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# The Impact of a Training Program Based on Learning Needs on Self-Care Behaviors among Patients with Heart Failure

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## Abstract

**Background:** Heart failure necessitates self-care; therefore, self-care training should be based on learning needs (LNs) of patients.

**Aim:** This study aimed to determine the impact of a training program based on learning needs on self-care behaviors among patients with heart failure

**Method:** This clinical trial was performed on 73 patients suffering from heart failure in Zanjan teaching hospitals in 2015. The subjects were randomly divided into three groups (based on having LNs assessment and family involvement). The intervention group received education based on LNs and family involvement. Control group 1 (without LNs assessment with family involvement), and control group 2 (without LNs assessment, and family involvement). The groups received three sessions of face-to-face training (lasting 15-20 minutes) on medical symptoms, necessary measures for the disease, diet, and medication regimen. Self-care behaviors before and 90 days after the intervention were evaluated using a self-care of heart failure index. To analyze the data, analysis of variance (ANOVA) and Bonferroni post-hoc test were used in SPSS, version 11.

**Results:** The mean age of the participants was  $65.5 \pm 14.1$  years. According to the results of ANOVA, the total self-care score before the intervention was not significantly different among the three study groups ( $P < 0.05$ ); however, this difference was statistically significant following the intervention ( $P < 0.001$ ). The results of the Bonferroni post-hoc test also showed a significant difference between the intervention group, control group 1 ( $P = 0.005$ ), and control group 2 ( $P < 0.001$ ). Moreover, the findings revealed a significant difference between the control group 1 and control group 2 ( $P < 0.001$ ).

**Implications for Practice:** Patient education based on LNs assessment could improve self care behaviors in patients with heart failure. Further family involvement needs to be considered in the process of patient education.

**Keywords:** Family, Heart failure, Self-care, Training

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## Introduction

Among cardiovascular diseases, heart failure, as one of the common chronic diseases, has been significantly debated in the domain of healthcare (1). High prevalence of heart failure can also impose heavy financial burdens on health systems of societies (2). Accordingly, numerous methods were proposed to control heart failure including self-care (3).

Self-care refers to a set of activities performed primarily by individuals in order to protect their life, health, and sense of well-being (4). In the model proposed by Riegel et al., self-care for heart failure was defined as a mental concept encompassing maintenance and management of self-care (5). In that model, self-care, in the dimension of self-maintenance, is comprised of behaviors aimed at maintaining the physiological stability of the heart, monitoring symptoms, as well as complying with treatment by a patient. In terms of self-management, self-care involves behaviors that are to identify and interpret symptoms associated with chronic heart failure, implement medical treatments to improve the given symptoms, and evaluate such measures (6).

Self-care can also enhance the ability of individuals to live with heart failure (7). Reduced severity of disease symptoms (8), increased efficiency and skills among individuals (9), and improved quality of life (10) can be similarly cited as desirable effects of self-care.

Results of the studies investigating self-care behaviors among patients with heart failure, such as the studies by Oksel (2009) in Turkey (11), Aboutalebi (2011) in Iran (12), as well as Jaarsma et al. (2013) in 15 countries across the world, suggested that the level of self-care behaviors among patients suffering from heart failure was poor, lower than the desirable level, and in need of improvement, respectively (13).

Poor self-care can cause individuals experience rapid changes in their condition, and in turn, undergo emergency interventions (7). Moreover, poor self-care among patients affected with heart failure is directly correlated with deterioration of general condition of patients and their hospitalization. The results of a study by Shojaie et al. (2010) demonstrated that heart failure patients with poor self-care behaviors were more frequently hospitalized (14). It should be noted that hospital readmission, as a frequent event, is costly and sometimes life threatening for patients (15). They also increase patient dependence on those around them, and consequently, could have adverse effects on patients in terms of quality of life and sense of well-being. Such hospitalizations are correlated with high rates of morbidity and mortality among individuals, especially the elderly (16).

Considering poor self-care behaviors among patients with heart failure, the most common barriers to performing such behaviors are lack of awareness, physical limitation, incompatibility with multiple treatments, emotional problems, as well as disbelief in the positive impact of behaviors on symptoms of the disease (17).

One of the major complaints of heart failure patients is lack of awareness regarding self-care behaviors (18). Given the mentioned issues, learning self-care behaviors is of utmost importance for patients with heart failure because most of healthcare services are provided away from the supervision of healthcare providers (19). Promoting awareness through training can similarly improve self-care behaviors among these patients (18). As these patients gain more information about their disease through training, they can more effectively participate in their treatment process (20). Therefore, adapting training to the needs of each patient can improve learning outcomes (21). Accordingly, studies suggested that interventions designed based on learning needs set by patients themselves were more successful than those developed in accordance with learning needs as determined by others (22). Learning needs or educational contents provided by nurses and other healthcare team members are different from those considered by patients. Thus, it is necessary for nurses to know what heart failure patients believe in to design appropriate and effective training interventions (19).

Since most of heart failure patients live with other family members, involvement and support by family members can play a leading role in self-care behaviors and improvement of disease control (23). Therefore, it is important for patients and their families to understand the nature of heart failure and the significance of involvement in treatment process (24). Accordingly, family involvement in self-care training program can influence the success rate, as well as the stability in changing patient behaviors (23).

Currently, the concept of self-care and involvement of patients in healthcare provision process and treatment of diseases has attracted much more attention than ever due to its importance (25). Although

**Table 1. Training program in study groups**

Session	Instructor	Session venue	Duration of training sessions	Educational contents	Teaching methods
First				Anatomy and physiology of the heart, definition of heart failure, symptoms and causes of heart failure, and risk factors of heart failure	Photos and replica heart
Second	Master's degree in Critical Care Nursing	Conference room in the Cardiology Ward	15-20 minutes	Medication regimen, diet, weight control, restrictions in consumption of liquids and salt, identification of symptoms and treatment measures in case of heart failure occurrence, smoking and tobacco use, and physical activities and sport	Face-to-face training, booklet
Third				Displaying ways of recalling hours of taking medications to prevent forgetfulness in terms of medication use as well as pulse control, weighing, examining limbs for patients and family members	Use of medication containers, practical training

several studies were conducted on self-care training among patients suffering from heart failure, some investigations reported contradictory results; for instance, the findings of a study by Walker (2011) revealed no significant difference in self-care behaviors after training (26), but the results of an investigation by Zamanzadeh (2013) indicated that self-care behaviors instigated statistically significant differences following training (27). Considering the slogan of the World Health Organization (WHO) about self-care, the necessity of implementing third-generation accreditation within hospitals and its special emphasis on self-care training, as well as the importance of self-care training among heart failure patients, along with a review of the related literature, there was a need to conduct the present study. We aimed to conduct this study using a three-group design to determine the impact of a training program based on learning needs on self-care behaviors among patients with heart failure.

## Methods

This randomized clinical trial was conducted on heart failure patients admitted to the cardiology wards at Ayatollah Mousavi and Hazrat-e Vali-e Asr (A.J.) hospitals, Zanjan, Iran, in 2015.

Following randomized block design, the study participants were assigned to the intervention group, control group 1, and control group 2. Based on the investigation by Zamanzadeh et al. (2013) (27) and considering the mean and standard deviation of self-care in this study, as well as using the STATA8 software, a total of 30 individuals were selected as the sample size in this study. To determine the appropriate sample size and to have more accuracy in the present study, 25 patients in each group and a total of 75 individuals were investigated taking sample attrition into account. In general, two patients in the control group 1 and control group 2 were excluded during the study due to death and 73 individuals were examined.

The inclusion criteria for the patients were diagnosis of heart failure confirmed by a cardiologist, left ventricular ejection fraction by 35% or lower, hospitalization in cardiology ward, access to a phone, having an companion as an effective member of the family, age over 18 years, no participation in other training programs along with the study, no employment in the healthcare system, lack of any psychological disorders and known memory ones, as well as chronic and debilitating diseases such as renal failure, and severe respiratory diseases filed in medical records. Moreover, the criteria for the inclusion of family members were having an effective role in patient care, a blood or in-law relationship with the patient, and no employment in the healthcare system.

The exclusion criteria for the patients were chronic condition of the disease and no consent for participation in the study. The exclusion criterion for family members was unwillingness to participate in the study.

The data collection instruments consisted of a demographic information form, as well as the Congestive Heart Failure Patient Learning Needs Inventory (CHFPLNI), the Self-Care Heart Failure Index (SCHFI V6.2), and the Caregiver Contribution to Self-Care of Heart Failure Index (CC-SCHFI).

It should be noted that CHFPLNI was used to identify and extract the learning needs of heart failure patients in the intervention group. The validity and the reliability of this instrument were confirmed in a study by Rafii (2008) ( $\alpha = 0.09$ ) (19).

The SCHFI was similarly employed to assess self-care behaviors. This index is comprised of three parts of self-maintenance, self-management, and self-confidence. Given that the two parts of A and B of this index could better show self-care status (28), they were used in the present study. Part A contains 10 items and the total score in this part ranges from 10 to 40. Part B entails three sections and 6 items and the total score in this part ranges from 4 to 25. In this research instrument, the scores obtained should be converted into 0 to 100 and a score of 70 or higher on each part reflects the adequacy of self-care. The reliability and the validity of this index were confirmed in an investigation by Moadab (2014) ( $\alpha = 0.80$ ) (29).

Furthermore, the CC-SCHFI was used to assess the involvement of family members in self-care behaviors and consisted of three parts of care-giver contribution in the dimension of self-maintenance, care-giver contribution in the dimension of self-management, and care-giver contribution in the dimension of self-confidence. Since parts A and B of the SCHFI were used to investigate self-care behaviors among heart failure patients, parts A and B of the given index were employed to examine caregiver contribution to self-care behaviors among patients suffering from heart failure. Part A involved 10 items and the total score in this section ranged from 10 to 40. Part B had three sections and 6 items and the total score in this index ranged from 4 to 25. In this research instrument, the scores obtained in each part should be converted to 0 to 100. A score of 70 or higher on each part reflects the adequacy of contribution to self-care. In the study by Riegel (2013), the validity and the reliability of this index were also reported ( $\alpha = 0.80$ ,  $r = 0.80$ ) (30).

To determine content validity of CC-SCHFI, the index was submitted to ten professionals and experts and each of them expressed their comments in written forms. After evaluating the given comments, the necessary changes were implemented. To establish the reliability of the given index, internal consistency method was used and the Cronbach's alpha coefficient was calculated at 0.84.

To conduct the present study, we obtained approval of Deputy of Research at Zanjan University of Medical Sciences, as well as officials of Ayatollah Mousavi and Hazrat-e Vali-e Asr (A.J.) hospitals. After obtaining written informed consent from all the participants, a demographic information form was filled out by the researcher for all the three study groups at the beginning of the study.

The training program consisted of three 15-20 minute sessions, which were held over three consecutive days and during stable clinical conditions for participants by the researcher with a Master's degree in critical Care Nursing. The course was held in a face-to-face manner in the conference room of the cardiology wards. Afterwards, the study was introduced and the purpose of the study was explained to the participants. Prior to the outset of training for the intervention group, learning needs, as well as priority and importance of training needs were determined using the CHFPLNI. Then, each person received training according to his/her level of knowledge, understanding, and needs concurrently with a family member who was in close contact with the patient. It should be noted that family members were involved in the training sessions in order to understand the contents and support the patients to be involved in self-care activities at home.

The training program was administered for the control group 1 based on a pre-designed booklet with family member involvement and without needs assessment. Furthermore, the program was implemented for the control group 2 excluding needs assessment and family member involvement. Educational contents for the groups included anatomy and physiology of the heart, definition of heart failure, symptoms and causes of heart failure, identification of risk factors in the development of heart failure, medication regimen, diet, psychological factors, weight control, limitations in consumption of liquids and salt, identification of disease symptoms, the necessary treatment

measures in case of heart failure occurrence, smoking and tobacco use, as well as physical activities and sports (Table 1).

The SCHFI was completed at the onset of the study and three months after the intervention by the participants, and the CC-SCHFI was completed at the end of the third month for a family member in the intervention group and control group 1. Follow-ups after hospital discharge in terms of self-care were conducted by phone at the end of the first and the second weeks after discharge and at the end of the first, second, and third months after discharge.

To analyze the data, we used SPSS version 11.5. Shapiro-Wilk test was performed to determine the normal distribution of quantitative data. Given the non-normal distribution for the mean score for self-care in the dimension of self-maintenance and the total score before the intervention, Kruskal-Wallis test was used to compare these variables between the three groups. To compare mean scores of self-care in the dimension of self-management before the intervention, the mean scores of self-care in the dimensions of self-maintenance and self-management, and total scores after the intervention, analysis of variance (ANOVA) was run based on the normal distribution of variables. Fisher's Exact test and Chi-square were employed to analyze the demographic information, and independent-samples t-test was used to compare the level of care-giver contribution to self-care behavior in the intervention group and control group 1. P-value less than 0.05 was considered statistically significant.

## Results

The findings of this study revealed that the mean age of the participants was  $65.5 \pm 14.1$  years. The mean left ventricular ejection fraction was  $26.2 \pm 9.76\%$ . Forty-four (58.6%) participants were male, 73 (97.3%) were married, and 40 (53.3%) were illiterate. Moreover, 52 (69.3%) participants were heart failure class III and 70 (93.3%) were living with their families. The mean age of the family members participating in the present study was  $38.0 \pm 12.1$  years.

In terms of the underlying variables, the patients in the three study groups (intervention group, control group 1, and control group 2) had similar distribution, and no statistically significant difference was observed between the given groups in this respect. However, the patients were not homogeneous in terms of educational level (Table 2).

Considering the demographic characteristics of family members including age, gender, educational level, and living with the patient, the study groups had a similar distribution and no significant difference was found between the groups (Table 2).

According to Kruskal-Wallis test, comparison of the mean score of self-care in the dimension of self-maintenance and the total score before the intervention in all three groups showed no significant differences between the groups. Similarly, comparison of the mean score of self-care in the dimension of self-management before the intervention using ANOVA suggested no significant differences between the study groups (Table 3).

Furthermore, comparison of mean score of self-care in the dimensions of self-maintenance and self-management, as well as the total score of self-care following the intervention using ANOVA revealed a significant difference between the groups (Table 3). To examine the differences between the groups, Bonferroni post-hoc test was employed. It showed that the degree of self-care in the dimension of self-maintenance increased after the intervention in the intervention group, as compared to the control group 2, which was statistically significant ( $69.8 \pm 11.1$  vs.  $51.8 \pm 10.5$ ;  $P=0.001$ ). However, there was no significant difference between the intervention group and the control group 1 ( $69.8 \pm 11.1$  vs.  $64.7 \pm 14.3$ ;  $P=0.45$ ). Considering the mean score of self-care in the dimension of self-management after the intervention, the scores assigned to the intervention group had a rising trend compared to those of the control group 1 and control group 2 ( $73.1 \pm 13.6$  vs.  $52.50 \pm 15.4$ ,  $40.5 \pm 17.6$ ;  $P=0.001$ ), which was statistically significant.

Moreover, self-care in this dimension in the control group 1 compared to the control group 2 revealed a statistically significant difference ( $52.5 \pm 15.4$  vs.  $40.5 \pm 17.6$ ;  $P=0.02$ ).

In terms of the total score of self-care, there was a significant difference between the intervention group, control group 1 ( $P=0.005$ ), and control group 2 ( $P=0.001$ ). The difference between the control group 1 and control group 2 was significant ( $P=0.001$ ). Independent-samples t-test reflected no significant difference in the mean scores of family involvement in self-care behaviors between the intervention group and control group 1 in the dimensions of self-maintenance ( $P=0.16$ ), self-

**Table 2. Demographic information for the three study groups**

Group		Intervention group N (%)	without LNs	without LNs	P-value	
Variable	without LNs assessment, with family involvement N (%)		without LNs assessment and family involvement N (%)			
Demographic characteristics	Age*	18-35	1 (4%)	3 (12%)	0 (0%)	0.12
		36-53	4 (16%)	6 (24%)	4 (16%)	
		54-71	13 (52%)	14 (56%)	11 (44%)	
		72-90	7 (28%)	2 (8%)	10 (40%)	
	Marital status*	Married	24 (96%)	25 (100%)	24 (96%)	1.000
		Single	1 (4%)	0 (0%)	1 (4%)	
	Level of education*	Illiterate	8 (32%)	13 (52%)	19 (76%)	0.001
		Lower than high school diploma	17 (68%)	8 (32%)	6 (24%)	
		High school diploma and higher	0 (0%)	4 (16%)	0 (0%)	
	Living with family*	Living with family	23 (92%)	23 (92%)	24 (96%)	1.000
Living alone		2 (8%)	2 (8%)	1 (4%)		
Occupation**	Unemployed	9 (36%)	4 (16%)	10 (40%)	0.07	
	Employed	10 (40%)	6 (24%)	7 (28%)		
	Stay-at-home	6 (24%)	15 (60%)	8 (32%)		
Gender**	Female	7 (28%)	15 (60%)	9 (36%)	0.06	
	Male	18 (72%)	10 (40%)	16 (64%)		
Medical records	Degree of heart failure**	III	17 (68%)	19 (76%)	16 (64%)	0.73
		IV	8 (32%)	6 (24%)	9 (36%)	
	Left ventricular ejection fraction	5-14	4 (16%)	1 (4%)	2 (8%)	0.45
		15-24	4 (16%)	5 (20%)	8 (32%)	
Family characteristics	Age*	25-35	17 (68%)	19 (76%)	15 (60%)	0.08
		18-33	7 (28%)	14 (56%)		
		34-49	11 (44%)	9 (36%)		
	Level of education*	Illiterate	5 (20%)	3 (12%)		0.69
		Lower than high school diploma	8 (32%)	10 (40%)		
Gender**	High school diploma and higher	12 (48%)	12 (48%)		0.50	
	Female	8 (32%)	16 (64%)			
	Male	17 (68%)	9 (36%)			

\*Fisher's exact test

\*\*  $\chi^2$ **Table 3. Comparison of mean±standard deviation for self-care behaviors before and after the intervention among the study groups**

Group		Intervention group	without LNs	without LNs	P-value
Mean±standard deviation	without LNs assessment, with family involvement		without LNs assessment and family involvement		
Self-care before the intervention	Self-maintenance	48.1±7.1	47.7±7.1	48.7±13.4	*0.12
	Self-management	44.9±613.3	36±11.1	37.9±17.6	**0.07
	Self-care total score	45.8±9.4	42.3±7.7	44.2±2.4	*0.47
Self-care after the intervention	Self-maintenance	69.8±11.1	64.7±14.3	51.8±10.5	**0.001
	Self-management	73.1±13.6	52.5±15.4	40.5±17.6	**0.001
	Self-care total score	69.4±9.9	58.7±13.0	46.4±11.0	**0.001

\*Kruskal-Wallis test

\*\*ANOVA

**Table 4. Comparison of mean scores for family involvement in self-care behaviors in the intervention group and control group 1 following the intervention**

Group	Test group	without LNs assessment, with family involvement	P-value
Variable	Mean±SD	Mean±SD	
Involvement in self-care (self-maintenance)	65.8±10.9	70.6±13	*0.16
Involvement in self-care (self-management)	52.4±17.2	56.3±16.7	*0.43
Total score	59.5±1.8	63.4±2.6	*0.23

\*Independent-samples t-test

management (P=0.04). Finally, the difference in total score of self-care was not significant between the intervention group and control group 1 (P=0.23; Table 4).

## Discussion

Comparison of self-care behaviors in the dimension of self-maintenance (heart failure symptoms monitoring, adherence to diet and medication regimen, physical exercise, and regular visits to physicians) after the intervention demonstrated a significant difference between the groups. However, paired comparison of the groups in this regard showed no significant difference between the intervention group and the control group 1. However, the differences between the intervention group and control group 2 and between the control group 1 and control group 2 were significant. Given these results, it seems that the non-significant difference between the intervention group and control group 1 was due to family involvement during the intervention process.

Self-care behaviors in terms of self-management (identification of changes in one's conditions and taking appropriate and timely measures accompanied with evaluation) and the total score of self-care after receiving learning needs-based intervention in the intervention group improved compared to those of the control group 1 and control group 2 and those in the control group 1 compared with control group 2, which were statistically significant.

Furthermore, the results of the related literature in this respect suggested that self-care behavior scores increased following the intervention, which was consistent with the findings of the present study. In the given studies, a patient/family training session, three-month phone follow-up (27), and three in-group training sessions for caregivers of patients with heart failure (23) were used as intervention.

Training intervention in the study by Walker (2011) had no effects in improving self-care behaviors in the dimension of self-maintenance (26), which was in line with the findings of the present study. The results of an investigation by Holst et al. (2007) using training intervention including one learning needs-based session and one-year phone follow-up, as well as the use of a multimedia program indicated that self-care behaviors measured via the European Heart Failure Self-Care Behavior Scale (EHFSCBS) remained unchanged during the study period (31). The EHFSCBS used as a research instrument in the given study was also associated with self-care behaviors in the dimension of self-maintenance, which was in agreement with our results.

To compare the extent of involvement of family members in self-care behaviors of heart failure patients in the intervention group and control group 1, the CC-SCHFI was used. Its results showed that involvement of family members in self-care behaviors in both dimensions of self-maintenance and self-management by patients, as well as the total scores of involvement in self-care in the intervention group and control group 1 were not significantly different. Given the non-significant difference in scores obtained by patients in the intervention group and control group 1 in terms of involvement in self-care behaviors, it seems that the effect of interventions implemented in both groups were similar.

Since the study groups were not homogeneous in terms of educational level, logistic regression revealed that level of education had no effect on self-care in the dimensions of self-maintenance and self-management; however, this variable could be considered as a predictor of the total score obtained for self-care. In other words, individuals holding high school diploma and higher degrees had higher chances to obtain higher total scores in this respect, and this issue could be considered as one of the limitations of the present study. Thus, given the importance of this variable in training interventions, future investigations are suggested to have homogeneous groups in this regard. One of the other limitations of the present study was associated with age range considered in this study (patients from



18 to 90 years old) without any attention to age groups. Therefore, it was recommended to conduct future studies using separate age groups.

### **Implications for Practice**

The results of this study suggested that training interventions based on patient/family learning needs could improve self-care behaviors among patients suffering from heart failure. The findings of this study also revealed that training based on learning needs as a non-pharmacological intervention could contribute to patients with heart failure to manage the disease symptoms away from the medical team. Therefore, physicians, nurses, and healthcare providers are required to consider learning needs among patients in terms of self-management in their training programs. This issue prevents teaching a high volume of redundant and unnecessary contents, which can waste time, money, and human resources. Furthermore, the results of this study indicated that family involvement in training intervention programs can promote heart failure patients' involvement in self-care behaviors because most of such patients are aging and less-educated and suffer from physical restraints such as forgetfulness, as well as poor eyesight and hearing. In this regard, family involvement can improve self-care behaviors among these patients.

Likewise, it is suggested to provide training for all patients, especially during the hospitalization days, in further investigations and examine the impact of the number of these days on experimental and control groups because the extent of patient training programs can vary during the first days of hospitalization and the subsequent days, and thus, affect the results.

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### **Conflict of interest**

The authors declare that there is no conflict of interest.

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