health-promoting behaviors total score (129.78 ± 20.21 vs 132.33 ± 23.07) ($P=0.373$). However, after the intervention, the mean scores on all health-promoting behaviors dimensions, except for self-actualization ($P=0.062$) and stress management ($P=0.069$), were significantly higher for the experimental group than the control group (152.32 ± 17.28 vs 135.43 ± 21.56) ($P=0.373$).

Conclusion: Education based on collaborative care model is effective in improving health-promoting behaviors of patients with heart failure. Therefore, we suggest healthcare providers and planners should consider this model in their efforts to improve health-promoting behaviors in this group of patients.

Keywords: Heart failure • Education lifestyle • Healthcare • Plan health • Improvement participation

Introduction

Heart failure is a chronic, progressive, and debilitating condition accompanied by substantial financial and health burden [1]. Heart failure is the most common cardiovascular disease [3], and often results from underlying cardiovascular conditions, including myocardial infarction, chronic hypertension, chronic increase in blood volume, heart valve disease, and chronic anemia; in other words, heart failure is the common path to all cardiovascular disorders [4]. Currently, about 26 million people around the world suffer from heart failure [6], and this figure is projected to increase by 25% by 2030 [7]. According to previous reports, about 6.2 million people in the US [2.2% of the total population] and 6.5 million people in Europe suffer from heart failure [8, 9]. In addition, each year in the US, 660,000 new cases of heart failure are identified [10]. In Iran, more than one million people suffer from this condition [11].

Despite significant advances in the treatment and management of heart failure, it is still

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a major health problem [12]. Cardiovascular disorders, including heart failure often result from an unhealthy lifestyle, therefore, attention has been drawn toward factors related to lifestyle [13]. The prevalence and incidence of heart failure can be greatly influenced by one's lifestyle [14]. Lifestyle refers to routine, daily activities that one has accepted as their way of living, so that one's health is affected by these activities [15].

Health-promoting behaviors, as a lifestyle, include behaviors in the domains of nutrition, physical activity, health responsibility, stress management, interpersonal relationships, and spiritual well-being that are aimed at improving personal health, self-actualization, and happiness [16, 17]. Health-promoting behaviors refer to a multidimensional pattern of self-motivated perceptions and actions maintaining and promoting personal health [18, 19]. The World Health Organization (WHO) emphasizes the importance of health-promoting behaviors as a key strategy to maintain quality of life (QOL) that promotes a positive attitude toward life [20].

A large body of evidence supports the positive effects of health-promoting behaviors on reducing the risk of cardiovascular disease (by 80%) and increasing QOL of cardiovascular patients [21, 22]. Previous studies have shown that adjustment to health-promoting behaviors is accompanied by reduced risk of mortality [23], increased QOL, and increased physical and mental health in patients with cardiovascular disease.

The positive effects of these behaviors on health promotion has been shown by different studies. For example, regular exercise, such as 20-60 minutes of aerobic exercise three times a week, has been recommended for all patients with heart failure who are not in the acute phase of the disorder (classes 1-3). Treatment of heart failure is often aimed at survival promotion and improvement of QOL. In order to achieve these goals, the patient must engage in health-promoting behaviors. Effective self-care and promotion of health-promoting behaviors seems to be a way of managing heart failure.

Non adherence to health-promoting behaviors is one of the main risk factors of cardiovascular disease, hypertension, obesity, type 2 diabetes, strokes, and cancers. Low levels of health-promoting behaviors and health

literacy increase the risk of complications, mortality, disability, and readmission to hospital and lead to higher treatment costs for chronic disorders. Kick Busch found that people with lower levels of health-promoting behaviors and health literacy are less likely to use emergency and preventive services and are more likely to be hospitalized. Heart failure, as a debilitating condition, negatively influences one's daily activities. Fatigue and shortness of breath as the main symptoms of heart failure lead to activity intolerance, as a result of which the patient becomes dependent on others in performing daily and self-care activities and becomes less able to engage in health-promoting behaviors. People with heart failure are often less aware of treatment regimen, diagnosis, and control of their symptoms; this indicates the importance of educating this group of patients. The overall goal of educating patients with cardiovascular disease is to alter their behaviors; in order to achieve this goal; the patient must believe that they are able enough to accept new responsibilities.

The goal of educating patients is to create behavioral changes through providing proper training. Education provides patients and their families with the opportunity to learn about illness and treatment, coping strategies, improvement of self-care skills, and empowerment. Use of theory and model is a way of educating patients. The nursing model helps all nursing personnel have a unified approach toward providing care for patients and conduct consistent care assessments. The collaborative care model was developed by Mohammadi et al. [2002] who assessed the model in educating patients on blood pressure control. Two components of care and collaboration form the central core of the collaborative care model. This model is in fact the regular and logical process of creating effective, collaborative, and dynamic rapport between the client [as the participant] and the healthcare provider (as the participator) in order to better understand the needs, problems, and expectations of the client in the process of controlling the illness, motivating the client to accept responsibility, and maintaining and improving the client's health. Overall, the symptoms of heart failure fluctuate day by day, and management of the condition and its symptoms that is possibly influenced by one's level of self-

efficacy is more challenging than that of other cardiovascular conditions with less fluctuating symptoms. Therefore, the present study is aimed at examining the effectiveness of education based on collaborative care model in improving health-promoting behaviors of patients with heart failure.

Methods

Design

This is a randomized clinical trial with two groups and a pre- and post-Intervention design that was conducted in Imam Khomeini Hospital, Saqqez, Kurdistan Province, Iran, in 2019. The study was approved by the Ethics committee at Kurdistan University of Medical Sciences [no. IR.MUK.REC.1398.228]. Sample size [30 participants in each group] was determined based on that of a similar study and using the following formula (by considering a significance level of .05 and a statistical power of 80%):

$$n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2 \sigma^2}{(\mu_1 - \mu_2)^2} = 30$$

Participants

The sample included 60 patients with heart failure [30 in the control group and another 30 in the experimental group] attending Imam Khomeini Hospital, Saqqez, Kurdistan Province, Iran. The inclusion criteria were as follows: willingness to participate in the study, definite diagnosis of heart failure based on the final decision of a cardiologist (a left ventricular ejection fraction (LVEF) of below 45%), aged 18-65 years, ability to communicate verbally or non-verbally, and not participating in another training program on heart failure at the time of the study. The exclusion criteria were as follows: lack of willingness to continue the study or completing the questionnaires, death due to heart failure, absence for more than one session, and symptoms getting more severe and requiring emergency intervention. The participants were selected using a convenience sampling method and based on the inclusion and exclusion criteria. Then, they were randomly [using the table of random numbers] divided into two groups of control (n = 30) and experimental (n = 30).

Measurement

The demographic questionnaire (assessing age, gender, marital status, job status, and

place of residence) and the Health-Promoting Lifestyle Profile (HPLPII) were used to collect data. The HPLPII has 52 items and the following subscales: a) Nutrition: diet and food selection (9 items: 2-8-14-20-26-32-38-44-50), b) Physical Activity: regular exercise (9 items: 4-10-16-22-28-34-40-41-46), c) Health Responsibility (9 items: 21-15-33-9-27-51-45-39), d) Stress Management: identification of sources of stress and actions aimed at managing stress (9 items: 23-17-11-5-35-41-25-29), E) Interpersonal Support: maintaining interpersonal relationships with a sense of closeness (7 items: 1-13-19-31-37-43-49), and F) Self-Actualization: a sense of purpose, seeking personal growth, and experiences of self-awareness and satisfaction (9 items: 12-52-48-42-36-30-24-18-6). The items are rated on a 4-point Likert-type scale ranging from 1 (Never) to 4 (Always). Total score ranges from 52 to 208, with higher scores indicating better health-promoting behaviors. A Cronbach's alpha of 0.82 has been reported for the total scale, and alphas ranging from 0.64 to 0.91 have been reported for the subscales.

Intervention

First, the questionnaire was completed by the participants in the experimental and control groups. It is worth to note that the researcher read the items of the questionnaire to the illiterate participants and recorded their answers. Then, the intervention was conducted in the experimental group based on the 4 stages of the model. The stages included motivation, preparation, involvement, and evaluation; all the stages are conducted continuously and in a dynamic manner [22]. The collaborative care model was provided for three months in the form of a) educational participatory visits and b) follow up participatory visits. The participatory visits included two stages of 1) motivation and 2) preparation, and were provided in 3 sessions held every 10 days. The follow up participatory visits included two stages of 3) involvement and 4) evaluation, and were provided in 4 sessions held every two weeks. The content of the training sessions is provided in Table 1.

Ethical considerations

The study objectives were explained to the participants, and their informed consents were obtained. In addition, they were reassured that their personal information remained confidential, and that they were allowed to

Table 1. Content of the collaborative training sessions.

Title of session	Number of session	Objective	Content	Instrument	Duration
Motivation	1	Stimulating the clients through assessment and cognition by taking a history, preparing a list of problems, exchanging views on philosophy of participation, awareness of psychological problems and thoughts discussion by clinical psychologist and nurse	Presenting care problems, current health conditions, and future risks in order to involve the client in the process of self-care and reviewing the anatomy of heart in simple language, causes of heart failure, exacerbating and mitigating factors, the importance of health-promoting behaviors	Lectures, educational videos, and photos	100 minutes
Preparation	2	Inform clients to perform their duties correctly according to schedule of educational participatory visits	Getting acquainted with proper diet, including consumption of vegetables and fruits, importance of exercise, stress control methods, and pain prevention strategies	Lecture, photo, educational video, pamphlet, group discussion, and feedback from the nurse	60 minutes
Preparation	3	Continuation of educational participatory visits, offering new tasks along with consolidating previous tasks	The role of drugs in controlling symptoms, the importance of timely drug consumption, and learning how to correctly calculate the heart rate	Group discussion and feedback	60 minutes
Involvement	1, 2, 3, and 4	Continuation of the care program, follow-up visits, and participation of clients	Correction of programs, adherence of clients to treatment and problems of clients to provide solutions and transfer experiences	Group discussion and feedback	60 minutes
Evaluation	Stage	Assess the learning rate of educational goals	Asking educational goals	Question and answer	During the sessions, as needed
	Final	Completing the scale		The self-efficacy scale	60 minutes

leave the study at any time. Moreover, at the end of the third month, when the experimental group completed the questionnaire for the second time, the control group were also invited to complete the questionnaire. At the end of the study, the comparative care model was explained to the control group in a one-hour session, and all the control participants received the educational booklet.

Data analysis

Frequency and frequency percentage were used to describe the data, and quantitative variables were analyzed using measures of central tendency and dispersion. Normality of data distribution was analyzed using the Kolmogorov–Smirnov test. Pre- and post-interventions means for both the experimental and control groups were examined using the paired sample t-test, the means for the two groups were compared using the independent samples t-test, and the Chi-squared test was used to compare the frequency of qualitative variables for the two groups. Significance level was set at $P < 0.05$. All analyses were performed using SPSS, version 21.

Results

The mean age of participants in the experimental

and control groups was 56.31 ± 12.22 and 54.28 ± 11.18 years, respectively ($P = 0.75$). Most of the participants in both groups were married (73.3% in the experimental group and 80% in the control group). In addition, most of the participants in both groups were illiterate (40% in the experimental group and 43.3% in the control group). Moreover, there was no significant difference between the two groups in demographic characteristics Table 2.

According to the results of independent samples t-test, before the intervention, there was no significant difference between the two groups in means of the six dimensions of health-promoting behaviors ($P > 0.05$). In addition, there was no significant difference between the experimental (129.78 ± 20.21) and control (132.33 ± 23.07) groups in the health-promoting behaviors total score at pretest (Table 3). After conducting the collaborative care intervention, i.e. at posttest, the experimental group had higher mean scores on Health Responsibility ($P < 0.001$), Interpersonal Relationships ($P = 0.042$), Physical Activity ($P < 0.001$), Nutrition ($P = 0.019$), and total health-promoting behaviors than the control group. The experimental group also had higher mean scores on the two

Table 2. Demographic description of the participants in the experimental and control groups.

Variable	Subgroup	Experimental group N (%)	Control group N (%)	P-value
Age (years)	< 45 years	6 (20)	7 (23.3)	0.75
	45-59	17 (56.7)	16 (53.3)	
	60-65	7 (23.3)	7 (23.4)	
Gender	Male	16 (53.3)	15 (50)	0.49
	Female	14 (46.7)	15 (50)	
Education	Illiterate	12 (40)	13 (43.3)	0.44
	Primary or middle school	11 (36.7)	12 (40)	
	High school or higher	7 (2.23)	5 (16.7)	
Job status	Self-employed	14 (46.6)	12 (40)	0.28
	Unemployed	16 (53.4)	18 (60)	
Marital status	Married	22 (73.3)	24 (80)	0.36
	Single	8 (26.7)	6 (20)	
Place of residence	City	25 (83.3)	26 (86.6)	0.56
	Village	5 (16.7)	4 (13.4)	

Table 3. Means and standard deviations of health-promoting behaviors and the six dimensions scores at pretest and posttest for the experimental and control groups.

	Health-promoting behaviors dimensions	Experimental group Mean (SD)	Control group Mean (SD)	P-value
Before the intervention	Self-Actualization	24.18±3.21	23.78±4.42	P=0.72
	Health Responsibility	24.38±5.56	24.31±6.28	P=0.64
	Interpersonal Relationships	26.3±6.81	25.47±3.26	P=0.18
	Stress Management	23.8±4.52	22.18±8.62	P=0.67
	Physical Activity	14.20±5.29	14.76±4.61	P=0.36
	Nutrition	27.41±6.3	26.51±6.3	P=0.43
	Total score	129.78±20.21	132.33±23.07	P=0.37
After the intervention	Self-Actualization	27.25±5.6	25.29±4.7	P=0.062
	Health Responsibility	32.27±5.28	25.19±3.82	P<0.001
	Interpersonal Relationships	33.22±4.6	28.2±4.46	P=0.042
	Stress Management	25.29±4.17	23.73±3.9	P=0.069
	Physical Activity	21.49±6.37	16.15±5.3	P<0.001
	Nutrition	33.14±5.56	26.92±6.47	P=0.019
	Total score	152.32±17.28	135.43±21.56	P<0.001

dimensions of Self-Actualization (P=0.062) and Stress Management (P=0.069) than the control group, but the group difference was not significant Table 3.

In addition, according to the results of paired sample t-test, there was no significant difference between pretest and posttest scores of total health-promoting behaviors and all the six dimensions in the control group (P=0.59). But, in the experimental group, there was a significant increase in the total health-promoting behaviors score after the intervention, and significant differences were found between pretest and posttest scores for all the dimensions except for Stress Management (P=0.073) Table 4.

Discussion

The goal of the present study was to examine the effects of education based on collaborative

care model on health-promoting behaviors of patients with heart failure. The results indicated that education based on collaborative care model improves health-promoting behaviors in patients with heart failure. Farsi et al. (2019) found the effectiveness of Pender’s health promotion model in improving health-promoting behaviors of patients with heart failure. They maintain that improving health-promoting behaviors and health awareness can lead to improved self-care skills, improved QOL, a better sense of control, and reduced hospitalizations in patients with heart failure. In the present study, the education based on collaborative care model was not effective in improving self-actualization (spiritual growth) of patients with heart failure; this finding is in line with those of Farsi et al.

Hua et al. (2017) explored the effects of collaborative care model on self-care skills

Table 4. Comparison of health-promoting behaviors mean scores before and after the intervention for the experimental and control groups.

Health-promoting behaviors dimensions	Control group (Means)			Experimental group (Means)		
	Paired sample t-test			Paired sample t-test		
	Before	After	P-value	Before	After	P-value
Spiritual Growth (Self-Actualization)	23.7	25.2	0.83	24.1	27.2	<0.001
Health Responsibility	24.3	25.1	0.7	24.3	32.2	<0.001
Interpersonal Relationships	25.4	28.2	.64	26.3	33.2	<0.01
Stress Management	22.1	23.7	0.81	23.8	25.2	0.073
Physical Activity	14.7	16.1	0.59	14.2	21.4	<0.001
Nutrition	26.5	26.9	0.72	27.4	33.1	<0.01
Total score	132.33	135.43	P=0.59	129.78	152.32	P<0.001

(including health-promoting behaviors) and QOL of patients with heart failure. They found that the collaborative care model significantly improved self-care skills, QOL, and cardiovascular function in patients with heart failure. It has been shown that self-care promotion improves health-promoting and self-care behaviors in patients with heart failure. The findings of Hua et al. are in line with those of the present study, and both studies were focused on the effects of collaborative care model; this indicates the positive effects of collaborative care model on health-promoting behaviors.

In a study by McElligott et al. (2010) aimed at examining the effectiveness of collaborative care-model in improving health-promoting behaviors of nurses, the intervention significantly improved health-promoting behaviors of nurses in the dimensions of nutrition, spiritual growth (self-actualization), and interpersonal relationships, but it had no significant effect on the other dimensions (i.e. physical activity, stress management, and health responsibility). The overall results of this study are consistent with those of the present study in that in both studies, health-promoting behaviors scores significantly increased as a result of administering the collaborative care model. However, in the present study, the collaborative care model had a significant impact on all health-promoting behaviors dimensions, except for stress management and self-actualization; the difference in the results of the two studies can be attributed to different demographic characteristics of participants.

Amini et al (2016) examined the effectiveness of the health-related lifestyle self-management program in improving health-promoting behaviors of patients with cardiac ischemia, and found the positive effects of the program

on health-promoting behaviors of patients. They concluded that patients' health can be improved using proper interventions. Despite using a different program than what used in the present study, Amini et al. (2016) found that the intervention had no significant effect on the stress management dimension; this is in line with our findings. On the other hands, in today's world, stress has become part of the daily life of both clinical and non-clinical populations.

Mohammadi et al. (2016) explored the effects of collaborative care model on daily activities of patients with heart failure, and found that the model significantly improved daily activities of the patients. The results of this study are consistent with those of the present study in that in our study, the collaborative care model significantly improved health-promoting behaviors of patients with heart failure in terms of physical and daily activities. In addition, he study results showed that after the intervention, the experimental group had significantly higher scores on the physical activity dimension than the control group; this is also in line with the findings of Amini et al.

Dunbar et al. (2013) examined the effects of collaborative care intervention on diet (sodium intake) and medication regimen adherence in patients with heart failure. They found that the intervention based on the collaborative care model improved nutrition and reduced sodium intake in patients with heart failure. This finding is in line with those of the present study in that we found that the collaborative care model improved the nutrition dimension of health-promoting behaviors in patients with heart failure.

According to the study results, after the intervention, there was a significant difference between the experimental and control groups

in “interpersonal relationships”; in other words, the experimental group had higher scores on this dimension than the control group. This finding is consistent with those of Amini et al. However, in contrast to our findings, Mohammadipour et al. found no significant difference between experimental and control group following intervention. This inconsistency can be attributed to different study populations or working with participants with different lifestyles.

Health responsibility was one of the dimensions of health-promoting behaviors examined in the present study. The experimental group had higher scores on this dimension after receiving the collaborative care intervention, while no change was observed in the control group. This finding is consistent with those of Audulv et al. (2010) who developed an intervention for patients with cardiovascular disease; the intervention significantly improved the responsibility of patients, and this in turn increased patients’ control on their condition.

The collaborative care model used in the present study was more effective in improving physical activity, nutrition, health responsibility, and interpersonal relationships than stress management and effective self-actualization; therefore, the two last dimensions require special research attention. In addition, patients with heart failure may require a longer time to adjust to their problem therefore developing a proper level of stress management and self-actualization. An important goal of education based on the collaborative care model is to build permanent adaptive behaviors, and it is the continuity of behavior that is important. When a patient learns the principles of care in accordance with their illness and prescribed medications, they can cope with their new condition more effectively. Lack of awareness of self-care in patients with chronic disorders can lead to readmission to hospital, and if part of care responsibly can be shared with the patient and their family through training, patient recovery from illness can be achieved faster, and hospital beds can be freed up.

In the collaborative care model, in-person and written training is used to increase clients’ awareness of the nature of their illness, proper diets, proper level of physical activity, and aggravating and alleviating factors related to the disorder. The collaborative care model makes clients more sensitive and responsible

toward the treatment regimen through involving them in the treatment process. In addition, through this model, clients can share their opinions with doctors and nurses. This collaboration helps patients better understand their conditions, and cooperate more with the medical team; this can in turn maintain their health and improve their self-efficacy.

Study limitations

The first limitation of the present study was that most of the participants were illiterate, and it was needed that the researcher explains the items of the questionnaire to them in a simple language; therefore, they may have misunderstood some items. Another limitation concerns the cultural and social factors that may have affected participants’ answers; therefore, caution should be taken in generalizing the results. In addition, during the time of the study, the participants may have received some information about the study objectives through public media (radio, television, newspapers); this was out the researcher’s control.

Conclusion

Collaborative care model has positive effects on health-promoting behaviors of patients with heart failure and is easily administered; therefore, it is suggested for patients with heart failure. It can significantly increase self-care capacity, independence in performing daily activities, and finally quality of life in patients with heart failure. Therefore, we suggest healthcare providers, especially nurses, as important members of the medical team, to use this intervention to improve health responsibility, nutrition, physical activity, and interpersonal relationships of patients with heart failure.

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