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Non-adherence to Clinic Schedule: One of Non-Medical Factors Associated with Early Hospital Readmission among Heart Failure Patients

Ipyana M. Kajembula[1], Joel S. Ambikile[1], Salma A. Wibonela[2]

[1]Clinical Nursing Department, School of Nursing, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
[2]Department of Clinical Nursing Services, Jakaya Kikwete Cardiac Institute, Dar es Salaam, Tanzania

***Corresponding author:**

Dr. Joel S. Ambikile

Muhimbili University of Health and Allied Sciences

P. O. Box 65001

Dar es Salaam, Tanzania

Email: joelambikile@yahoo.com

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Abstract

Background

Regardless of improvement in the delivery of care and treatment to patients, management of heart failure is still challenging. This is evidenced by increasing rates of both admission and readmission among patients with heart failure. Unlike medical conditions associated with heart failure such as hypertension, myocardial infection, and cardiomyopathy, this study focused on non-medical factors associated with hospital readmission among heart failure patients.

Broad Objective

The aim of this study was to determine non-medical factors associated with early hospital readmission among heart failure patients at Jakaya Kikwete Cardiac Institute in Tanzania.

Methodology

A hospital-based cross-sectional study was conducted among heart failure patients from March to May 2021 at Jakaya Kikwete Cardiac Institute, a tertiary specialized hospital in Eastern Tanzania. Data were collected using a structured questionnaire and analysis was performed using version 20 of the Statistical Package for the Social Sciences. Chi-square test and logistic regression were performed to determine associations, with a p-value of <0.05 considered for statistical significance.

Results

A total of 134 heart failure patients with second admission participated in this study. The mean age was 56.3 (SD 14.1), and 71 (53.0%) were females. Thirty-eight (28.4%) patients experienced early readmission (within 30 days after discharge), and non-adherence to clinic visits (AOR: 3.658; 95% CI: 1.549, 8.637; p=0.003) was associated with early readmission.

Conclusion and Recommendations

Heart failure is common and is associated with high rate of readmission. Non-adherence to clinic visits is an important factor leading to early hospital readmission. Strategic interventions that address non-adherence to clinic visits may be important in reducing readmissions among heart failure patients.

Keywords: *Heart failure, Readmission, Clinic Visit, Non-Medical Factors, Patients.*

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Introduction

Heart failure (HF) is a medical condition considered as the chief complication of all heart diseases worldwide. Globally, more than 37.7 million people suffer from HF (1). The prevalence of HF is estimated to be 0.7% in persons aged 45 to 54, and over 10% in those aged 85 and above (2). In Sub-Saharan African (SSA) countries, hospital prevalence studies indicate that HF contributes to 9.4 to 42.5% of all medical admissions and 25.6 to 30.0% of admissions into the cardiac units (3). Even with improvement in medical and nursing care, management of HF patients, which usually presents as a disease syndrome, poses a challenge to healthcare providers. This is evidenced by increased rate of morbidity and readmission leading to high mortality rate (4).

HF has been attributed to various causes and risk factors. Studies previously conducted in Tanzania have shown that hypertension, cardiomyopathies and rheumatic heart disease are the major etiological factors (5–7). This corroborates with the situation in SSA where hypertensive heart disease is the leading risk factor, followed by cardiomyopathy, and rheumatic heart disease which are responsible for over 75% of HF in the region (3). The situation is different in other regions of the world, especially in high income countries. In a comparative study done in Sweden and Tanzania, for instance, Sweden had less HF patients with hypertension and patients were older and more commonly males compared to Tanzania (8). This is a typical phenomenon observed in high income countries such as North America, Western Europe, and Japan where HF is a disease of the elderly, with ischemic heart disease being the commonest etiologic risk factor (9). However, HF etiologies in SSA are gradually becoming more similar to those in high income countries due to changes in social life such as embracing western lifestyle and sedentary living, among other factors (3,7).

Hospital readmission refers to the second admission to the hospital after previous discharge, and it depends on the patient's condition and prognosis (10). In Tanzania hospital readmission due to heart failure accounts for 19.4% of the elderly patients admitted to the medical ward (11). Various medical causes have been implicated in hospital readmissions among HF patients. These include infections, anemia hypertension and arrhythmias which are facilitated by inadequate medical treatment, poor compliance, inadequate follow up, and poor knowledge among patients (12). Among these factors, hypertension is emerging as an important cause just like in other SSA countries (8). While a previous study in Tanzania

revealed unemployment being associated with readmission (13), a recent scoping review showed no sociodemographic differences, except that readmission likelihood was higher in men when follow-up duration was longer than 1 year (14). HF readmission impacts negatively on health care facilities and patients, and causes a huge financial burden (15).

Most studies on HF readmissions have focused on medical reasons and associated factors (16,17). Less is known about non-medical factors precipitating hospital readmission among patients with HF. However, non-medical factors such as lifestyles may significantly contribute to readmissions and associated costs among patients with HF (18,19). If they remain unaddressed, they may continue to contribute to the burden of costs associated with HF readmissions. This study was conducted to determine non-medical factors associated with early hospital readmission (within 30 days after discharge) among HF patients at Jakaya Kikwete Cardiac Institute (JKCI) in Tanzania.

Materials and methods

Our study employed a hospital-based cross-sectional analytical design and was conducted from March to May 2021 among patients with HF at JKCI in Dar es Salaam region, which is a commercial city in Tanzania. The latest data (2021) from the United Nations - World Population Prospects show that Dar es Salaam has a population of over 7 million people. It is the most populous city in Tanzania and sixth largest and fastest growing city in Africa.

JKCI is the highest public tertiary hospital in Tanzania which serves patients with heart problems. As such, patients with heart problems from other regions in the country are referred to JKCI for specialized and advanced management. The main services offered are cardiology, cardiovascular, and surgical services. The institute has 103 bed capacity and serves about 100 inpatients and 700 outpatients per week including those with HF. During the period of data collection, records showed that from 150 to 500 HF patients were attending the clinic in a month.

In addition to sociodemographic information, an anonymous, self/interviewer-administered, structured questionnaire was used to collect data on non-medical factors associated with early hospital readmission. The questionnaire consisted of questions on compliance to medication use, clinical visit patterns after first discharge, patterns of physical exercise, and dietary use. Early or late readmission was determined by asking a patient the number of

days stayed at home since last discharge. Based on literature, staying up to 30 days at home without being readmitted was considered as early readmission, and staying more than 30 days as late readmission (10,13). Non-adherence to clinic visit and forgetting to take medication were considered a problem when each had occurred at least once in the last 30 days (20). Presence of physical exercise was considered when participants had performed any physical activity that lasted for at least 30 minutes per week. The questionnaire was developed in English with consultation from HF experts (doctors and nurses) and translated into Kiswahili, which is the most commonly used language in Tanzania. To ensure the accuracy and quality of the translation, back-translation was performed by two authors who are competent in both languages. The Kiswahili version of the questionnaire was then pre-tested among 20 patients with HF at JKCI whose data was not included in the final analysis. Feedback from the pre-test on aspects such as the clarity, sequence and organization of questions, as well as the time required, were considered to improve the questionnaire before commencing data collection. Except those seriously ill, HF patients with more than one admission, aged 18 years and above, and who gave consent, participated in the study. A consecutive sampling method for almost one month was used to maximize getting participants since there was a significant drop in the number of patients attending/admitted at JKCI due to the COVID-19 pandemic. Sample size was estimated by using the formula $n_o = z^2pq/e^2$ (21), where n_o is the sample size, z is the confidence level at 95% (1.96), p is the estimated proportion of an attribute that is present in the population (we used a previous study with proportion of early hospital readmission of 25% (22)), q is 1-p, and e is the level of precision (0.05). Based on this formula, the estimated sample size was 288.

Data collection was carried out by the authors within the wards of JKCI. Patients who could not fill the questionnaires for various reasons were assisted by a present relative or researcher. Written informed consent was obtained from all respondents and confidentiality was guaranteed by ensuring anonymity. Participation was voluntary and withdrawal from the study at any time was at the disposal of participants. The questionnaire took about 10 to 15 minutes to fill, and those completed were securely kept in a locked cabinet by one of the authors. Double data entry into Statistical Package for the Social Sciences (SPSS) computer program was done by two authors to avoid errors, followed by analysis.

Besides analyzing the HF patients' sociodemographic information, the Chi-square test was performed in bivariate analysis followed by a logistic regression to determine non-medical

factors associated with hospital readmission. All analyses were carried out using IBM SPSS, Version 20, with frequency tables and percentages used to summarize the data. A p value of less than 0.05 was used to indicate statistical significance in all analyses.

Results

Sociodemographic characteristics of patients readmitted for heart failure

A total number of 134 HF patients were invited to participate in the study during the period of data collection and all of them (100%) completed the questionnaires without missing data and were included in the final analysis (we could not reach the required sample size of 288 due to low number of admitted patients as a result of COVID-19 pandemic and limited data collection period). Table 1 shows sociodemographic characteristics of patients readmitted for heart failure. Participants' mean age was 56.3 (SD 14.1), and 71 (53.0%) were females. Thirty-eight (28.4%) participants experienced early readmission while the rest had late readmission (30 to 90 days: 53.0%; more than 90 days: 18.7%). While there were no significant differences observed with all other independent variables, patients with lower level of education (Chi-square test, $p = 0.041$) and irregular clinic visit (X^2, $p < 0.001$) were more likely to experience early hospital readmission.

Table 1: Sociodemographic characteristics of patients readmitted for heart failure (N=134)

Characteristics	Total	Hospital Readmission		X^2	p value
		Early (≤30 days)	Late (>30 days)		
	n (%)	n (%)	n (%)		
Mean Age (SD)	56.3(14.1)	54.0 (13.7)	57.2(14.2)		
Sex					
Male	63 (47)	20 (52.6)	43 (44.8)	0.7	0.412
Female	71 (53)	18 (47.4)	53 (55.2)		
Level of Education					
≤Secondary education	100 (74.6)	33 (86.8)	67 (69.8)	4.2	0.041
>College University	34 (25.4)	5 (13.2)	29 (30.2)		
Employment Status					
Employed	104 (77.6)	33 (86.8)	71 (74.0)	2.6	0.107
Unemployed	30 (22.4)	5 (13.2)	25 (26.0)		
Having a partner					
Yes	97 (72.4)	30 (78.9)	67 (69.8)	1.1	0.285

No	37(27.6)	8 (21.1)	29 (30.2)		
Physical exercises					
Yes	69 (51.5)	23 (60.5)	46 (47.9)	1.7	0.188
No	65 (48.5)	15 (39.5)	50 (52.1)		
Table salt use					
Yes	52 (38.8)	14 (36.8)	38 (39.6)	0.1	0.769
No	82 (61.2)	24 (63.2)	58 (60.4)		
Medication cessation					
Yes	53 (39.6)	19 (50.0)	34 (35.4)	2.4	0.12
No	81 (60.4)	19 (50.0)	62 (64.6)		
Adherence to clinic visits					
Yes	81 (60.4)	14 (36.8)	67 (69.8)	12.4	<0.001
No	53 (39.6)	24 (63.2)	29 (30.2)		
Forgetting to take medication					
Yes	65 (48.5)	20 (52.6)	45 (46.9)	0.4	0.548
No	69 (51.5)	18 (47.4)	51 (53.1)		

X^2 = Chi-square test

Non-medical factors associated with HF readmission

Table 2 shows logistic regression analysis of sociodemographic characteristics associated with hospital readmission, with both crude and adjusted odds ratios. Among patients with HF, non-adherence to clinic visit was associated with early hospital readmission (AOR: 3.658; 95% CI: 1.549, 8.637; p = 0.003). Sex, level of education, employment status, partner status, physical exercise, table salt use, forgetting to take medication, and medication cessation had no significant associations with hospital readmission.

Table 2: Associations of sociodemographic characteristics with hospital readmission (N=134)

	Early readmission (≤30 days)					
	COR	95% CI	p value	AOR	95% CI	p value
Sex (ref: Male)	1.37	0.645, 2.909	0.413	0.783	0.324, 1.893	0.587
Level of education (ref: ≤ Secondary)	2.857	1.013, 8.055	0.047	0.405	0.130, 1.258	0.118
Employment status (ref: Employed)	2.324	0.817, 6.609	0.114	0.52	0.162, 1.670	0.272
Having a partner (ref: Yes)	1.623	0.664, 3.966	0.288	0.713	0.252, 2.023	0.525
Physical exercises (ref: Yes)	1.667	0.776, 3.578	0.19	0.471	0.194, 1.146	0.097

Table salt use (ref: Yes)	0.89	0.410, 1.934	0.769	1.135	0.451, 2.854	0.788
Medication cessation (ref: Yes)	1.824	0.852, 3.904	0.122	0.667	0.277, 1.606	0.366
Adherence to clinic visits (ref: Yes)	3.961	1.797, 8.728	0.001	3.658	1.549, 8.637	0.003
Forgets to take medication (ref: Yes)	1.259	0.593, 2.672	0.548	1.04	0.424, 2.546	0.932

Discussion

In the current study, non-medical factors associated with early hospital readmission among heart failure patient were assessed. While gender, level of education, employment status, partner status, physical exercise, use of table salt, and adherence to medication were not independent predictors of hospital readmission, non-adherence to clinic visit was. Strategic interventions that address non-adherence to clinic visits among HF patients should be considered as they may be crucial in reducing early hospital readmission and improving patient outcomes.

There was no significant sex difference regarding HF hospital readmissions. This may mean that, for some reasons, female and male HF patients are equally or similarly affected by HF readmissions. This finding corroborates with results from previous studies conducted in Tanzania (12,22). However, it is generally known that there is sex difference in health seeking behaviour, with women seeking more health care (whether physical or mental) in response to health concerns (23,24). This shows that sex generalization about health seeking behaviour may not hold for specific health conditions like HF. One study showed that women tend to be more likely to have higher readmission rates when duration of follow-up is less than 12 months (14). In this case, women's vulnerability to hospital readmission was associated with compliance to pharmacological treatments.

Unlike other sociodemographic factors included in our study, the bivariate analysis indicated that lower level of education and non-adherence to clinic visit were significantly associated with early hospital readmission. However, when demographic characteristics were adjusted for in the multivariate analysis, only non-adherence to clinic visit remained a significant factor. This shows that non-adherence to clinic visit is an important non-medical factor that needs to be addressed among HF patients to reduce early hospital readmissions. This finding corroborates with a study in the US which showed that in-person clinic follow-up

within 7 days after discharge among HF patients is important as it is associated with lower early hospital readmission (25). Factors that may influence clinic visit such as transport, distance from the facility, and co-payment, should also be considered as they may affect frequency of clinic visit and ultimately impact hospital readmission. To address this, strategies that can facilitate follow-up may be applied such as an appointment near the patient's home, sending reminder messages, transportation to appointment, elimination of co-payment, and follow-up within 7 days post-discharge (25,26).

HF clinic is a vital intervention strategy in managing patients with HF as it reduces hospital readmission within 30 days of discharge and lowers mortality rates. This is because it provides the opportunity for patients to be seen acutely after discharge, to have multiple medication adjustments, and to receive ongoing follow-up (27). Wherever possible, it is recommended that HF clinics that use nurse intervention should be integrated in care process for patients with HF, with attention paid to the quality of care delivered by the clinics to ensure persistence of benefits of the intervention strategy. Treatment in specialized HF clinics using nurse intervention reduces readmission frequencies and improves quality of care for HF patients and is achieved by improving patient education and support (28). Appropriate modern information technology such as mobile phones may facilitate reminding HF patients to visit clinic (29). In the era of COVID-19, the feasibility of virtual visits to provide education and support to HF patients needs to be considered in our study setting as practiced in the US. However, this needs to be done with great caution, especially in low income settings, due to socioeconomic variations (30).

Sex, level of education, employment status, having a partner, physical exercises, use of table salt, frequently forgetting to take medication, and stopping to take medication (medication cessation) did not significantly predict readmission among HF patients in our study. These findings may not necessarily reflect the reality as some of them are contrary to what has been previously established. For instance, findings from previous systematic reviews were not conclusive regarding the effects of physical exercises and use of salt on HF hospital readmission due to scarcity of studies and methodological challenges (31,32). However, other studies have portrayed that a higher level of education, employment, and adherence to medication are associated with less hospital readmissions (12,22,33). This is supported by a systematic review and meta-analysis of a randomized controlled trial which established that medication adherence interventions improve HF readmission rates. The

observed differences between our study and others may also be attributed to methodological variations such as sample size used.

Our study has some limitations. First, use of the consecutive sampling method and small sample size (caused by a decrease in the number of patients attending the hospital due to COVID-19 and limited time for data collection) might have affected the representativeness of the study population, hence the generalization of our study findings. Secondly, aetiologies and duration of HF were not explored and adjusted for which might have affected the results. Nevertheless, our study findings highlight clinic visit as an important non-medical factor that may be responsible for hospital readmissions among HF patients, from which specific interventions may be drawn to address the problem.

Conclusion and Recommendations

Heart failure is common and is associated with an extremely high rate of readmission. Non-adherence to clinic visits among HF patients is one of the important non-medical factors that may lead to early hospital readmission. Strategic interventions that focus on addressing non-adherence to clinic visits may be important in reducing the number of HF readmissions. Further studies involving a random sampling and bigger sample size, HF aetiologies, HF duration, and different levels of health facilities are needed to provide more insight regarding non-medical factors associated with HF readmission. In future studies, there is also a need to consider other factors that may affect HF readmissions such as health insurance and use of alternative treatment facilities including spiritual care and traditional medicine.

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Authors' contribution

IMK conceived the study and its design, performed data entry, and drafted the manuscript; SAW refined the study and guided data collection. JSA reviewed the study, provided technical support, and overall supervision. All the authors revised and approved the final manuscript.

Abbreviations

HESLB	Tanzania Higher Education Students' Loans Board (HESLB)
HF	Heart Failure
JKCI	Jakaya Kikwete Cardiac Institute
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa

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