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Investigation the Relationship Between Self-Care and Readmission in Patients With Chronic Heart Failure

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Background: Chronic heart failure (CHF) is associated with unpredictably increased prevalence of hospital admissions. Self-care is one of the most important aspects of management for patients with CHF. Self-care adequacy has led to increased satisfaction, independence in daily activities, reduced stress, and morbidity.
Objectives: We aimed to assess the relationship between self-care behavior and readmission rate in patients with heart failure.
Patients and Methods: A total of 287 patients with a diagnosis of systolic CHF with a left ventricular ejection fraction less than 35% admitted for acute heart failure were enrolled. The self-care behavior was assessed using SCHFI questionnaires that have three domains (self-care maintenance, self-care management, and self-care confidence). An acquired score greater than 70 was considered as proper self-care index. The study population was followed over three months after discharge for readmission.
Results: This study showed that self-care behavior was improper in our study population. More than 75% of patients had a score less than 70 in the different domains for self-care. The multivariable regression analyses showed a significant relationship between self-care management (ß = 1.6, P = 0.006, OR (CI) = 2.66 (1.37-5.1) and self-care confidence (ß = 0.9, P = 0.02, OR (CI) = 2.01 (1.1-3.68) and readmission rate.
Conclusions: We concluded that a good administration program such as education and a surveillance plan for the improvement of self-care behaviors would reduce hospital readmissions in patients with heart failure.

Keywords: Heart Failure; Self Care; Patients

1. Background

Nowadays, chronic heart failure (CHF) is one of the most common chronic diseases and the cause of most hospitalizations in the elderly (1). Nearly 15 million people worldwide and more than 4.9 million people in the United States have been diagnosed with heart failure (2). According to the Iran Ministry of Health, the number of patients with congestive heart failure was 3,337 per 100,000 persons in 2001. The median age of death and years of life lost (percent) were 65.7 years and 1.7%, respectively (3). In patients with heart failure, factors such as reduced physical abilities, impairment in social and personal relationships, reduced ability to perform job duties causing economic problems, rising cost of treatment, and affect the quality of life (QoL) (4). Self-care is considered a naturalistic decision-making process in which a patient chooses behaviors to maintain physiologic stability (maintenance) and symptom monitoring along with their responses when they occur (management). The self-care behaviors that physicians ask patients with heart failure (HF) to perform them are as follows: a low-sodium diet, weighing themselves daily, checking their limbs for swelling, taking medications, having out-patient visits regularly, being physically active, and receiving flu and pneumonia vaccinations (5, 6). The promotion of self-care behavior in patients helps them to have more control in daily activities as well as the ability to manage social performance to enhance QoL (7). The patients with heart failure need training and support in the drug regimen, proper use of drugs, diet, activities, diagnosis of signs of worsening heart failure, and the need to carry out the appropriate actions with obvious symptoms (8). At least one third of patients with heart failure are hospitalized once and 15–20% several times a year (1, 9). In the United States, heart failure results in approximately 500,000 patient admissions a year (1, 9). Most important factors for hospital readmission in these patients is a lack of awareness of the symptoms, recurrence, clinical course, medications, and food (10). Also, the non-compliance with treatment due to a lack of knowledge is a nursing diagnosis in patients with CHF (11). Therefore, attention to self-care and readmission rate in patients with CHF is a significant issue.

2. Objectives

In the present study, we assessed whether the self-care

status of Iranian patients with HF has any relationship with their readmission rate.

3. Patients and Methods

3.1 Patients Selection

After approval of the study by the Research and Ethics Committee of the Rajaie Cardiovascular Medical and Research Center, which is a tertiary center for cardiovascular medicine and heart failure programs in Tehran, Iran, a total of 287 patients with a diagnosis of reduced ejection fraction heart failure with a left ventricular ejection fraction (LVEF) less than 35% (LVEF $\leq$ 35%) who were hospitalized for acute heart failure from March–October 2013 were enrolled. The patients had to be older than 18 years of age and had good verbal communication.

3.2. Assessment of Self-Care Behavior

After obtaining informed consent, the demographic and disease-related information of the study population were registered. Then, the self-care status of each patient was assessed by the Self-care Heart Failure Index V 6.2 (SCHFI) (5, 6, 12) questionnaire. This questionnaire was designed by Riegel et al. (6) based on the three following domains: self-care maintenance, self-care management, and self-care confidence. Zamanzadeh et al. established the validation and reliability of the questionnaire in Iran (13, 14). According to the scoring guidelines of the questionnaire (6), the range of the score was transformed to 0–100 in each domain to make the results comparable and an acquired score of $\geq$ 70 was considered as score indicating a proper self-care.

3.3. Follow up the Patients

The study population was subsequently followed for 3 months after discharge for readmission. The patients were followed via phone or by reviewing their hospital charts. All causes for readmission in our center or other centers were considered.

3.4. Statistical Analysis

Patients were divided into the two following groups: > 70 proper self-care and < 70 improper self-care according to earned scores from the SCHFI. SPSS (ver 19; IBM corp, Armonk, NY, USA) was used for all statistical analyses. All data were initially analyzed using the Kolmogorov-Smirnov test to assess normal distribution. Categorical variables were presented as counts and percentages, and quantitative variables as means (standard deviation). Categorical data were compared by the chi-square test and student t-test or the Mann-Whitney tests were used, as appropriate, to compare quantitative variables. A logistic regression model was applied for multivariable analysis.

Table 1. Demographic and Clinical Findings of the Study Population [a, b]

Characteristics	Value
Age, y	60.2 ± 43.1
Gender	
Female	93 (32.4)
Male	194 (67.7)
Marital status	
Single/Widow	15 (4.9)
Married	272 (95.1)
Education status	
Primary School	110 (38.3)
High School	153 (53.3)
Academic Education	24 (8.4)
Occupation	
Unemployed	133 (46.3)
Jobholder	123 (42.9)
Retired	31 (10.8)
Heart failure etiology	
Ischemic	106 (36.9)
Valvular	52 (18)
Cardiomyopathy	129 (44.9)
Disease duration, y	
< 1	115 (40.1)
1-5	111 (38.7)
> 5	61 (21.3)
Heart failure pharmacotherapy	
Diuretic	279 (97.2)
ACE inhibitor or ARB	276 (96.2)
b-Blocker	267 (97)
Spironolactone	270 (94.1)
Digoxin	103 (35.9)
NYHA Function Class	
Class I	4 (1.4)
Class II	53 (18.4)
Class III	200 (69.7)
Class IV	30 (10.5)
Comorbid conditions	
Hypertension	97 (33.8)
Diabetes	80 (29.9)
Chronic renal failure	53 (18.5)
Chronic Lung disease	19 (6.6)
Malignancy	11 (3.8)
Cause of Admission	
Decompensated heart failure	174 (60.6)
Arrhythmias	46 (16)
Infection episode	20 (7)
Acute coronary syndrome	47 (16.4)

[a] Abbreviation: NYHA; New York Heart Association.
[b] Data are presented as Mean ± SD or No. (%).

4. Results

The majority of patients were men (67.6%) and married (95.1%) and in the range of 18–92 years of age .The mean of LVEF was 21.01 ± 7.21%. Non-ischemic cardiomyopathy was the main etiology of heart failure (47%) in our study population and decompensated heart failure was the main cause of hospitalization. All patients were managed with standard medical treatment for heart failure based on the latest guidelines (1). Table 1 depicts demographic and clinical findings of the study population.4.1. Self-Care Behavior Scores

Table 2 shows the self-care scores of the study population in the three domains obtained by the questionnaire. Further, Table 2 shows that self-care was improper for considerable percentage of the study population .The most improper domain of the self-care index was the self-care maintenance for which only 16.7% of patients had a score greater than 70 and greater than 75% of patients had an improper self-care status. In the two other domains, self-care management and confidence, only one fourth and one third of patients had proper self-care scores, respectively.

Table 2. Self-Care Scores of the Study Population [a]

Self-Care Domains	Self-Care Score	Proper Self-Care	Improper Self-Care
Self-care Maintenance	57.7 (15.11)	48 (16.7)	239 (83.3)
Self-care Management	56.05 (21.35)	73 (25.4)	160 (55.8)
Self-care Confidence	61.7 (21.52)	97 (33.8)	190 (66.2)

[a] Data are presented as No. (%).

4.2. Association Between Self-Care and the Study Variables

There was significant association among age, self-care maintenance, and self-care confidence. Self-care maintenance and confidence were significantly better among the younger population (Table 3). Tables 4 and 5 show the association between different self-care domains and study variables. Among the different variables of the study, the education level, occupation and the marital status had significant association with all three sections of the self-care index.

Table 3. Self-Care Score Among Different Age Groups [a]

Self-care domains	Age Group, y						P Value
	18–40		40–60		> 60		
	Mean score	Proper score	Mean score	Proper score	Mean score	Proper score	
Maintenance	61.6 ± 4.7	33.3	61.4 ± 4.7	19.4	57.2 ± 5.9	11.4	0.01
Management	62.2 ± 5.6	34	61.2 ± 6	37.3	59.8 ± 9.2	27	0.2
Confidence	66.5 ± 6.6	61.1	62.6 ± 4.5	41.9	56.6 ± 5.02	23.1	< 0.001

[a] Data depicts percentage of patients who have proper self-care score.

Table 4. Association Between Different Self-care Domains and Demographic Variables [a]

	Self-Care Domains					
	Self-care Maintenance		Self-Care Management		Self-Care Confidence	
	Proper Score	P Value	Proper Score	P Value	Proper Score	P Value
Gender		0.01		0.6		< 0.001
Female	8.6		29.1		18.3	
Male	20.6		32.5		41.2	
Marital status		0.001		0.02		0.05
Single	50		66.7		57.1	
Married	15		29.1		32.6	
Occupation		0.06		< 0.001		< 0.001
Unemployed	13.5		24.1		19.5	
Jobholder	23.9		46		59	
Retired	22.6		53.8		45.2	
Education		< 0.001		< 0.001		< 0.001
Primary school	12.7		23.6		8.2	
High school	20.2		35.6		49.9	
Academic Education	41.7		76.2		83.3	

[a] Data are presented as %.

Table 5. Association Between Different Self-Care Domains and Clinical Variables [a, b]

	Self-Care Domains					
	Self-Care Maintenance		Self-Care Management		Self-Care Confidence	
	Proper score	P Value	Proper Score	P Value	Proper Score	P Value
NYHA Class		0.8		0.3		0.005
Class I	25		0		0	
Class II	11		39.7		67	
Class III	19.6		25.7		27.7	
Class IV	12.6		37.1		39.1	
Duration of illness		0.2		< 0.001		0.2
< 1 year	15.7		14.9		28.7	
1-5 years	21.2		39.9		36.8	
>5 years	11.6		47.1		39.4	
Admission Cause		0.1		0.5		0.2
DHF	17.2		30.1		34.5	
Arrhythmias	26.1		32.3		41.3	
Infection episode	5		50		15	
ACS	10.6		29.4		31.9	
Comorbid Conditions						
DM	16.3	0.8	32.8	0.7	27.5	0.1
HTN	10.3	0.03	27.7	0.3	18.6	< 0.001
CLD	10.5	0.4	22.2	0.3	36.8	0.7
CRF	11.3	0.2	49	0.003	43.4	0.1
Malignancy	9.1	0.4	62.5	0.05	18.2	0.2

[a] Abbreviations: ACS; acute coronary syndrome, CLD; chronic lung disease, CRF; chronic renal failure, DHF; decompensated heart failure, DM; diabetes mellitus, HTN; hypertension, NYHA; New York heart association.
[b] Data are presented as %.

4.3. Follow up Findings

All patients were successfully followed for 3 months for all causes of readmission. During this 3 months follow up, 167 (58.2%) of 287 patients were readmitted and 5 (1.7%) patients died. The main cause of readmission was decompensated heart failure (67%) and the most common cause of decompensation was pneumonia or urinary tract infection (87%). The arrhythmias or acute coronary syndromes were other causes of rehospitalization.

4.4. Association Between Readmission and Self-Care

The multivariable regression model showed that self-care maintenance had no association with readmission in our study population. However, self-care management and confidence showed significant association with readmission (Table 6).

Table 6. The Adjusted Relationship Between Dimensions of Self-Care, Readmission and Other Factors [a]

	Beta	SE	P Value	OR (95%CI)
Age	0.4	0.39	0.2	1.5 (0.7-3.3)
Gender	0.2	0.2	0.4	0.8 (0.5-1.3)
Marital status	1	0.8	0.2	2.7 (0.5-13)
Occupation	0.007	0.2	0.9	1.007 (0.65-1.5)
Education	0.2	0.2	0.3	0.7 (0.47-1.3)
LVEF	0.009	0.2	0.9	0.9 (0.6-1.4)
NYHA class	0.001	0.12	0.9	0.9 ((0.7-1.3)
DM	0.02	0.3	0.9	1.02 (0.5-2.1)
HTN	0.06	0.3	0.8	1.06 (0.5-2.1)
CLD	2.06	0.6	0.001	0.12 (0.03-0.4)
CRF	0.2	0.4	0.5	0.7 (0.3-1.7)
Malignancy	0.9	0.9	0.3	2.5 (0.4-15)
Readmission	0.13	0.17	0.4	0.8 (0.6-1.2)
Self-care Maintenance	0.19	0.4	0.6	1.2 (0.5-2.7)
Self-care Management	1.06	0.4	0.006	2.9 (1.4-5.3)
Self-care Confidence	0.9	0.3	0.02	2.4 (1.1-5.3)

[a] Abbreviations: CLD; chronic lung disease, CRF; chronic renal failure, DHF; decompensated heart failure, DM; diabetes mellitus, HTN; hypertension, LVEF; left ventricular ejection fraction, NYHA; New York heart association

5. Discussion

CHF is the most common cause of hospitalization in the elderly, which is a burden on the public health system (1, 2). For this reason, in parallel with the increasing

prevalence of heart failure worldwide, instructing and treating this group of patients and educating them on the different self-care domains is emphasized to help them to adapt to the disease, have lower rates of hospitalization, and a better QoL (4, 9, 15, 16). Due to the increasing number of patients with HF who were referred to our center, which is a tertiary center for heart failure programs in Iran, it was necessary to have studies on various aspects of self-care in heart failure. The results of the present study indicated that the three domains of self-care were improper in our study population. As mentioned in the results, more than 3/4 of patients had improper self-care scores. Only one fourth and one third of patients had good self-care management and self-care confidence, respectively. This suggests that patients with HF are not properly trained when they encounter the nature of their disease and its treatment methods. Other studies in different countries have shown similar results. Seto et al. (17) indicated that 50–60% of patients had improper scores in the three domains of self-care. Dennison et al. in United States (18) indicated that 60% of patients had low scores in all three domains of self-care. In our study, significant relationships were seen among the three domains of self-care and different factors such as age, gender, occupation, education, left ventricular ejection fraction, and duration of disease. Table 2 shows that self-care was better in men, those who have higher education, and are younger. Chriss et al. (19) and Lee et al. (20) indicated similar results. To overcome this problem more training sessions for females, elderly patients, and those with less education as well as their families would be useful. There was an inverse relationship along the three various domains of self-care with a married status and patients who were single had better scores for self-care, which may be due to involvement of family and marital conflicts. Lee et al. (20) showed that the self-care maintenance is better in unmarried women. They explained that the responsibilities of married women to care for other family members might cause less attention to their own self-care. Family counseling can be an effective way of optimizing this domain of self-care. Chriss et al. (19) found that the reason of heart failure could affect self-care behavior. In the present study, multivariate analysis showed that a history of high blood pressure and shorter duration of disease could be related to improper self-care (Table 3). Cameron et al. (21) stated that self-care management is better in patients with HF for more than two months. Multivariate analysis was used to examine the relationship between ejection fractions and functional capacity with the three self-care domains of the study, and showed that people with a lower ejection fraction and higher functional capacity had a better score in self-care. The severity and longer duration of the disease leads to readmission of patients to medical centers and helps them to obtain more experience as to the signs, symptoms, self-care, and treatment. In our study, no significant relationship was found among a history of diabetes mellitus, lung disease, cancer, and self-care and/or readmission rate. In contrary to our study, Carlson et al. (22) showed that underlying lung diseases lead to higher readmission rate . A readmission rate of 58.2 in this study is considerably high which is similar to other similar studies (16, 19). As shown in Table 4, there is no significant relationship between the self-care maintenance and hospital readmission rate . Similar result has been reported by Dennison et al. (18) Given that one of the factors in readmission for heart failure is the lack of awareness about treatment regimen, patient awareness of appropriate treatment regimen is not only a key factor against the disease, but also increases the patient's ability to accept the new situation and to prevent the increased risk of complications. There was significant relationship between self-care management and confidence of a heart failure patient with readmission rate. The patients with low self-care management and confidence had higher readmission rates. Lee et al. (20) and Dennison et al. (18) concluded the same result about self-care management and confidence respectively. According to the findings of our study, patients with chronic heart failure were improper in the three domains of self-care (maintenance, management, and confidence). Management and confidence domains were significantly associated with readmission rate of patients with HF .The result of this study indicates the need of a good administration program such as education and surveillance plans to improve self-care behaviors will reduce hospital readmissions for these patients.

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Authors' Contributions

Ali Sahebi. data collection, statistical analysis, interpretation; and drafting of the manuscript; Jaleh Mohammad-Aliha, design of the study, Interpretation and drafting of the manuscript; Mohammadmostafa Ansari-Ramandi, drafting the manuscript; Nasim Naderi, (corresponding author) concept and design of the study, interpreting the data, revising and editing the manuscript.

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