Frequency of Various Causes of Hospitalization and Its Other Related Factors in Patients with Heart Failure

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Authors' contributions

This work was carried out in collaboration among all authors. Author MS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author EZ managed the analyses of the study. Author HRJ managed the literature searches. All authors read and approved the final manuscript.

ABSTRACT

Background: Heart failure has the highest rate of Rehospitalization with 20-33% readmissions within 1 to 3 months of discharge from the hospital. we decided to find out the frequency of different causes of hospitalization in patients with heart failure during 2017 to 2019.

Methods: This study was a cross-sectional descriptive study. A total of 120 patients with heart failure who were referred to Afshar Hospital of Yazd during 2017 to 2019 were enrolled. The random sampling method was used. The required information was collected from heart failure patients’ registry project. datum were collected and were analyzed by statistical tests and SPSS version 18.

Results: The mean age of patients was 53.53±12.36 years. Of the 120 patients under study 41.7% were women and 58.3% were male. The results showed that, 14.2% did not follow the recommended diet, 14.2% had not regular use of drugs, 14.2% had renal dysfunction, 9.2% had...
Keywords: Heart failure; frequency; hospitalization.

1. INTRODUCTION

Cardiovascular disorders are among the most common conditions ultimately resulting into hospitalization. Among these diseases, heart failure has attracted much attention in the healthcare system [1,2]. It is one of the most prevalent cardiovascular conditions considered as a chronic, progressive, and debilitating disorder [3]. In this condition, the heart is unable to adequately pump blood to tissues to provide oxygen and nutrients. Impaired blood pumping by myocardium leads to increased afterload, dilatation of cavities, and increased intraventricular pressure. As a result, regurgitation of blood from left ventricle to the left atrium causes pulmonary congestion while regurgitation of blood from the right ventricle results in venous congestion and, finally leads to peripheral edema [4]. The onset and incidence of heart failure is enhanced by increasing age so that about 1-10% of Americans aged 50-80 years are affected with heart failure [5]. The increasing trend of heart failure due to infectious, inflammatory, vascular, and valvular complications serves as a major health problem and an epidemic condition in the USA. Annually, 5,000,000 Americans are affected with heart failure and an extra 500,000 new cases are added each year. These figures and statistics are expected to double by the next 30 years to come [6]. In Iran, the 2001 report by Center for Diseases Management has announced that 3337 per 100,000 people are affected with cardiac failure in 18 provinces [7]. Numerous factors contribute to lack of compensation for heart failure and patient hospitalization. These include: lack of adherence to drug and food regimen, uncontrolled hypertension, arrhythmia, inappropriate environmental conditions, inadequate treatment, pulmonary infections, psychological stress, inappropriate drug prescription and administration, myocardial ischemia, endocrine disorders like thyrotoxicosis, cardiac diseases, anemia, pregnancy, pulmonary embolism, infectious endocarditis, and myocarditis [8]. It appears that unawareness of heart failure patients about the factors that influence their hospitalization plays a role in the incidence of this condition. Therefore, identifying the factors affecting hospitalization of patients with heart failure can reduce the hospitalization of these patients by 33%. [9] Consequently, this study investigated the frequency of various causes of hospitalization and its other related factors in patients with heart failure to Afshar Hospital in Yazd, central Iran, during 2017 to 2019.

2. METHODS

A total of 120 heart failure patients presenting to Afshar Hospital in Yazd, central Iran, during 2017 to 2019 participated in this randomized descriptive cross-sectional study. They were hospitalized for clinical complaints and cardiac failure symptoms and were diagnosed with heart failure by the related cardiologist. They were selected randomly. Inclusion Criteria: Diagnosis of heart failure recorded in the patient's file, passage of at least 6 months after diagnosis of the disorder, age of 18+ years, and Ejection Fraction (EF)< 40%. Patients with incomplete information who were inaccessible were excluded from the study. The required data were gleaned using information from heart failure patients' registry project. The information included: cause of hospitalization, age, gender, frequency of hospitalization, chief complaint of patient's at admission, history of smoking, patient's signs, history of chronic diseases (diabetes, hypertension, and dyslipidemia), patient's vital signs (systolic pressure, diastolic pressure, heart rate), Electrocardiogram (ECG), echocardiographic findings (left ventricle hypertrophy (LVH), mitral valve regurgitation (MR), Ejection Fraction (EF), laboratory findings included: creatinine, urea, sodium, potassium, Brain Natriuretic Peptides (BNP), hemoglobin, troponin level, etiology of heart failure, and whether having a cardiac device included: Cardiac Resynchronization Therapy (CRT), implantable cardioverter-defibrillator (ICD), pace-maker. This information was recorded on a prepared form. Causes of hospitalization included: 1. nutritional diet (example: do not
avoid salt), 2. Lack of adherence of drug regimen (patients who have discontinued their heart failure medication or taken them irregularly and), 3. Disturbance in renal function (on the basis of creatinine level), 4. Pulmonary causes such as pneumonia, and aggravation of chronic obstructive pulmonary disease (COPD), 5. Idiopathic conditions, 6. Miscellaneous conditions including: arrhythmia, stress, other infections except pneumonia, anemia, and myocardial infarction (MI). The gleaned data were imported to SPSS18 and analyzed with descriptive statistics including: mean, Standard deviation, frequency distribution tables, T-test, low significant difference (LSD) and Chi-square tests.

3. RESULTS

A total of 120 heart failure patients presenting to Afshar Hospital in Yazd, central Iran, were investigated in this analytic cross-sectional study during 2017 to 2019. Of these, 50 (41.7 percentage) were females and 70 (58.3 percentage) were males. The results of means of variables of age, systolic pressure, diastolic pressure, heart rate, EF, creatinine levels on admission and discharge, urea, sodium, potassium, brain natriuretic peptide (BNP), and hemoglobin are displayed in Table 1.

Also, the results of frequency distribution of the variables of subjective symptoms, presence of a cardiac device, patient’s signs, etiology, history of smoking, hypertension, dyslipidemia, diabetes, ECG rhythm, Left ventricular hypertrophy (LVH), MR, troponin level level, and frequency of previous hospitalizations are presented in Table 2.

The results of frequency distribution of various causes of hospitalization of patients are given in Table 3.

Table 4 presents the results of the correlations among age, systolic pressure, diastolic pressure, heart rate, EF, creatinine on admission and discharge, urea, sodium, potassium, BNP, hemoglobin, and also frequency distribution of gender, cardiac device, etiology of disease, smoking, hypertension, dyslipidemia, diabetes, ECG rhythm, left ventricle hypertrophy, troponin level, frequency of previous hospitalizations, Mitral valve regurgitation, and cause of hospitalization. T-test showed a significant difference between the mean diastolic pressures of the patients with hospitalization due to cause of hospitalization. Repeated analysis with LSD test indicated a significant difference in the mean diastolic pressure between patients with hospitalization due to pulmonary disease and patients with other causes of hospitalization. Also, the mean systolic pressure was significantly higher in patients with hospitalization due to pulmonary disease compared to other patients. Moreover, Chi-square test demonstrated no significant correlation between cause of hospitalization and frequency distribution of any of the variables under study.

4. DISCUSSION

The highest rate of hospitalization in heart disease is related to heart failure so that 20-33% of cases are hospitalized during 1-3 months after discharge. The rate of rehospitalization due to heart failure during 30-60 days after discharge is about 30% and the mortality rate varies from 4% to 20% [10]. The rate of hospitalization of heart failure patients has been explored in other studies as well. The study by O’Connor reported 5239 cases of hospitalization while Kang reported a 36% rate [11,12]. Also, the qualitative study by Hekmatpour [13] enumerated the barriers to control rehospitalization as the following: insensitivity to causes of rehospitalization, patients’ wrong hygienic/health beliefs and expectations, incomplete training, poor compliance with nutritional and pharmacological diet, wrong life style, lack of a proper follow-up system, lack of confidence in the physician, lack of rapport with the patient, patient’s psychological problems, and patient’s familial challenges [13]. The results of Christopher’s study revealed that 39.2% of causes of patient hospitalization are non-cardiovascular, 46.3% are due to aggravated heart failure, and the rest are due to other miscellaneous causes like MI, stroke, etc. [22]. Although that study used a different taxonomy of causes of hospitalization compared to our study, given that it reported non-cardiovascular causes like infections, pulmonary conditions, lack of dietary observance, lack of drug regimen observance, etc. as the most common causes of hospitalization. It was consistent with our study in which the non-cardiovascular causes such as idiopathic cases, followed by lack of adherence to dietary and pharmacological regimens and impaired renal function were the most common causes of patient hospitalization. Kang’s study [12] reported poor health status, presence of severe pain and presence of skin problems as risk factors of hospitalization of heart failure patients [12].
Table 1. Means of variables of age, systolic pressure, diastolic pressure, heart rate, EF, creatinine level on admission and discharge, urea, sodium, potassium, BNP and hemoglobin

| Variables                     | Frequency | Descriptive indexes |
|-------------------------------|-----------|---------------------|
|                              |           | Mean±SD             |
|                              |           | Minimum             |
|                              |           | Maximum             |
| BNP                           | 28        | 1450.42±3577.98     | 20     |
| systolic pressure             | 120       | 119.74±25.34        | 61     |
| diastolic pressure            | 120       | 75.91±15.08         | 47     |
| heart rate                    | 119       | 83.58±16.63         | 49     |
| EF                            | 118       | 23.17±12.77         | 10     |
| creatinine on admission       | 120       | 1.65±0.89           | 0.6    |
| creatinine on discharge       | 120       | 1.68±0.91           | 0.6    |
| Urea                          | 119       | 68.07±53.45         | 18     |
| sodium                        | 120       | 136.72±4.39         | 123    |
| potassium                     | 120       | 4.48±0.66           | 3      |
| hemoglobin                    | 119       | 12.89±2.35          | 6      |
| Age(year)                     | 120       | 53.53±12.36         | 30     |

Table 2. Frequency distribution of symptoms, presence of a cardiac device, signs, etiology, history of smoking, hypertension, dyslipidemia, diabetes, ECG rhythm, LVH, MR, troponin level level and frequency of previous hospitalizations

| Variables                      | Frequency | Percent |
|-------------------------------|-----------|---------|
| Symptoms                      |           |         |
| Dyspnea                       | 29        | 24.2    |
| Dyspnea+fatigue               | 35        | 29.2    |
| Dyspnea+fatigue+ edema        | 26        | 21.7    |
| Dyspnea+fatigue+ Cardiac symptoms | 18   | 15      |
| Dyspnea+fatigue+edema+Cardiac symptoms | 10 | 12      |
| Cardiac device                |           |         |
| CRT                           | 6         | 5       |
| ICD                           | 7         | 5.8     |
| pace-maker                    | 2         | 1.7     |
| non                           | 105       | 87.5    |
| Signs                         |           |         |
| Pulmonary(Crackle+ Wheeze)    | 29        | 24.2    |
| Peripheral symptoms           | 26        | 21.7    |
| Third Heart Sound(S3)         | 1         | 0.8     |
| non                           | 36        | 30      |
| Pulmonary+ Peripheral symptoms| 21        | 17.5    |
| Pulmonary+S3                  | 3         | 2.5     |
| Pulmonary+ Peripheral symptoms+S3 | 4   | 3.3     |
| Etiology                      |           |         |
| ischemic heart disease        | 75        | 62.5    |
| Cardiomyopathy                | 20        | 16.7    |
| Valvular disease              | 9         | 7.5     |
| miscellaneous                 | 16        | 13.3    |
| Smoking                       |           |         |
| No                            | 92        | 76.7    |
| yes                           | 13        | 10.8    |
| unknown                       | 15        | 12.5    |
| Hypertension                  |           |         |
| No                            | 65        | 54.2    |
| yes                           | 44        | 36.7    |
| unknown                       | 11        | 9.2     |
| dyslipidemia                  |           |         |
| No                            | 72        | 60      |
| yes                           | 33        | 27.5    |
| unknown                       | 15        | 12.5    |
| Diabetes                      |           |         |
| No                            | 59        | 49.2    |
| yes                           | 53        | 44.2    |
| unknown                       | 8         | 6.7     |
| ECG                           |           |         |
| sinus                         | 71        | 59.2    |
| Atrial fibrillation           | 27        | 22.5    |
| miscellaneous                 | 22        | 18.3    |
| LVH                           |           |         |
| yes                           | 11        | 9.2     |
| no                            | 109       | 98.8    |
| MR                            |           |         |
| mild                          | 13        | 10.8    |
| moderate                      | 37        | 30.8    |
Variables | Frequency | Percent
--- | --- | ---
sever | 14 | 11.7
normal | 11 | 9.2
unknown | 45 | 37.5
Troponin level | | |
positive | 23 | 19.2
negative | 89 | 74.2
unknown | 6 | 6.7
Frequency of previous hospitalizations | | |
0 | 77 | 64.2
1 | 18 | 15
2≤ | 4 | 3.2
unknown | 21 | 17.5

- Symptoms of shortness of breath including: dyspnea and orthopnea
- Cardiac symptoms including: chest pain, palpitation/fibrillation, and syncope
- Peripheral symptoms including: ascites, peripheral edema, and coolness of organs and limbs
- Other miscellaneous causes including: hypertension, COPD, tricuspid valve failure and pulmonary embolism
- Positive troponin level includes cases ≥100

Table 3. Frequency distribution of various causes of hospitalization of patients under study

| Variable | Frequency | Percent |
| --- | --- | --- |
Pulmonary(pneumonia,COPD) | 10 | 8.3 |
Lack of adherence to nutritional diet | 17 | 14.2 |
Lack of observance of drug regimen | 17 | 14.2 |
Disturbance in renal function | 17 | 14.2 |
Idiopathic conditions | 48 | 40 |
Miscellaneous conditions | 11 | 9.2 |

Table 4. Correlation between the study variables and various causes of hospitalization

| Variable | P-value | Variable | P-value |
| --- | --- | --- | --- |
| Mitral valve regurgitation | 0.482 | Etiology | 0.137 |
| Age | 0.632 | Device | 0.065 |
| Frequency of previous hospitalizations | 0.768 | Gender | 0.806 |
| Troponin level | 0.581 | Hemoglobin | 0.084 |
| Left ventricle hypertrophy | 0.138 | BNP | 0.957 |
| ECG rhythm | 0.880 | Potassium | 0.125 |
| Diabetes | 0.363 | Sodium | 0.625 |
| Dyslipidemia | 0.493 | Urea | 0.351 |
| Hypertension | 0.071 | Creatinine on admission | 0.570 |
| Smoking | 0.400 | Creatinine on discharge | 0.334 |
| EF | 0.242 | Diastolic pressure | 0.026 |
| Heart rate | 0.091 | Systolic pressure | 0.158 |

Although our study did not investigate the mentioned factors in Kang study, none of our variables affected frequency of hospitalization. This is consistent with the results of the study above. A study carried out in 2016 on 387 heart failure patients with a mean hospitalization time of 11 days (8-18 days) suggested that 11.6% of patients sustained aggravation of heart failure symptoms or death during the first 7 days of hospitalization and 23.3% sustained aggravation of heart failure symptoms or death at any time of hospitalization. This latter group had more symptoms, lower systolic pressure, weaker renal function, and higher baseline troponin level [14]. The results of this study are not consistent with our finding that there was no significant difference among the means of systolic pressure, creatinine on admission and discharge, and urea, sodium, and potassium as indices of renal assessment in terms of various causes of hospitalization. It seems that small sample volume in our study is the cause of insignificance of these factors in the patients under study. Also, our study assessed troponin level qualitatively (positive/negative) and found no significant difference in frequency distribution of causes of patient hospitalization in terms of troponin level. However, our study found a significant difference in mean diastolic pressure in terms of causes of patient hospitalization so that the diastolic pressure was significantly higher in patients with pulmonary causes of hospitalization compared to other causes. The results of another study by Ural demonstrated that the use of nitrate was
associated with increased risk of mortality in patients that had used nitrate compared to patients that had not used it. Nevertheless, nitrate had not increased the risk of hospitalization. Moreover, coronary artery disease (CAD), age, gender, and underlying diseases had no significant effect on mortality rate and hospitalization [15]. The results of this study are consistent with our study that found no significant difference in the frequency distribution of causes of patient hospitalization in terms of age, gender, and underlying diseases. In other words, the mentioned variables had no effect on frequency of patient hospitalization in our study as well.

5. CONCLUSION

It may be postulated on the basis of our results that the most common causes of hospitalization of heart failure patients are idiopathic with ischemic heart disease being the most common etiologic cause of heart failure. Additionally, considering absence of any statistically significant correlation between frequency distribution of causes of hospitalization of heart failure patients in terms of variables, it may be said that none of the mentioned factors have influenced frequency distribution of hospitalization of heart failure patients.

CONSENT AND ETHICAL APPROVAL

In this study, except for maintaining the secrets of the patient in accordance with the Helsinki Treaty, it is assured to patients that their information will be confidential and will be used only for the purposes of the research. In addition, no additional costs were imposed on patients. The proposal is approved by ethics committee of Yazd Shahid Sadoughi University of Medical Sciences.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Abbaci A, Asayesh H, Hoseini A, Ghorbani M, Abdollahi A. The relationship between functional ability and quality of life in patient with heart failure. Southern Medical Journal, biology-Medical Research center of Persian Gulf. 2010;13(1):31-40.
2. Bento VF, Brofman PR. Impact of the nursing consultation on the frequency of hospitalization in patients with heart failure in curitiba, parana state. Arq Bras Cardiol. 2009;92(6):454-60:473-9:490-6.
3. Chriss P, Sheposh J, Carlson B, Riegel B. Predictors of successful heart failure Self-care Maintenance in the first three months after hospitalization. Heart & Lung. 2004;33(6):345-53.
4. Riegel B, Driscoll A, Suwanno J, Moser D, Lennie T, Chung M, et al. Heart Failure self-care in developed and developing countries. J Card Fail. 2009;15(6):508-16.
5. Jaarsma T, Halfens R, Tan F, Abu-Saad HH, Dracup k, Diederiks J. Self-care and quality of life in patients with advanced heart failure: the effect of a supportive educational intervention. Heart Lung. 2000;29(5):319-30.
6. Zambroski CH, Moser Dk, Bhat G, Ziegler C. Impact of symptom prevalence and symptom burden on quality of life in patients with heart failure. Eur J Cardiovasc Nurs. 2005;4(3):198-206.
7. Rahnavard Z, Zolfaghari M, kazemnejad A, Hatamipour KH. An investigation of quality of life and factors affecting it in the patients with congestive heart failure."Hayat" Journal of Faculty of Nursing and Midwifery. (Persian). 2006;1(12):77-86.
8. Ghali Jk, kadakia S, Cooper R, Fertlinz J. Precipitating factors leading to decomposition of heart failure. Traits among urban blacks. Arch Intern Med. 1988;148(9):2013-2016.
9. Hamner JB, Ellison kJ. Predictors of hospital readmission after discharge in patients with congestive heart failure. Heart & Lung. 2005;34(4):231-239.
10. Lloyd-Jones D, Adams R, Carnethon M, De Simone G, Ferguson TB, Flegal k, et al. Heart disease and stroke statistics--2009 update: A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. 2009;119(3):480-6.
11. O'Connor CM, Miller AB, Blair JE, konstam MA, Wedge P, Bahit MC, et al. Causes of death and rehospitalization in patients hospitalized with worsening heart failure
and reduced left ventricular ejection fraction: Results from efficacy of vasopressin antagonism in heart failure outcome study with tolvaptan (EVEREST) program. American Heart Journal. 2010;159(5):841-851.

12. Kang Y, McHugh MD, Chittams J, Bowles kH. Risk factors for all-cause rehospitalization among medicare recipients with heart failure receiving telehomecare. Telemed J E Health. 2017;23(4):305-312.

13. Hekmatpou D, Mohammadi E, Ahmadi F, Arefi S. Barriers of readmission control among patients with congestive heart failure: A qualitative study. Journal of Arak University of Medical Sciences. (Persian)2009;11(4):49-58.

14. Carubelli V, Cotter G, Davison B, Gishe J, Senger S, Bonadei I, et al. In-hospital worsening heart failure in patients admitted for acute heart failure. International Journal of Cardiology. 2016;225:353-361.

15. Ural D, kandemir AŞ, karaüzüm k, Baydemir C, karaüzüm IY, Bozyel S, et al. Effect of oral nitrates on all-cause mortality and hospitalization in heart failure patients with reduced ejection fraction: A propensity-matched analysis. Journal of Cardiac Failure. 2017;23(4):286-292.

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