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Risk Factor of Congestive Heart Failure Patients Readmission at Pertamina Cirebon Hospital

Sizil Safir Fadila, Sherly Cancerita, Ahmad Fariz Malvi Zamzam Zein
Universitas Swadaya Gunung Jati, Indonesia
Email: sizilmargana22@gmail.com

KEYWORDS
Risk factors;
Readmission;
Congestive Heart Failure

ABSTRACT
Heart failure is a complex clinical syndrome caused by structural or functional impairment of the heart, resulting in the inability to pump sufficient blood to meet the metabolic demands of body tissues. It commonly manifests as congestive heart failure and is associated with high morbidity, mortality, and frequent readmissions. Readmission refers to the rehospitalization of patients after discharge due to the recurrence or worsening of heart failure symptoms. This study aims to identify and analyze the risk factors associated with readmission among patients with congestive heart failure at Pertamina Hospital Cirebon. This analytical observational study employed a cross-sectional design. Data were collected using a total sampling technique and analyzed using chi-square and Fisher's exact tests. A total of 72 eligible patients were included, of whom 27 (37.5%) experienced readmission. Factors significantly associated with readmission included medication adherence (p = 0.001; OR = 5.50; 95% CI = 1.94–15.5), adherence to a low-sodium diet (p = 0.018; OR = 3.29; 95% CI = 1.21–8.97), and adherence to fluid restriction (p = 0.003; OR = 4.49; 95% CI = 1.61–12.5). Comorbidities significantly associated with readmission included hypertension (p = 0.012; OR = 3.71; 95% CI = 1.29–10.6), coronary artery disease (p = 0.002; OR = 5.17; 95% CI = 1.80–14.8), and diabetes mellitus (p = 0.021; OR = 4.00; 95% CI = 1.17–13.6). These findings indicate that medication adherence, dietary and fluid restrictions, and comorbidities are key factors associated with hospital readmission in patients with congestive heart failure.

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INTRODUCTION

Heart failure is a complex clinical syndrome generally caused by structural or functional impairment of the heart, resulting in the inability to pump sufficient blood to meet the metabolic demands of body tissues. It has clinical impacts that often manifest as congestive heart failure, which is associated with high morbidity and mortality rates, reduced patient quality of life, and increased healthcare utilization. In addition, congestive heart failure is a major cause of patient readmission (Al-Tamimi et al., 2021).

Research from the Global Health Data Exchange (GHDx) in 2020 shows that there were 64.34 million cases of congestive heart failure worldwide, with 9.91 million deaths. According to World Health Organization (WHO) data in 2016, there were 550,000 new cases of congestive heart failure annually in the United States, while in Europe, prevalence ranges from 0.4% to 25%, increasing with age. According to the Indonesian Ministry of Health in 2020, congestive heart failure is the second leading cause of death in Indonesia after stroke, with a mortality rate ranging from 6%–12%. Based on Riskesdas (2018), the prevalence of congestive heart failure in Indonesia based on a doctor's diagnosis is 1.5%, or approximately 1,017,290 individuals, with 4.6% aged 65–74 years. Based on diagnosis or symptoms, West Java Province has the highest number of heart failure patients, totaling 96,487 people (0.3%) (Anggia et al., 2024).

The incidence of congestive heart failure continues to increase. Even after hospitalization, patients' conditions may worsen, and symptoms often recur, leading to rehospitalization, known as *readmisi* (Khasanah et al., 2020). Readmission refers to the rehospitalization of patients with congestive heart failure due to recurrence or worsening of signs and symptoms (Akkineni et al. 2020; Ryan et al. 2019; Vader et al. 2016). The American Heart Association (AHA, 2012) reports that nearly 50% of patients hospitalized with congestive heart failure experience readmission. Approximately 100,000 patients with congestive heart failure are hospitalized annually in the United Kingdom. Data from the Indonesian Hospital Information System (SIRS) indicate that the readmission rate among patients with congestive heart failure is approximately 13.42% (Ministry of Health of the Republic of Indonesia, 2013) (Sugiyanti et al., 2020).

According to research by Khasanah (2020), the incidence of readmission in congestive heart failure is generally associated with patients' inability to adhere to treatment, noncompliance with medical follow-up, failure to follow recommended dietary guidelines, engaging in excessive physical activity, or lack of awareness of symptom recurrence (Khasanah et al., 2020). Maharani (2021) reported that within six months, the hospitalization rate among congestive heart failure patients remains high at 50%, while within 30 days, the readmission rate is 24% (Maharani & Aspar, 2023).

Al-Tamimi et al. (2021) found that hospitalizations for heart failure were significantly higher in men (73.3%) than in women. Additionally, 42.1% of patients experienced readmission due to nonadherence to treatment, 72.3% experienced financial difficulties, and 43.9% experienced readmission associated with comorbidities (Al-Tamimi et al., 2021). Research by Rasyid (2021) indicates that comorbid conditions such as hypertension, diabetes mellitus, and coronary artery disease contribute to readmission and may affect the length of hospitalization. Other studies report that common comorbidities associated with readmission in heart failure patients include respiratory disease (18.7%), arrhythmia (18.5%), coronary artery disease (15.8%), and kidney dysfunction (6.7%) (Lan et al., 2021).

Based on the description above, the readmission rate among patients with congestive heart failure remains high and is influenced by multiple factors (Durand et al. 2017; Umehara et al. 2020; Wideqvist et al. 2021). However, in the Cirebon area, data regarding these risk factors are still limited. Therefore, this study aims to examine the risk factors for readmission among patients with congestive heart failure at Pertamina Cirebon Hospital using the most recent medical record data from June 2023 to June 2024.

Based on this background, the research question is: what are the risk factors for readmission among patients with congestive heart failure at Pertamina Cirebon Hospital? This study aims to identify the risk factors for readmission among patients with congestive heart failure at Pertamina Cirebon Hospital from June 2023 to June 2024. The findings are expected to provide both theoretical and practical benefits. Theoretically, this study may contribute to the body of evidence regarding factors influencing congestive heart failure readmission. Practically, the results are expected to serve as valuable input for hospitals, healthcare professionals, patients, and families in designing preventive strategies, strengthening patient education, improving adherence to therapy and lifestyle modifications, and ultimately reducing readmission rates among patients with congestive heart failure

METHOD

This study uses a research design with an observational analytical method with a cross-sectional approach to observe risk factors for remission of congestive heart failure patients at Pertamina Hospital.

This research was conducted at Pertamina Cirebon Hospital from April – May 2025. The

target population in this study was all patients with congestive heart failure. The affordable population in this study is all congestive heart failure patients at Pertamina Cirebon Hospital in June 2023-June 2024

The sample in this study was all patients with congestive heart failure who met the inclusion criteria.

1. Inclusion criteria

   All patients diagnosed with congestive heart failure at Pertamina Cirebon Hospital for the period of June 2023-June 2024

2. Exclusion criteria

   Patients who are pregnant. Patient has a history of congenital heart disease. Incomplete medical record data. Patients who cannot be contacted

1. Independent Variables

   An independent variable is a variable that affects or causes the change or the emergence of dependent (bound) variables. The independent variable in this study is the risk factor.

2. Bound Variables

   Bound variables are variables that are affected or that are the result of independent variables. The bound variable in this study is the remission of congestive heart failure patients at Pertamina Cirebon Hospital.

Table 1. Operational definition

Variable	Definition	Measuring Instruments	Measurement Results	Scale
Independent				
Hypertension	Blood pressure high with systolic more than 140 mmHg and diastolic pressure of more than 90 mmHg as seen from Results physical examination in the medical record.[11]	Medical records	1. History hypertension 2. No history of hypertension	Nominal
PJK	Disruption heart function due to heart muscle lack of blood due to blockage or narrowing of vessels blood coroner consequences of atherosclerosis.[16]	Medical records	1. History of PJK 2. No history of CHD	Nominal
Chronic kidney failure	Conditions where kidney function gradually decreases over 3 months or more that cause damage kidneys in the form of tissue abnormalities, composition blood and urine![28]	Medical records	1. History of GGK 2. No history of GGK	Nominal

Atrial fibrillation	Common comorbidities in patients heart failure that can increase hemodynamic instability, decreased Cardiac Output so that it can worsen Symptomsheart failure.[25]	Medical records	1. History of atrial fibrillation 2. None History of atrial fibrillation	Nominal
Diabetes mellitus		Medical records	1. History DM 2. None DM history	Nominal
PPOK		Medical records	1. History of COPD 2. No history of COPD	Nominal
Medication adherence	*Morisky Medication Adherence Scale* (MMAS-8)[31]		1. Obey=0-2 2. Non-compliant = >2	Nominal
Adherence to a low-sodium diet	*Dietary Salt Reduction Self-Care Behavior Scale* (DSR-SCB *scale*)[32]		1. Compliant=18 2. Non-compliant= <u>≤17</u>	Nominal
Compliance with fluid restrictions		Questionnaire	1. Compliant= 60-100% Non-compliant=10%-50	Nominal

Source: Adapted from previous studies and guidelines and primary data instruments developed by the researcher (2025)

1. Materials and Tools
   a. Medical records
   b. Questionnaires (MMAS-8, DSR-SCB, and fluid restriction compliance questionnaires).
2. Research Procedure

   The research procedure was carried out in 3 stages, namely:
   a. Preparation Stage
      1) Goal setting of research title
      2) Consultation with supervisors regarding titles, research variables, and research methods
      3) Preparing research instruments
      4) Taking care of permits and coordinating with the heads of relevant agencies
      5) Setting a schedule of activities
   b. Implementation Stage
      1) Define samples according to inclusion and exclusion criteria
      2) The researcher collected secondary data through searching for medical record data of patients with congestive heart failure for the period June 2023-June 2024
      3) The researcher collected primary data (filling out questionnaires) through

autoanamnesis in the form of interviews with patients and alloanamnesis interviews with patients' families for deceased patients.

c. Completion Stage
   1) Processing data and analyzing data
   2) Compiling a research report

Data Processing

1. Editing

   Editing is done after the data is collected, so that if an error occurs, editing efforts can be made immediately.
2. Coding

   Coding is coding every data obtained from respondents so that it is easier to analyze data.
3. Processing

   Processing is processing data using a computer or manually so that it can be analyzed.
4. Tabulating (Grouping)

   Tabulating is grouping data according to the variables being studied to facilitate data analysis.
5. Entry (Data input)

   Entry is the activity of entering data on the results of the answers in the processing program

   References
6. Cleaning (Re-check)

   Double-check if there are any data errors so that the data is completely ready for analysis.

Data Analysis

1. Univariate and Bivariate Analysis

   Univariate analysis was to describe the frequency of distribution of subject characteristics and risk factors for remission of congestive heart failure at Pertamina Cirebon Hospital, while bivariate analysis aimed to determine the relationship between independent variables (risk factors) and bound variables (remission of congestive heart failure patients). After the normality test was carried out on the results of the free and bound variable data, it was found that both variables had abnormal data distribution ($p<0.05$). Therefore, data analysis was carried out by chi-square statistical test and fisher's exact test.

Research Ethics

This research has been approved by the Health Research Ethics Committee (KEPK) of the Faculty of Medicine, Swadaya Gunung Jati University with letter number No.39/EC/FKUGJ/II/2025 and meets the administrative requirements of Pertamina Cirebon Hospital, namely the FK UGJ Research Permit.

RESULT AND DISCUSSION

The research data collection was carried out at Pertamina Hospital, Cirebon Regency. The implementation of secondary data collection using medical record data and primary data

by filling out a questionnaire was carried out from April-May 2025 at Pertamina Cirebon Hospital. The total sampling of 87 respondent data has met the inclusion criteria and there are 15 exclusion samples, making a total sample of 72 respondents. The exclusion criteria in the sample were because some medical records were not equipped with telephone numbers and there were patients who were readmitted not due to a diagnosis of congestive heart failure.

Univariate Analysis Results

Univariate analysis in research is for knowing the frequency distribution of subject characteristics that include gender and age.

Table 2. Frequency and distribution of subject characteristics

Characteristics	Frequency	Percentage (%)
Gender		
Male	30	41,7
Women	42	58,3
Age		
31-40	1	1,4
41-50	10	13,9
51-60	16	22,2
61-70	29	40,3
71-80	13	18,1
81-90	3	4,2
Readmissions		
Yes	27	37,5
No	45	62,5
Hypertension		
Yes	22	30,6
No	50	69,4
PJK		
Yes	36	50,0
No	36	50,0
Chronic Kidney Failure		
Yes	4	5,6
No	68	94,4
Atrial Fibrillation		
Yes	4	5,6
No	68	94,4
Diabetes Mellitus		
Yes	14	19,4
No	58	80,6
PPOK		
Yes	2	2,8
No	70	97,2

Medication Compliance		
Non-compliant	30	41,7
Obedient	42	58,3
Low Diet Adherence Sodium		
Non-compliant	35	48,6
Obedient	37	51,4
Liquid Restriction Compliance		
Non-compliant	27	37,5
Obedient	45	62,5
Quantity	72	100,0

Source: Primary data processed by the researcher (2025)

Based on table 2, it can be seen that out of a total of 72 respondents, most of them were female respondents, namely 42 respondents (58.3%). Based on age characteristics, 29 (40.3%) were 61-70 years old. The number of congestive heart failure patients at Pertamina Hospital who experienced remission was 27 (37.5%). Based on the table above, it shows that 22 (30.6%) patients with congestive heart failure who have a history of comorbid hypertension were obtained. The data from the study showed that 36 (48.6%) patients had congestive heart failure who had a history of comorbid CHD.

Patients who have a history of comorbid GGK and atrial fibrillation show the same number, which is obtained by 4 (5.6%) patients. The comorbid history of Diabetes Mellitus in patients with congestive heart failure was obtained in 14 (19.4%) patients, while the comorbid history of COPD in patients with congestive heart failure showed a relatively very small number, namely only 2 (2.8%) patients. The results of the medication compliance questionnaire data were obtained from 30 (41.7%) patients who did not comply with treatment, the results of the low-sodium diet compliance questionnaire data were obtained 35 (48.6%) patients who did not comply, while the results of the data of patients who did not comply with limiting fluid intake were obtained 27 (37.5%) patients. The number of respondents who filled out the questionnaire through autoanamnesis was 47 respondents, while the remaining 25 respondents went through alloanamnesis because the patient had died.

Bivariate Analysis

Based on the results of the study with the bivariate test, the following data results were obtained:

1. The Relationship of Hypertension with Congestive Heart Failure Readmissions

Table 3. Relationship between hypertension and congestive heart failure remission

Hypertension	Readmission				Total		p-value	GOLD (95% CI)
	Yes		No					
	n	%	n	%	N	%		
Yes	13	59,1	9	40,9	22	100	0,012	3,71
No	14	28,0	36	72,0	50	100		(1,29-10,6)
Quantity	27	37,5	45	62,5	72	100,0		

Source: Primary data processed by the researcher (2025)

Based on table 3, it can be seen that the results of the bivariate analysis of the relationship between hypertension and congestive heart failure readmissions are from

22 congestive heart failure patients with hypertension, 13 (59.1%) of whom experienced readmission, while patients with hypertension who did not experience remission were obtained 9 (40.9%) patients. The results of the statistical test using chi-square obtained a p-value of 0.012 (<0.05), meaning that there is a significant relationship between hypertension and congestive heart failure remission at Pertamina Cirebon Hospital. The results of the analysis obtained an OR=3.71, meaning that patients with congestive heart failure with hypertension have a 3.71 chance of experiencing remission.

2. The Relationship between CHD and Congestive Heart Failure Readmissions

Table 4. The relationship between CHD and congestive heart failure remission

PJK	Readmission				Total		p-value	GOLD (95% CI)
	Yes		No					
	n	%	n	%	N	%		
Yes	20	55,6	16	44,4	36	100	0,002	5,17 (1,80-14,8)
No	7	19,4	29	80,6	36	100		
Quantity	27	37,5	45	62,5	72	100		

Source: Primary data processed by the researcher (2025)

Based on table 4, it can be seen that the results of the bivariate analysis of the relationship between CHD and congestive heart failure readmissions are from 36 patients with congestive heart failure with CHD, 20 (55.6%) of whom experienced readmission, while patients with CHD who did not experience remission obtained 16 (44.4%) patients. The results of the statistical test using chi-square obtained a p-value of 0.002 (<0.05), meaning that there is a significant relationship between CHD and congestive heart failure remission at Pertamina Cirebon Hospital. The results of the analysis obtained an OR=5.17, meaning that patients with congestive heart failure with CHD have a 5.17 chance of experiencing remission.

Characteristics of Research Subjects

This study was carried out by collecting secondary data using medical records and primary data by filling out questionnaires on medication adherence, adherence to a low-sodium diet, and adherence to fluid intake restrictions in congestive heart failure patients at Pertamina Cirebon Hospital. In this study, there were 72 respondents, most of the respondents were female with a total of 42 (58.3%) while the rest were male 30 (41.7%). These results can be caused because the entire population of congestive heart failure patients at Pertamina Cirebon Hospital is dominated by women. Research conducted by Madanat in 2021 showed similar results that female heart failure patients showed a larger number than men, which was (50.5%). Based on the age of the respondents, there were six age groups taken from Madanat's research in 2021 (Madanat et al., 2021), where most of them occurred at the age of 61–70 years as many as 29 (40.3%) respondents.

Based on the results of this study, it was found that of the 72 patients with congestive heart failure at Pertamina Cirebon Hospital, 27 (37.5%) people underwent remission. Research conducted by Naderi in 2022 showed the results of data on heart failure patients who experienced remission by 24%. Most of the patients with congestive heart failure at Pertamina Cirebon Hospital who experienced remission due to their non-compliance with treatment were obtained as many as 18 (60%). Non-adherence to medication in patients with congestive heart failure is caused because patients feel that their condition has improved so they feel no need to

take medication. In addition, most of them still forget to take medication so that it can worsen the symptoms of congestive heart failure and often lead to remission. The results of this study are in line with the results of Al-Tamimi's 2021 research which stated that as many as 42.1% of heart failure patients who experienced remission due to non-compliance with treatment, and non-adherence to treatment was the most significant factor (p=0.02) (Al-Tamimi et al., 2021). In addition, factors that cause congestive heart failure patients to experience remission are non-adherence to a low-sodium diet 18 (51.4%) and non-compliance with fluid restriction 16 (59.3%). The results of this study are in line with the results of Khasanah's research in 2020 stating that there are 25% of patients who are re-hospitalized in the high category due to non-compliance with a low-salt diet (Khasanah et al., 2020). According to Zisis' research in 2021, there are 25% of patients who experience remission or readmission within 30 days in the hospital due to fluid overload (Zisis et al., 2021).

Other factors that cause remission in patients with congestive heart failure are the presence of comorbid factors such as hypertension (59.1%), CHD (55.6%), diabetes mellitus (64.2%), chronic kidney failure (50%), atrial fibrillation (75%), and COPD (50%). The results of the study conducted by Sabe in 2023 stated similar results to the results of this study, that there are comorbid factors that cause heart failure remission, including hypertension, diabetes mellitus, chronic kidney failure, COPD, and atrial fibrillation (Sabe et al., 2023).

The Relationship of Hypertension with Congestive Heart Failure Readmissions

The results of the chi-square test between hypertension and congestive heart failure remission in this study showed statistically significant results with a p-value of 0.012 (<0.05), meaning that there is a significant relationship between hypertension and congestive heart failure remission. This study is in line with the results of Prabowo's research in 2022, it is known that of 11 respondents with a history of hypertension, 10 (90%) of them had experienced rehospitalization with the results of further analysis known to be p-value of 0.042, meaning that there is a significant relationship between the history of hypertension and the incidence of rehospitalization of congestive heart failure patients (Kunto Prabowo & Vaeli, 2022). Another study conducted by Akkineni in 2020 showed consistent results that there were 49.1% of heart failure patients who experienced readmission, while patients who did not experience readmissions were lower, namely 38.7% with the results of further analysis known to have a p-value of 0.034, meaning that there is a significant relationship between hypertension and the incidence of readmission (Akkineni et al., 2020). Research conducted by Aldihan in 2021 showed the same research results, that there was a significant relationship between hypertension and the incidence of heart failure remission with the results of further analysis known to be p-value <0.001. The results of a study conducted by Jain in 2023 stated similar results to the results of this study, that hypertension is one of the comorbid factors that has a significant relationship with the incidence of heart failure remission. The results of further analysis obtained a p-value of 0.005.

Hypertension affects the compensation mechanism in the form of thickening of the ventricular wall and abnormal accumulation of fibril collagen which can result in concentric hypertrophy of the left ventricle so that it can reduce compliance, relaxation, and filling of the left ventricle. This will trigger diastolic dysfunction of the left ventricle. Over time, left ventricular dysfunction can result in heart failure with preserved ejection fraction. Based on the results of Paramita's research in 2021, it was obtained that 73.8% of subjects had decreased left ventricular diastolic function with the majority of indications of HFrEF type heart failure (43.1%) which are generally caused by coronary heart disease (Paramita et al., 2021).

Hypertension is one of the significant risk factors in congestive heart failure patients who

undergo remission in a relatively short period of time. Hypertension causes an increase in cardiac afterload, contributing to the morbidity of congestive heart failure patients. According to another study, uncontrolled hypertension has a strong association with an increased risk of remission because worsening of heart failure symptoms is more likely to occur in patients with uncontrolled hypertension that causes patients to experience remission. This suggests that it is important to regularly control blood pressure in patients with congestive heart failure to reduce the risk of remission. Uncontrolled hypertension has a detrimental impact on the development of the heart and blood vessels and can lead to complications such as diastolic dysfunction, left ventricular hypertrophy, and myocardial ischemia which can increase the risk of remission (Alsulymani et al., 2023).

The Relationship between CHD and Congestive Heart Failure Readmissions

The results of the chi-square test between CHD and congestive heart failure remission in this study showed statistically significant results with a p-value of 0.002 (<0.05), meaning that there is a significant relationship between CHD and congestive heart failure remission. According to research conducted by Zhang et al. in 2024, it is stated that CHD is the most common comorbid factor in heart failure patients (54%). The results of this study are similar to the results of research conducted by Jain in 2023, stating that CHD is one of the comorbidities that cause heart failure remission. Based on the results of the study, a p-value of <0.001 was obtained for comorbid CHD, which means that there is a significant relationship between comorbid CHD and the incidence of remission in heart failure patients.

The results of a study conducted by Madanat in 2021 stated that CHD is the second most frequent comorbidity disease in patients with congestive heart failure after hypertension with a percentage of 70.4%. Based on the data results, of the 45 remission patients, 34 (24.6%) patients with a history of CHD were obtained while those without a history of CHD were 11 (19%). However, the results of further analysis found that the p-value of 0.389 showed that there was no significant relationship between the comorbid history of CHD and the incidence of remission in patients with congestive heart failure (Madanat et al., 2021). Research conducted by Naderi in 2022 stated similar results, that CHD is the most common comorbid disease in heart failure patients. However, the results of further analysis were found to be p-value 0.1, meaning that there was no significant relationship between comorbidities of CHD and the incidence of remission.

Based on the European Society of Cardiology in 2023, CHD is the most common cause of heart failure, which mostly occurs in patients with reduced left ventricular ejection fraction. Patients suffering from heart failure with CHD have a poor prognosis, as they experience not only myocardial dysfunction but also ischemic and recurrent myocardial infarction that can further lead to myocardial damage and arrhythmias.

The Relationship of Chronic Kidney Failure with Congestive Heart Failure Readmissions

The results of the Fisher's exact test between chronic kidney failure and congestive heart failure remission in this study showed statistically insignificant results with a p-value of 0.628 (>0.05), meaning that there was no significant relationship between chronic kidney failure and congestive heart failure remission. The results of this study are in accordance with the results of a study conducted by Madanat in 2021 that there is no significant relationship between chronic kidney failure and the incidence of remission, the results of further analysis are known to have a p-value of 0.898 (Madanat et al., 2021).

The results of this study are also in line with the results of a study conducted by Naderi in 2022, that there is no statistically significant relationship between the comorbid history of chronic kidney failure and the incidence of remission in heart failure patients with a known p-

value of 0.4. The results of the study conducted by Cui Lingling in 2025 show results that are in line with the results of this study, that 4 heart failure patients who experienced remission with a history of chronic comorbid kidney failure were obtained, while those who did not experience remission were 19 patients. The results of further analysis showed a p-value of 0.185, meaning that there was no significant relationship between the comorbid history of chronic kidney failure and the incidence of remission.

Another study conducted by Sabe showed different results from the results of this study, that there were 36.5% of heart failure patients with a history of chronic kidney failure who underwent remission, while patients who did not undergo remission had a lower number of 17.8% with the results of further analysis known to have a p-value of <0.001, meaning that there was a significant relationship between chronic kidney failure and the incidence of remission in heart failure patients (Sabe et al., 2023). The results of this study are also different from the results of Aldihan's research, that there are significant risk factors related to remission in heart failure patients, one of which is a history of comorbid chronic kidney failure with a p-value of 0.03, meaning that there is a significant relationship between chronic kidney failure and the severity of heart failure remission.

Congestive heart failure is generally characterized by congestion in the lungs and systemic circulation that causes a decrease in effective circulation volume, eventually causing reduced organ perfusion. On the other hand, in patients with Acute Kidney Injury (AKI), there is a decrease in the rate of glomerular filtration, resulting in an increased volume load and worsening heart dysfunction. However, the results of this study show that there is no association between chronic kidney failure and readmission, this is likely due to the small number of samples with a history of chronic kidney failure, which is not strong enough to show statistical significance.

Association of Atrial Fibrillation with Congestive Heart Failure Readmissions

The results of Fisher's exact test between atrial fibrillation and congestive heart failure remission in this study showed statistically insignificant results with a p-value of 0.145 (>0.05), meaning that there was no significant relationship between atrial fibrillation and congestive heart failure remission. The results of this study are in accordance with the results of a study conducted by Cui Lingling in 2025, stating that there is no significant relationship between the history of atrial fibrillation comorbidities and the incidence of remission in heart failure patients with the results of further analysis known to have a p-value of 0.802. The results of this study are also similar to the results of Akkineni's study in 2020, it is known that the p-value for atrial fibrillation is 0.132, meaning that there is no significant relationship between atrial fibrillation and the incidence of remission in heart failure patients (Akkineni et al., 2020).

The results of the study conducted by Naderi in 2022 stated that the results were in line with the results of this study, that 33.7% of heart failure patients had a history of atrial fibrillation comorbidities. However, the results of further analysis were found to be p-value 0.7, meaning that there was no significant association between atrial fibrillation and the incidence of remission in heart failure patients. The results of the study conducted by Madanat in 2021 stated that the results were also in line with the results of this study, that there was no significant relationship between the history of comorbid atrial fibrillation and the incidence of remission in heart failure patients with a p-value of 0.611 (Madanat et al., 2021). The results of this study show different results from the study conducted by Zhang in 2024 which stated that atrial fibrillation is one of the comorbid factors for remission in heart failure patients. The results of further analysis obtained a p-value of 0.014 (<0.05), meaning that there was a significant relationship between atrial fibrillation and the incidence of remission in heart failure patients.

According to research by Alsulymani et al. in 2023, it is stated that atrial fibrillation is

one of the comorbid factors in heart failure patients and can increase the risk of remission because it can increase hemodynamic instability, decrease cardiac output, and increase the risk of thromboembolism so that it causes worsening of heart failure symptoms (Alsulymani et al., 2023). However, the results of this study show that there is no association between atrial fibrillation and readmission, this is likely due to the small number of samples with a history of atrial fibrillation so it is not strong enough to show statistical significance.

The Relationship of Diabetes Mellitus with Congestive Heart Failure Readmissions

The results of the chi-square test between diabetes mellitus and congestive heart failure remission in this study showed statistically significant results with a p-value of 0.021 (<0.05), meaning that there is a significant relationship between diabetes mellitus and congestive heart failure remission. The results of this study show results that are in line with the results of Akkineni's research in 2020, that there is a significant relationship between the history of comorbid diabetes mellitus and the incidence of remission in heart failure patients with the results of further analysis known to be p-value 0.019 (Akkineni et al., 2020). Another study showed results that were also in line with the results of this study, that diabetes mellitus was considered one of the risk factors associated with heart failure remission. The results of further analysis showed that a p-value of <0.005 was known, meaning that there was a statistically significant relationship between diabetes mellitus and heart failure remission. According to the study, the community prognosis for heart failure patients is very poor, the highest risk of high remission rates being obtained in patients with diabetes mellitus at the same time. Therefore, it is important to have effective glycemic control, lifestyle management, ensure adequate fluid intake to prevent kidney complications, and optimize treatment to regulate heart rate in order to reduce the rate of remission and mortality.

According to research conducted by Niu Na Xiao in 2022, the risk of remission in heart failure patients with diabetes mellitus has a higher number of 1.426 times compared to heart failure patients without diabetes mellitus, as evidenced by the results of further analysis, it is known that a p-value of 0.005 means that there is a statistically significant relationship between diabetes mellitus and the incidence of remission in heart failure patients. Research conducted by Sabe in 2023 stated that the results are in harmony, that diabetes mellitus is one of the risk factors for remission in heart failure patients. The results of further analysis were found to be p-value <0.001, meaning that there is a significant relationship between diabetes mellitus and the incidence of remission in heart failure patients (Sabe et al., 2023). The final results of the logistic regression test in a study conducted by Sadeq in 2020 show that there are seven risk factors that can cause remission in heart failure patients, one of which is diabetes mellitus with a p-value result of <0.006.

Diabetes mellitus is an independent risk factor that can cause heart failure and has a direct effect on the occurrence of diabetic cardiomyopathy. Based on clinical evidence, heart conditions in patients suffering from diabetes will experience diastolic dysfunction followed by preserved ejection fraction. This change is caused by the remodeling process of the heart. In diabetes, there is also activation of the RAAS pathway which can accelerate the occurrence of atherosclerosis, reduce cardiomyocytes, and myocardial fibrosis so that in diabetic patients, RAAS inhibitors are needed as first-line therapy for the prevention of primary and secondary cardiovascular diseases (Paramita et al., 2021).

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The Relationship between COPD and Congestive Heart Failure Readmissions

The results of the Fisher's exact test between COPD and congestive heart failure remission in this study showed statistically insignificant results with a p-value of 1.0 (>0.05), meaning that there was no significant relationship between COPD and congestive heart failure remission. The results of this study are in line with the results of a study conducted by Niu Na Xiao in 2022, that there was no significant relationship between COPD and the incidence of remission within 3 or 6 months in heart failure patients. The results of further analysis were found to have a p-value of >0.05. The results of this study are different from the results of Sabe's research in 2023, according to the study, COPD is one of the risk factors for remission in heart failure patients.

The results of further analysis were found to be p-value <0.001, meaning that there was a statistically significant relationship between COPD and the incidence of remission in heart failure patients (Sabe et al., 2023). The results of research conducted by Zhang in 2024 show results similar to the results of this study, that in patients who experience heart failure remission with a history of comorbid COPD known to have a p-value of 0.592, meaning that there is no significant relationship between the history of COPD and the incidence of remission in heart failure patients.

Chronic Obstructive Pulmonary Disease (COPD) and heart failure are very common conditions that occur at the same time. COPD and heart failure can affect significant morbidity and mortality. This may result from abnormalities in the pulmonary blood vessels and hypoxia that occur in COPD patients which can cause ventricular enlargement and left ventricular degeneration. Poor heart remodeling makes patients with COPD susceptible to certain subtypes of heart failure. However, the results of this study show that there is no relationship between COPD and readmission, this may be due to the small number of samples with a history of COPD so that it is not strong enough to show statistical significance.

The Relationship of Medication Compliance with Congestive Heart Failure Readmissions The results of the chi-square test between medication adherence and congestive heart failure remission in this study showed statistically significant results with a p-value of 0.001 (<0.05), meaning that there was a significant relationship between medication adherence and congestive heart failure remission. This study is in accordance with the results of Khasanah's research in 2021, there is a relationship between medication adherence and the incidence of rehospitalization with a p-value of 0.032 (Khasanah et al., 2020).

The results of the study conducted by Lima in 2024 show results similar to the results of this study, that poor treatment adherence is a significant factor with the incidence of remission of p-value results <0.001. The results of this study are different from Prabowo's research in 2022, the results of the study show that there is no significant relationship between medication adherence and the incidence of rehospitalization of patients with a p-value of 0.58. However, the negative trait shows that the more obedient the medication is as recommended by doctors, the frequency of rehospitalization will decrease (Kunto Prabowo & Vaeli, 2022).
As recommended by doctors, the frequency of rehospitalization will decrease.

Research conducted by Abedin in 2023 states that medication adherence has an important role in the prevention of remission. As many as 40% of CHF patients experience remission due to non-compliance with the prescribed treatment, leading to the risk of symptom exacerbation and readmission. This suggests that post-hospital follow-up care is essential because

inadequate care can worsen the disease and lead to remission (Abedin et al., 2023). According to Al-Tamimi's research in 2021, non-compliance with medication is the most significant factor related to remission with a p-value of 0.02. As many as 42.1% of heart failure patients who experienced remission were due to patients not complying with treatment. The results of the study explained that poor medication adherence was caused by financial problems (Al-Tamimi et al., 2021). Another factor that causes patients to not comply with taking medication is the possibility of boredom to take medication that causes unsuccessful recovery. As a result, there is a worsening of the condition of congestive heart failure patients who require them to be readmitted to the hospital (Khasanah et al., 2020). Other research states that depression is associated with decreased adherence against treatment due to a lack of interest and ability in self-care resulting in a poorer quality of life.

The purpose of administering medication to patients with congestive heart failure is to help reduce the cardiac workload, improve myocardial contractility, and reduce the initial and final workload of the heart. Therefore, taking medication is an important thing that must be done by patients with congestive heart failure to keep their condition stable (Khasanah et al., 2020). In addition, heart failure treatment aims to alleviate symptoms, delay the development of heart failure, reduce morbidity, and reduce the incidence of remission and mortality due to heart failure.

The results of the chi-square test between low-sodium dietary adherence and congestive heart failure remission in this study showed statistically significant results with a p-value of 0.018 (<0.05), so there was a significant relationship between low sodium dietary adherence and congestive heart failure remission. Most patients who do not adhere to a low-sodium diet experience remission due to not restricting the intake of the amount of salt. The results of this study are in line with Khasana's research in 2020, there is a relationship between adherence to a low-salt diet and the incidence of rehospitalization with a p-value of 0.021. The more compliant the congestive heart failure patient in undergoing a low-salt diet, the less the incidence of rehospitalization. According to the study, a low-salt diet in patients with congestive heart failure aims to regulate fluid volume, regulate osmolarity, regulate fluid balance, and regulate blood pressure in patients with congestive heart failure to keep it stable. (4)

Research conducted by Naderi in 2022 stated that low sodium levels are one of the factors related to the incidence of remission and mortality in heart failure patients. The results of the study showed similar results to the results of this study, it is known that the p-value at low sodium levels to the incidence of remission is 0.01, meaning that there is a statistically significant relationship between low sodium levels and the incidence of remission in heart failure patients. The results of Madanat's 2021 study stated that patients who followed a low-salt diet daily had a lower remission rate compared to patients who did not follow a low-salt diet. However, a p-value of 0.919 means that there is no significant association between a low-salt diet and the rate of remission in patients with congestive heart failure. This is likely due to the fact that the number of samples that underwent remission in the study was too small, namely 45 (23%) patients (Madanat et al., 2021).

A low-salt diet can lower sodium intake, so it can reduce fluid buildup in patients with congestive heart failure. In patients who do not adhere to sodium restrictions it will lead to increased fluid retention in the body in patients with congestive heart failure. So it can result in an increase in the volume of fluid in the body, which can ultimately cause an increase in the load of the heart and an increase in fluid dams. This can trigger the occurrence of signs and symptoms of failure congestive heart and causes the patient to experience remission or readmission to the hospital.

The Relationship of Fluid Restriction Compliance with Congestive Heart Failure

Readmissions

The results of the chi-square test between fluid restriction compliance with congestive heart failure remission in this study showed a statistically significant result with a p-value of 0.003 (<0.05), so there was a very significant relationship between fluid restriction compliance with congestive heart failure remission.

Heart failure patients who are treated with excess fluids have a greater risk of remission or readmission or even death. About 25% of patients treated for heart failure experience remission or readmission within 30 days in the hospital caused by fluid overload as the main cause. Based on the results of the 2021 Zisis study, heart failure patients who received the implementation of a fluid management program before discharge from the hospital had a greater intervention effect (p=0.001 OR=0.43) compared to heart failure patients who received a fluid management program after discharge from the hospital (OR=0.78). Therefore, the status of intravascular assessment can optimize diuresis, reducing the risk of remission and mortality.

Once the patient is discharged, it is important to conduct patient education and patient self-care to guide fluid management. There are three main aspects of patient management, namely monitoring hypervolemia by monitoring daily weight, limiting sodium intake, and immediately contacting health professionals when gaining weight. In addition, the intensity of diuretic treatment upon discharge from the hospital also plays an important role in the patient's fluid management. It aims to monitor symptoms and ensure patient compliance.

Compliance with fluid restrictions is the patient's action in complying with fluid intake restrictions so that it can prevent fluid overload. Fluid overload or hypervolemia is an increase in the volume of intravascular, interstitial, and intracellular fluid which is one of the complications in patients with congestive heart failure, characterized by the presence of edema, weight gain, and shortness of breath. Excess fluid volume in patients with congestive heart failure occurs due to the inability of the right side of the heart to control the incoming blood flow causing a failure to push the volume. Thus, it causes an increase in venous pressure in the systemic circulation and results in leakage of fluid that comes out filling the organs. So that there is an enlargement of the organs, edema, and even ascites. Fluid overload has a close relationship with death as it can lead to increased fluid volume and some complications such as pulmonary edema, delayed wound healing, impaired bowel function, and tissue damage.

CONCLUSION

The study concludes that remission in congestive heart failure patients at Pertamina Cirebon Hospital is significantly associated with hypertension, coronary heart disease, diabetes mellitus, and adherence to medication, low-sodium diets, and fluid restrictions, while chronic kidney failure, atrial fibrillation, and COPD were not linked to readmission risk. These findings highlight the importance of strengthening discharge planning, patient education, and ongoing monitoring—particularly in promoting adherence to treatment and managing key comorbidities—to reduce readmissions. Future research is recommended to explore additional factors such as psychosocial influences, healthcare access, and long-term adherence patterns, as well as to evaluate the effectiveness of targeted intervention programs in improving patient outcomes.

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