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DETERMINATION OF FACTORS RELATED TO EMERGENCY RE-REFERRAL IN PATIENTS WITH HEART FAILURE A HOSPITAL IN TEHRAN — IRAN: A CROSS-SECTIONAL STUDY

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ABSTRACT

INTRODUCTION: The re-referral of heart failure patients to the hospital is a significant health problem today and is one of the most costly and preventable events for these patients. The present study aimed to investigate the factors affecting the re-referral of patients with heart failure to the emergency department of Shahid Beheshti University of Medical Sciences in Tehran in 2021. Identifying these factors can lead to the recognition of patients at high risk for re-hospitalization and the design of preventive and effective interventions.

MATERIAL AND METHODS: This descriptive-correlational research was performed cross-sectionally. Ninety patients with heart failure who were re-referred to the emergency department of Masih Daneshvari Hospital entered the study. Sampling was done for 6 months from December 2020 to May 2021. Data collection tools included a researcher-made questionnaire and a European self-care questionnaire for heart failure patients, and the New York Heart Association Classification (NYHA) standard for classifying heart failure class. After completing the questionnaires, the collected data were analyzed by SPSS23 software.

RESULTS: The results showed that age (the mean age of the participants in the study was 69.9 years), duration of disease (77.8% was six months to four years), body mass index (the mean body mass index was 27.2) (demographic characteristics) dyspnea (78.9%), organs edema (47.8%), shortness of breath (pathological factors), high blood pressure (54.4%), diabetes (25%), chronic obstructive pulmonary disease (11.1%), and ischemic heart disease (3.3%), (background diseases), high creatinine (the mean 1.98), (laboratory findings), not using beta-blockers (18.4%) and not taking angiotensin receptor blockers (18.8%) (pharmacological agents), NYHA criteria (89% were in NYHA class 3 and 4) and self-care levels of heart failure patients (the mean self-care score was 37.4) have a statistically significant association to re-referrals to emergency (p-value < 0.05).

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CONCLUSIONS: Identify patients with a high risk of hospital re-referral and decrease additional costs imposed on care centers by recognizing the factors influencing the re-referral of patients with heart failure and design preventive and effective interventions. So, it is possible to increase the patient's self-care level while reducing the number of re-referrals.

KEY WORDS: re-referral; heart failure; patients; hospital cooperation; Iran

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INTRODUCTION

Heart failure is a complex clinical syndrome that results from functional or structural dysfunction of the ventricular or extracorporeal filling, leading to clinical symptoms such as dyspnea, fatigue, and signs of respiratory failure such as edema and pulmonary rale [1]. Besides, this disease is considered one of the most common chronic diseases worldwide and is the final stage of many cardiovascular diseases [2–4].

Today approximately 26 million patients are diagnosed with heart failure worldwide, and this number is likely to increase by 25% in 2030 [5]. According to the Centers for Disease Management, the number of people with heart failure in Iran is about 3,400 per 100,000 [6]. Despite significant advances in diagnostic evaluations and therapeutic interventions, heart failure is a condition characterized by disability, mortality, and high economic burden [7–9]. According to the American Heart Association (AHA), about 7.3% of all deaths from cardiovascular disease are due to heart failure. Studies in Iran have also shown that cardiovascular disease has the highest mortality rate compared to other diseases. The 5-year mortality rate has been reported to be 45% in women and 60% in men [6, 10, 11]. Still, according to the AHA, the prevalence of heart failure between 2012 and 2030 is expected to increase by 46%. So, patients with heart failure will be under 65, and they will have a 6 to 9 times higher risk of sudden death [12].

Heart failure is a significant cause of economic costs in many parts of the world. The main costs are related to referring and hospitalization, followed by medications and social support [13–15]. The admissions and returns of these patients to the hospital are critical health problems today. Despite the advances in political management and numerous studies predicting the re-occurrence of heart failure, it is estimated that more than 50% of patients with heart failure return to the hospital within six months of discharge due to disease-related conditions. Also, one in five patients with heart failure will return to the emergency room after discharge. Moreover, a re-emergence of heart failure 18 to 24 months after discharge is a poor prognosis for the patient [16–18].

Health care for patients with heart failure occurs mainly in healthcare centers. When these patients need immediate treatment due to the worsening of their symptoms [19, 20], emergency departments are the first line of communication between the patient and the health care system and the patient's main entrance to this system. Due to the unique nature of functional processes in terms of complexity and the number of patients, the emergency has an essential role in reducing mortality and restoring health and satisfaction [21]. Overcrowding in the emergency department is a severe problem in the healthcare system worldwide. Recognizing the causes of this problem will probably decrease the number of patients and improve care quality [22].

Decrease re-referrals to hospitals and emergency rooms after patient discharge is a priority for policymakers, healthcare leaders, and physicians. This reduction is recognized as one of the health care indicators in the United States [23]. The unnecessary use of these resources influences the quality of services provided to patients and the effectiveness of the discharge process. To achieve positive effects on the clinical outcomes reported by patients, heart failure management programs have been developed [24–26].

Despite the number of studies about the rate of re-referrals and hospitalization of heart failure patients, little is known about the cause of returns and re-referrals to the emergency room. Interventional studies inside and outside the hospital have been able to identify factors that decrease the risk of re-hospitalization in heart failure. In general, the reasons for returning to the hospital are divided into three general categories: 1 — Factors related to health care: such as health and subsets of health care; 2 — Factors related to the patient: includ-

ing social and family environment and adoption of treatment measures; 3 — Disease-related factors: such as its natural progression or a combination of all of them [27]. While some of these factors may be avoidable and controllable, the factors related to heart failure are not consistently controlled. Identifying these factors can help identify patients at high risk for re-hospitalization and design effective preventive interventions [28, 29].

Nursing participation is a comprehensive dimension of disease management programs for heart failure and a vital component of this intervention. Some studies have found that a multidisciplinary approach to disease management reduces the duration of hospitalization, and the rate of admission and re-referral improves the quality of life and increases patient survival [30–32]. Nurses have a special place as members of the health team. Their understanding of heart failure patients' re-referral helps develop a strategy to prevent the possibility of re-referral and thus better use of resources and cost maintenance.

To improve heart disease management, it is necessary to understand the factors associated with re-referral [29, 33, 34]. Recognition of these factors plays an essential role in increasing the life expectancy of patients while identifying the unmet medical, educational, and psychological needs of patients, which will reduce their re-referral rate [34]. Therefore, this study was conducted to investigate the factors related to emergency re-referral in patients with heart failure in the selected hospital of Shahid Beheshti University of Medical Sciences in Tehran.

MATERIAL AND METHODS

Study design

This descriptive-correlational research was performed cross-sectionally. The research population includes patients with heart failure referring to the selected hospital emergency department of Shahid Beheshti University of Medical Sciences in Tehran. Sampling was done for 6 months from December 2020 to May 2021 Accordingly, based on the Heydari et al. study [35], the sample size was estimated to be 81, including the possibility of 20% sample loss. Ninety patients with heart failure were selected and studied as available samples which were qualified and referred to the emergency room of Masih Daneshvari Hospital. Inclusion criteria: the ability to answer questions, age over 55, at least six months after diagnosis, congestive heart failure grade 2 or 3 or according to the New York Heart Association (NYHA) classification, and absence of mental problems such as Alzheimer's and mental retardation. After obtaining a Shahid Beheshti University of Medical Sciences license, they referred to the research fields. Sampling began in this center after introducing and obtaining permission from the competent authorities of Masih Daneshvari Hospital. At the beginning of the study, the patient was informed about the research, and the confidentiality of the questionnaire information was emphasized. Data collection tools included a researcher-made questionnaire and a European self-care questionnaire for heart failure patients, and the NYHA standard for classifying heart failure class.

Statistical analysis

After completing the questionnaires, the collected data were analyzed using SPSS23 software. Descriptive statistical tests were used to analyze the frequency of data and determine the factors affecting patients' re-referral. Independent parametric T-tests, one-way analysis of variance, and nonparametric Spearman correlation tests were used.

The tools used in this study included the following three questionnaires: Questionnaire related to patient information, NYHA criteria for classifying heart failure and severity of illness and European self-care questionnaire for patients with heart failure.

Questionnaire related to patient information

According to previous studies, this questionnaire examines patients with heart failure in 5 dimensions:

— **Demographic dimension:** Demographic characteristics of people were measured, including age, sex, marital status, income status, insurance status, employment status, level of education, patient referral, caregiver, heart failure detection time, body mass index, and body surface area.

— **Pathological factors:** The pathological causes of the patient's re-referral to the emergency room were evaluated, including dyspnea, weakness, lethargy, chest pain, general body pain, limb edema, shortness of breath, and fever, cough, abdominal asthma.

— **Background diseases:** Background diseases were examined along with heart failure, including cases such as acute coronary syndrome, heart attack, open-heart surgery, chronic

obstructive pulmonary disease, having a pacemaker, atrial fibrillation heart rhythm, peripheral vascular disease, diabetes, hypertension, stroke, malignancies, hyperlipidemia, anemia, gastrointestinal diseases, chronic renal failure, dialysis, pneumonia, asthma, ischemic heart disease, pleural effusion, and pulmonary emphysema.

— **Pharmacological factors:** The patient's medications were questioned based on group therapy and included the following: beta-blockers, renin-angiotensin system inhibitors, diuretics, nitrates, statins, insulin, calcium channel blockers, and alpha-receptor inhibitors.

— **Laboratory and paraclinical findings:** The laboratory findings were available to patients (blood sugar, biochemical tests, liver tests, arterial blood gas results), and findings from echocardiography were evaluated (ejection fraction and pulmonary vein pressure).

The validity of the questionnaire was confirmed by experts and was given to professors and 10 patients with heart failure to determine the reliability of the questionnaire, and its overall reliability was estimated at 0.73.

NYHA [36] criteria for classifying heart failure and severity of illness

The New York Heart Association has divided heart failure into four categories based on the amount of activity that causes these symptoms:

— **Class one:** The patient performs regular physical activity without causing fatigue, dyspnea, palpitations, or chest pain. Lack of lung congestion or peripheral blood pressure, the patient is asymptomatic. There is no limit to daily life activities, and the prognosis is good.

— **Class two:** The patient has low limitations in daily life activities. The patient does not report symptoms during rest but will experience symptoms with increased physical activity. The rale and S3 murmur may be heard at the base of the lungs, and the prognosis is still good.

— **Class three:** The patient has clear limitations in daily life activities. The patient feels comfortable at rest but suffers from dyspnea with less activity than usual, and the prognosis is poor.

— **Class four:** The patient also has symptoms at rest, which is a sign of heart failure, and the prognosis is poor.

European self-care questionnaire for patients with heart failure

The European questionnaire on the self-care behavior of patients with heart failure was developed by Jarasma et al. [37]. The questionnaire has 12 items. Furthermore, the items are based on a five-point Likert rating: that is totally true 1 point, that is true 2 points, to some extent 3 points, that is not true 4 points, and not at all 5 points. This questionnaire's overall score was calculated by adding the scores of all items together. The score range will be between 12 to 60. Scores between 12 and 28 were considered good, 29 and 44 average, and 45 and 60 poor. The lower the score obtained in this questionnaire, the better the self-care behavior level of people and vice versa. The formal and content validity of the self-care questionnaire in Khoshtarash et al. [38] research was approved by ten nursing and midwifery professors. Its reliability was calculated at 0.71 by Cronbach's alpha method.

Ethics considerations

This study was drawn from a research project (No. IR.SBMU.PHARMACY.REC 1397.095) sponsored by the Deputy of Research and Technology at Shahid Beheshti University of Medical Sciences. Participants were aware of the purpose of the study and provided informed consent prior to accessing the questionnaire and participated voluntarily. No compensation was provided, and all collected data was stored securely.

RESULTS

Sociodemographic profiles results of the data analysis from the questionnaire related to patients' information and the European self-care questionnaire for heart failure patients, and the NYHA standard for classifying heart failure class, showed that most of the participants were men (62.2%), married (76.7%), and had primary education (24.4%). The duration of diagnosis in the majority (77.8%) was six months to four years. Meanwhile, most of the samples (90%) were in Classes 3 and 4 of the American Heart Association. The mean age of the participants in the study was 69.93 years, the mean body mass index was 27.25, and the mean number of emergency referrals was 11.33.

Most participants (78.9%) re-referred to the emergency room due to dyspnea followed by hands

and feet edema (47.8%) and 25.6% by chest pain. Cough, palpitations, and nausea are other common symptoms that have caused CHF patients to re-refer to the emergency room. Some symptoms such as loss of consciousness, imbalance, and dizziness were not reported in any samples.

Among the background comorbidities, most patients with heart failure who participated in the study had high blood pressure (54.4%). Cardiac angioplasty (34.4%) and diabetes mellitus (25%) also appeared, and other background diseases associated with heart failure include chronic kidney failure, smoking, hypothyroidism, and heart attack.

The frequency of patients with different drugs shows that most samples participating in the study (67.7%) use beta-blockers. Followed by antiplatelet drugs, diuretics, and booster medications. Insulin and levothyroxine were also evaluated as diabetes and hypothyroidism were among participants.

The minimum ejection fraction of participants of the study is 10%, and the maximum is 65%. In terms of blood sugar, the mean blood sugar in participants was 131.76. Other important biochemical experiments that influenced the study results are given in Table 1.

In addition to Table 1 shows the demographic and self-care characteristics of patients with heart failure referred to Masih Daneshvari Hospital. The minimum self-care score is 23, the maximum is 50, and the average self-care score is 37.44. Only 6.7% of the participants had an excellent self-care score. Most patients with heart failure who were re-referred to the emergency room of Masih Daneshvari Hospital (83.3%) had a moderate self-care score.

In relation to related laboratory and paraclinical factors, since the distribution of data was normal, Spearman's non-parametric test was used to correlate them with re-visits, and the results showed that only creatinine of heart failure patients has a statistically significant relationship with their re-visits. The results of the data analysis are shown in Table 2.

The result of the study showed that some of the factors raised in the questionnaire can have a direct effect on emergency re-referral in patients with heart failure, which is shown in Table 3.

DISCUSSION

The study results showed that some of the factors mentioned in the questionnaire could directly affect re-referral, which is fully shown in Table 1. In the results

Table 1. Questionnaire related to information of heart failure patients re-referred to the emergency room of Masih Daneshvari Hospital

Demographic specifications		
Age (average)	69.9	
Body mass index (average)	27.2	
Body surface area (average)	1.9	
Emergency re-referrals (average)	11.5	
Gender		
Man (frequency)	56	62.2
Woman (frequency)	34	37.8
Marital status		
Married	69	76.7
Single	5	5.6
Dead spouse	16	17.8
CHF diagnosis time		
Less than 6 months	4	4.4
4 months to 4 years	70	77.8
More than 4 years	16	17.8
NYHA classification		
1 class	2	2.2
2 class	7	7.8
3 class	40	44.4
4 class	41	45.6
Income		
Enough	25	27.8
Somewhat enough	46	51.1
Insufficient	19	21.1
Level of education		
Illiterate	18	20
Elementary	22	24.4
High school	14	15.6
Diploma	17	18.9
University	19	21.1
Pathological factors	**Number**	**Percent**
Dyspnea	71	78.9
Chest pain	23	25.6
Limb edema	43	47.8
Shortness of breath	3	3.3
Palpitations	11	12.2
Fever	2	2.2
Cough	14	15.6
Abdominal ascites	4	4.4
Nausea	11	12.2
Background comorbidities		
Acute coronary syndrome	2	2.2
Heart attack	16	17.8
Coronary artery angioplasty	31	34.4

→

Table 1 (cont.). Questionnaire related to information of heart failure patients re-referred to the emergency room of Masih Daneshvari Hospital

Open heart surgery	2	2.2
Chronic obstructive pulmonary disease	10	11.1
Blood pressure	49	54.4
Diabetes	25	27.8
Pacemaker	6	9.7
Stroke	1	1.1
Chronic renal failure	11	12.2
Dialysis	3	3.3
Pulmonary embolism	4	4.4
Pleural effusion	5	5.6
Malignancies	3	3.3
Addiction	3	3.3
Smoking	18	20
Hypothyroidism	9	10
Ischemic heart disease	7	7.8
Medicinal agents		
Beta-blockers consumption	60	66.7
Taking angiotensin receptor blockers	37	41.1
Using angiotensin II receptor antagonists	38	42.2
Diuretics consumption	61	67.8
Digital consumption	30	33.3
Statins consumption	37	41.1
Nitrates consumption	19	21.1
Insulin consumption	15	16.7
Alpha-blockers consumption	6	6.7
Calcium channel blockers consumption	11	12.2
Taking consumption	9	10
Antiplatelet drugs consumption	64	71.1
Laboratory factors	**Average**	**Standard deviation**
Urea	76.03	64.1
Creatinine	1.98	1
CPK	81.13	70
CKmb	19.81	8.6
Na	135.51	3.38
K	4.19	0.61
Ca	9.33	0.97
LDH	285.12	193.4
Alk.p	303.54	265.7
AST	33.2	38.6
ALT	48.7	110
WBC	8.84	3
RBC	4.52	0.70
Hb	12.60	2.1
Plt	209.24	99.3
INR	1.45	0.44
PT	15.41	2.9
PTT	35.78	9.5
BS	131.76	59.6
HCO3	55.56	3.3
PaCO2	44.44	5.9
PH	7.39	0.06
Para clinical agents		
Ventricular ejection fraction	38.67	11.6
Pulmonary vein pressure	46.34	10.7
Self-care agent		
Self-care		
Good	6	6.7
Medium	75	83.3
Weak	9	10

INR — the international normalized ratio; PT — prothrombin time; PTT — partial thromboplastin time; BS — blood sugar; HCO3 — bicarbonate/hydrogencarbonate; PaCO2 — partial pressure of carbon dioxide; PH — potential of hydrogen; CPK — creatine phosphokinase; CK-mb — creatine kinase-MB; Na — Na sodium; K — potassium; Ca — calcium; LDH — lactate dehydrogenase; Alk.p — alkaline phosphatase; AST — aspartate aminotransferase; ALT — alanine transaminase; WBC — white blood cells; RBC — red blood cells; Hb — hemoglobin; Plt — platelets; PAP — pulmonary artery pressure

of this study, most patients with heart failure (77.8%) were re-referred to the emergency department more than six times. Comparing, Heydari et al. [35] found that 57% of heart patients were hospitalized again. Bhatia et al. [39] study, the re-referral rate of heart failure patients during the six months after discharge was 61.8%. Dharmarajan's et al. [40] study reported that the re-referral rate in patients with heart failure was 24.8%. In the Hamner et al. [41] study, performed retrospectively, 40% of heart failure patients were re-admitted six months after the first hospitalization.

In contrast, the percentage of patients with heart failure in European countries was lower than in the research conducted in Iran. Perhaps more advanced medical centers and more attention to home care systems in Western countries can be attributed to this difference. In the case of demographic factors, the study results showed three age variables, body mass index, and duration of disease diagnosis as factors related to re-referral. No study has been found on the duration of the disease and its relationship to re-referral, but it can be argued that the longer the duration of heart

Table 2. Results of quantitative variables correlation in the study with re-referrals based on the Spearman test

Variables	Re-referral	
	The correlation coefficient	Significance level
Body area level	–0.017	0.87
Ejection fraction rate (EF)	–0.022	0.83
PAP	–0.175	0.09
Urea	0.009	0.93
Creatinine	0.042	0.00
CPK	–0.116	0.27
Sodium	–0.121	0.25
Potassium	0.024	0.82
Calcium	0.008	0.94
LDH	–0.095	0.37
Alkaline phosphatase	–0.085	0.42
AST	0.031	0.77
ALT	–0.147	0.16
White blood cells	0.017	0.87
Red blood cells	0.016	0.88
Hemoglobin	0.059	0.58
Platelet	–0.059	0.58
PT	0.022	0.83
PTT	0.085	0.42
INR	–0.106	0.32

INR — the international normalized ratio; PT — prothrombin Time; PTT — partial thromboplastin time; BS — blood sugar; HCO3 — bicarbonate/hydrogencarbonate; PaCO2 — partial pressure of carbon dioxide; PH — potential of hydrogen; CPK — creatine phosphokinase; CK-mb — creatine kinase-MB; Na — Na sodium; K — potassium; Ca — calcium; LDH — lactate dehydrogenase; Alk.p — alkaline phosphatase; AST — aspartate aminotransferase; ALT — alanine transaminase; WBC — white blood cells; RBC — red blood cells; Hb — hemoglobin; Plt — platelets; PAP — pulmonary artery pressure

failure, the patient has more time to refer. Different studies have shown different results regarding age. In some studies, age has been suggested as a strong predictor [42–44]. However, in other studies, such as the study by Roohani et al. [45], there is no significant statistical relationship between re-referral and re-hospitalization with age. Explaining whether age can be statistically related to the number of re-referrals, it can be examined that with increasing age, heart rate decreases.

On the other hand, the elderly are more prone to disease progression. Therefore, age can affect re-referrals. Regarding the body mass index and its relationship to re-hospitalization, the results of Hekmatpour et al. and the Ravi Shah study also showed that body mass index effectively re-hospitalization of patients with heart failure [46, 47], and is consistent with the results of the present study. In the Arora study, the results showed that obesity is one of the factors influencing re-hospitalization [48]. Obesity in patients with heart failure can add extra pressure to the heat load and, therefore, be more effective in their re-referrals to medical centers. Another variable examined concerning re-referral was the American Heart Association's classification of heart failure. The study results showed that the NYHA classification level was consistent with the re-referral of heart failure patients [49].

The results showed a statistically significant relationship with re-referral, consistent with some studies, including the Farasat. The results showed that most participants were referred to the emergency room due to dyspnea, followed by Hands and feet edema. In contrast, in the Retrum study, limb edema and shortness of breath were reported as the most common causes of re-referrals in patients with heart failure [50]. Gheorghiade's study also showed that orthopnea (dyspnea while lying down) is one of the main factors in the re-referrals of patients with heart

Table 3. Factors associated with emergency re-referral in patients with heart failure
Demographic factors
Age
Body mass index
Diagnosis time
Pathological factors
Dyspnea
Limb edema
Shortness of breath
Factors related to background diseases
Blood pressure
Diabetes
Chronic obstructive pulmonary disease
Ischemic heart disease
Laboratory and para clinical agents
High creatinine
Medicinal agents
Not using beta-blockers
Not taking angiotensin receptor blockers
Self-care level
Poor self-care level
NYHA classification
Classes 2 and 3 based on the NYHA classification

failure [51] and is consistent with the results of the current study. Also, in a study by Heydari et al. [35], some patients were re-hospitalized for more than one underlying cause. Others were re-referred due to the exacerbation of the disease (with symptoms such as chest pain, dyspnea, palpitations, edema, weakness, and lethargy). So, patients with heart failure experience many symptoms due to the inefficiency of the heart system; and dyspnea and limb edema are the most common symptoms. Examining the causes of early recurrence in patients with heart failure, Muzzarelli et al. [52] showed that angina, limb edema, and dry cough were associated with re-referrals of these patients.

Furthermore, Moser [53] showed that 94.4% of heart failure patients had shortness of breath during the month after discharge, 81.7% reported some degree of limb edema, and 88.7% reported fatigue during the day. According to this study and other similar studies, pathological symptoms associated with heart failure are considered one of the leading causes of these patients' re-referrals, including dyspnea, limb edema, and fatigue. Therefore, more attention to the control of these symptoms can moderate the re-referral and re-admission of these patients.

When the heart cannot function correctly, it affects other systems in the body, including the lungs, nerves, kidneys, and other organs. On the other hand, defects in any body system can affect the severity of symptoms associated with heart failure, so paying attention to background diseases and heart failure is fundamental in re-referrals and plays an essential role in treatment plans. The current study results showed that chronic obstructive pulmonary disease, hypertension, diabetes mellitus, and ischemic heart disease are the four most common background diseases affecting the re-referral of patients with heart failure. In a study, Lim at al. [42] showed that chronic obstructive pulmonary disease and hypertension could affect the re-referral of patients with heart failure. However, ischemic heart disease and diabetes mellitus did not predict re--referral, which contradicts the results of this study. In Aranda's et al. [54] study, background diseases, high blood pressure, and diabetes mellitus had a statistically significant relationship with the re-referral of heart failure patients six to nine months after discharge. However, it should be noted that chronic obstructive pulmonary disease has not been considered in this study. In Pierre-Louis's [55] article, diabetes mellitus and chronic obstructive pulmonary disease have been cited as the leading causes of heart failure patients' re-referral to the hospital. However, high blood pressure did not have a statistically significant relationship with re-referrals. In Western countries, healthcare systems are more focused on prevention and treatment at home. Maybe high blood pressure has no significant relationship in this study because the factor influencing the re-referral of patients with heart failure was poor health care in Iran. No attention is paid to home care and prevention principles in this treatment category. Based on the results of this study and other studies, it can be concluded that the background diseases associated with chronic obstructive pulmonary disease, hypertension, and diabetes mellitus are the major causes of patients with heart failure re-referrals to medical centers. Therefore, these centers and relevant specialists should consider the control of these diseases.

The goal of drug therapy in patients with heart failure is to prevent exacerbation of the disease, improve the heart's contractile strength, and reduce the pressure on the heart. Medications such

as beta-blockers, angiotensin receptor blockers, and digoxin are among the drug groups used. Suppose medication is prescribed based on the level of heart failure. In that case, better treatment will undoubtedly be given, and the subsequent side effects will be diminished, and a decrease follows this in re-referrals. The association of medications with re-referral was assessed. The current study results showed that most samples received beta-blockers, angiotensin receptor inhibitors, and diuretics.

On the other hand, the T-test results showed a statistically significant relationship between the re-referral of patients with prescription or non-prescription beta-blockers and angiotensin receptor inhibitors. In this way, patients with heart failure who did not receive these drugs had a higher average refer to the emergency room. Similar studies were reviewed: in Moser's study [53], the considered samples (79%) used beta-blockers, and 77% of them received ACEI, which confirms the present results. Lim et al. [42] showed that the administration of beta-blockers and angiotensin receptor inhibitors after discharge was significantly statistically associated with re-referrals in patients with heart failure and is consistent with the current results. Pierre Louis et al. [55] concluded that prescribing beta-blockers and ACEIs did not have a statistically significant association with re-hospitalization, which was inconsistent with the current study results. The results of the Sanam et al. [56] study showed that prescribing ACEI after discharge reduced the re-referral of patients with heart failure. Setoguchi et al. [57] also found that not prescribing beta-blockers after discharge increased the re-referral rate in patients with heart failure.

Disruption of laboratory findings, in turn, can cause signs and symptoms that can lead to re-referral in patients with heart failure. Water and electrolyte disturbances, heart enzyme disturbances, and disturbances in arterial blood gases can affect the severity of heart failure symptoms. Therefore, the attention and elimination of these causes and their treatment can affect the subsequent patients' re-referrals. Pearson's correlation in Table 2 showed that the only laboratory parameter associated with the re-referral of patients with heart failure was creatinine. Decreased cardiac function, which leads to heart failure, will affect kidney function.

On the other hand, heart failure is one of the main symptoms of limb edema, and now if the kidneys are underactive, these symptoms will intensify. The explanation was physiological, but it is necessary to examine the studies to prove or disprove this claim with more substantial reasons. In the study of Gheorghiade et al. [51], which looked at the factors associated with re-hospitalization in patients with heart failure, the results showed high creatinine, high urea, sodium, and B-type natriuretic peptide (BNP) were statistically significant in association with re-referrals [50]. In the present study, only high creatinine had a statistically significant relationship. In the study of Muzzarelli [52], the results showed that re-referral in patients with heart failure had a statistically significant relationship with high creatinine past thirty to ninety days after discharge.

Sodium disorders did not have a statistically significant relationship with re-hospitalization, which confirms the current study results [51]. Instead of using creatinine, Pierre Louis et al. [55] used glomerular filtration to relate kidney function to re-hospitalization. The study results showed that the lower the kidney function, the higher the re-referral rate of patients with heart failure, which is consistent with the results of the current study [54]. Regarding the para-clinical findings based on extracted echocardiography from the patient, ventricular ejection fraction and pulmonary artery pressure did not significantly correlate to re-referral. Muzzarelli's study showed that the mutation ejection fraction was not consistent with the re-referral of patients with heart failure and was consistent with the current study [52]. However, the study results by Gheorghiade et al. [51] showed that EF had a statistically significant relationship to the re-referral of heart failure patients, so that the lower the rate of ventricular mutation ejection fraction, the lower the rate of ventricular mutation ejection fraction, the higher the mean hospitalization and re-referral [50].

The study results showed that the average self-care score of patients with heart failure was 37.44. Most patients with heart failure who were referred to the emergency room of Masih Daneshvari Hospital (83.3%) had moderate self-care scores. ANOVA test revealed that the self-care status of patients with heart failure was statistically significant when they were re-referred to the emergency room, which means that patients who had better self-care had lower referrals to the emergency room and vice versa. In the study of Khoshtarash M et al. [38], the results showed a significant statistical relationship between the self-care of patients with heart failure and hospitalization and re-referrals, which is

consistent with the results of the current study [33]. Retrum's study showed that good self-care alone could not moderate re-referral, but both good and practical self-care can moderate the number of re-referrals [50]. In his study, Ditewig et al. [58] showed that good self-care could reduce the number of re-referrals and even deaths of patients with heart failure. However, it should be noted that in Western countries, more attention is paid to increasing self-care because most Western studies have reported higher rates of patient self-care. However, the results of this study and the studies that were examined confirm the principle that more self-care in patients with heart failure can moderate re-referrals.

Limitations

The psychological state of the research units when answering the questions can affect the way they answer and therefore it is considered a limitation of the research. In this research, all the cultural-social aspects of the patients cannot be examined, and considering the possible impact of the cultural and social status of cardiac patients on the occurrence of re-hospitalization, this issue can be considered a limitation of the research. Considering the hemodynamic status and clinical conditions of the patients and the many questions in the questionnaire, the assessment of the patient's mental status, including depression and anxiety, and its effect on re-visits could not be measured, so it should be investigated in separate studies. The reason for conducting the study in a hospital may reduce the generalizability of the study results.

CONCLUSIONS

The emergency room has always been known as the heart of hospitals and a symbol of the whole hospital. The hustle and bustle of the emergency department can overshadow the quality of nursing care, and planners should always keep in mind that they need to reduce the number of emergency referrals in the future. Patients with heart failure experience a complex and chronic condition, and a variety of factors can exacerbate the disease and its symptoms, leading to re-referrals. A general understanding of the factors and risk factors affecting the re-referral of patients with heart failure can identify patients at high risk of re-referral. Nurses, who have consistently been recognized as the critical elements of health care systems, can reduce the number of emergency re-referrals by modifying these symptoms. This study provides a comprehensive review of the factors associated with the re-referrals of patients with heart failure in hospital emergencies, and planners are expected to use the results of this study in future planning of treatment systems, especially emergencies.

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Conflict of interest

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