



CLINICAL CHARACTERISTICS AND IN HOSPITAL OUTCOME OF ACUTE HEART FAILURE PATIENTS ADMITTED AT MEDICAL WARD, AT SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE, ADDIS ABABA, ETHIOPIA.

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List of abbreviation and Acronyms

AHF : acute heart failure

ARNI : Angiotensin receptor-neprilysin inhibitor

ACE : Angiotensin converting enzyme inhibitor

ARB : Agent angiotensin II receptor blockers

EF : Ejection fraction

HF : heart failure

HFrEF : heart failure with reduced ejection fraction

HFpEF : heart failure with preserved ejection fraction

HFmrEF : Heart failure with mildly reduced ejection fraction

GDMT : guideline directed medical therapy

EPI INFO: Epidemiological Information

ETB: Ethiopian birr (money)

SPHMMC: Saint Paul's Hospital Millennium Medical College SPSS: Statistical Package for the Social Sciences

SGLT2 i: sodium glucose transporter 2 inhibitors

SSA: Sub-Saharan Africa

TASH: Tikur Anbesa Specialized Hospital WHO: World Health Organization .

Abstract

Background :Heart failure, a debilitating condition, is increasingly prevalent in developing countries. However, information on how it manifests and responds to treatment in these settings is often scarce. This study addresses this gap by examining the clinical features and in-hospital outcomes of patients admitted with acute heart failure to the internal medicine department of St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia.

Methods :This study retrospectively reviewed medical records of 332 patients admitted with acute heart failure at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, over a two-year period (September 2010 - September 2015). Data was collected using a standardized form and analyzed using statistical software (SPSS Version 26).

Results :Out of the 332 patients, the median age of patients with acute heart failure was 55 years(IQR=38-67) and the median hospital was 12 days (IQR=6-20). The leading precipitating factor and underlying disease at the time of admission were pneumonia (39.2) and ischemic heart disease (23.4), respectively. The in- hospital mortality was found to be 13.8%. IHD (adjusted odd ratio (AOR) = 9.96 , P = 0.05) , diabetes mellitus (AOR) = 0.78, P = 0.04), shock (AOR) = 32.5 , P =0.01) and anemia (AOR) = 4.76, P =0.05) were predictors of in – hospital mortality. The findings on plural effusion on CXR predicted the prolonged length of stay (B=0.283,P<0.001) and in- hospital respiratory failure was associated with shorter length of stay (B=-0.151 ,P= 0.005)

Conclusion : This study in Ethiopia revealed a concerning high in-hospital mortality rate of 13.8% among patients admitted with acute heart failure (AHF). Notably, the presence of IHD, diabetes mellitus (DM), anemia, and shock during hospitalization emerged as significant predictors of poor outcomes.

1. INTRODUCTION

.1 Back ground

Acute heart failure (AHF) is a syndrome defined as the new onset (de novo heart failure (HF)) or worsening (acutely decompensated heart failure (ADHF)) of symptoms and signs of HF, mostly related to systemic congestion. In the presence of an underlying structural or functional cardiac dysfunction (whether chronic in ADHF or undiagnosed in de novo HF), one or more precipitating factors can induce AHF, although sometimes de novo HF can result directly from the onset of a new cardiac dysfunction, most frequently an acute coronary syndrome.[1], [2].

Patients with AHF may exhibit a wide range of signs and symptoms at the time of admission, including dyspnea, paroxysmal nocturnal dyspnea, high jugular venous pressure, peripheral edema, murmur, S3 gallop, orthopnea, neck vein distension, and an easy fatigue. Major triggers that may cause decompensation and hospital admissions include cardiac diseases like uncontrolled hypertension (HTN), arrhythmias, as well as non-cardiac conditions like diabetes mellitus, renal dysfunction, infection, and non-adherence to a prescribed treatment plan. The most common causes of AHF admission in Ethiopia include infection, arrhythmia, anemia, myocardial infarction, and treatment cessation.

The stages of HF were also revised as at risk for HF (stage A), pre-HF (stage B), symptomatic HF (stage C) and advanced HF (stage D)

Heart failure (HF) is a chronic and progressive clinical syndrome induced by structural or functional cardiac abnormalities displaying either reduced (in HF with reduced ejection fraction (HFrEF)) or preserved (in HF with preserved ejection fraction (HFpEF)) left ventricular ejection fraction (LVEF)[2]

The prevalence of heart failure is increasing in Africa, adding to the already existing burden of infectious disease and making HF a common cause of hospitalization on the continent [3], [4]

Population-based incidence and prevalence studies are lacking in SSA. According to the published hospital prevalence studies, HF accounts for 25.6-30.0 percent of admissions to cardiac units and 9.4-42.5 percent of total medical admissions. [5]

Young and middle-aged adults in sub-Saharan Africa (SSA) are most affected by HF, which has a significant

disability-adjusted life year burden. This contrasts with the clinical characteristics and distribution of HF in high-income North America, Western Europe, and Japanese countries, where the disease primarily affects the elderly. Furthermore, HF in SSA is primarily non-ischemic in origin, despite ischemic heart disease being the most prevalent aetiological risk factor for HF in high income nations. The most prevalent risk factors include hypertensive heart failure, dilated cardiomyopathy, rheumatic heart disease, pericardial disorders, and HIV-associated cardiomyopathy.

The average hospital stay, according to the sub-Saharan Africa Survey of Heart Failure survey, was 7 days, although it was 11 days in Abeokuta, Nigeria, and 13 days in a rural health facility in Cameroon. The common occurrence of readmission after an initial or index episode of HF is typically caused by CV variables (worsening HF). About 15.4% of people die or are readmitted after 60 days [2].

Despite advancements in treatment, acute heart failure (AHF) remains a leading cause of hospital visits and admissions in Africa, accounting for 3-7% of all cases. [4] Worryingly, outcomes for AHF patients in Africa are significantly worse than for many cancers. This disparity is exacerbated by delayed presentation with severe symptoms, leading to in-hospital mortality rates ranging from 9-25% considerably higher than in developed countries. The grim toll continues after discharge, with case fatality rates exceeding 25%, 40%, and 75% at three months, one year, and five years, respectively. These stark statistics underscore the urgent need for improved diagnostics, earlier intervention, and comprehensive management strategies to address the devastating impact of AHF in Africa.

The study Bane A et al [10] found that the three most common reasons for immediate admission to the St. Paul's hospital in 2016 were pneumonia 188 (22.4%), tuberculosis 177 (21.1%) and heart failure 134 (16.0%).

Esubalew et al. (2015) retrospectively analyzed 496 patients at St. Paul's Hospital, finding an average age of 47 years and a male predominance. Rheumatic heart disease was the most common cause of AHF. While the median hospital stay was 11 days, factors like chronic kidney disease, female sex, and high admission heart rate were associated with worse survival.

Tigabu et al. (2021) studied 59% female patients at Black Lion Hospital with an average age of 51 years.

Their findings showed an in-hospital mortality rate of 10.6%. Predictors of increased mortality included atrial fibrillation, concurrent ischemic heart disease, poor left ventricular function, difficulty breathing while lying down, and requiring oxygen therapy.

Mulubirhan Tirfe (2023) conducted a prospective study at Black Lion Hospital with 169 participants. The median age was 34 years, and chronic rheumatic heart disease was again the leading cause of AHF. This study reported a higher in-hospital mortality rate of 17.2%.

Non-compliance as a Trigger for Extended Hospital Stays: using multivariate logistic regression analysis (adjusted for various patient characteristics) identified non-compliance with treatment as a significant predictor of longer hospital stays exceeding the median duration of 5 days. The analysis showed that patients who were non-compliant were 1.58 times more likely to have a prolonged stay compared to compliant patients, with a statistically significant p-value of 0.035. This finding suggests that improving medication adherence could potentially reduce hospital stays for heart failure patients.[5].

Anemia and Renal Dysfunction Linked to Increased Mortality: The same study employed multivariate logistic regression to analyze factors associated with in-hospital mortality. The analysis revealed that anemia and renal dysfunction were independent risk factors for death during hospitalization. Patients with anemia were 1.74 times more likely to die compared to those without anemia (p-value = 0.028), while patients with renal dysfunction had a 2.75 times higher risk of mortality (p-value < 0.001). These findings highlight the importance of addressing these complications promptly to improve patient outcomes. [5].

These studies highlight the significant burden of AHF in Ethiopia, identifying key characteristics and risk factors. However, the single-center nature and limited sample sizes warrant further research with larger and more diverse populations to confirm these findings and inform improved management strategies.

1.2 Statement of the problem

1.2.1 High Burden of Acute Heart Failure:

- Despite advancements in treatment, AHF remains a leading cause of hospital visits and admissions in Africa, with Ethiopia being no exception. This is evident in a study by Bane A et al. (2016) where heart failure ranked third among the reasons for immediate admission at St. Paul's Hospital, constituting 16% of cases.
- The severity of the problem is further emphasized by the grim mortality rates, exceeding 25% at three months and reaching 75% at five years.

1.2.2. Delayed Presentation and Poor Outcomes:

- Studies, including Esubalew et al. (2015) and Tigabu et al. (2021), reveal delayed presentation with severe symptoms, contributing to significantly higher in-hospital mortality rates (9-25%) compared to developed countries.
- This highlights the lack of awareness and inadequate access to early diagnostics and timely interventions, leading to worse patient outcomes.

1.2. 3. Knowledge Gaps and Limited Research:

- Existing research, like Mulubirhan Tirfe (2023), suffers from limitations including single-center designs and small sample sizes. This restricts the generalizability of findings and hinders the development of comprehensive management strategies.
- More research with larger and diverse populations is crucial to confirm existing knowledge, identify further risk factors, and inform evidence-based interventions.

1.2.4. Specific Predictors of Prolonged Hospital Stay and Mortality:

- While studies like the referenced one have identified non-compliance and complications like anemia and renal dysfunction as predictors of outcome, further research is needed to explore a wider range of potential factors influencing hospital stay and mortality in AHF patients within the Ethiopian context.

1.2.5. Need for Tailored Management Strategies:

- Considering the unique characteristics of AHF in Ethiopia, including the predominance of non-ischemic etiologies and younger demographics, there is a critical need for developing localized and culturally appropriate management strategies that address the specific challenges faced by Ethiopian patients.

This effectively highlight the significance of further research and emphasize the need for improved diagnostics, early intervention, and tailored management strategies to combat the devastating impact of AHF in Ethiopia.

1.3 Significance of the study

Addressing the Burdensome Reality of Acute Heart Failure in Ethiopia: Acute heart failure (AHF) presents a significant public health challenge in Ethiopia, contributing to a substantial burden of morbidity, mortality, and healthcare resource utilization. Despite advancements in treatment globally, the African context exhibits several unique characteristics that exacerbate the severity of AHF and necessitate region-specific research and interventions.

This study aims to address the critical knowledge gaps and unmet needs identified in the reviewed literature. While previous studies have shed light on the prevalence and risk factors associated with AHF in Ethiopia, limitations such as single-center designs and small sample sizes restrict the generalizability of findings and hinder the development of comprehensive management strategies.

This study addresses these limitations by employing a in hospital based retrospective patient chart

review with sample size of 332 patients admitted to the medical ward of St. Pual's hospital millennium medical college, allowing for a more robust understanding of AHF in the Ethiopian context.

This study holds significant value for various stakeholders:

1. Improved Understanding of AHF Burden and Predictors:

- By comprehensively analyzing clinical characteristics, treatments received during hospitalization, complications that have occurred during hospitalization and finally the outcome of patient's admission, the study will provide a more precise estimate of AHF prevalence and identify novel demographic, clinical, and socio-economic risk factors specific to the Ethiopian population. This comprehensive understanding is crucial for informing targeted preventive and early intervention strategies.

2. Tailored Management Strategies:

- By exploring the specific predictors of prolonged hospital stay and mortality beyond previously identified factors like non-compliance, anemia, and renal dysfunction, the study will pave the way for the development of evidence-based and culturally appropriate management protocols. This can significantly improve patient outcomes and optimize healthcare resource allocation.

3. Informing Policy and Public Health Interventions:

- The findings of this study will be valuable for policymakers and public health professionals in designing and implementing targeted interventions to address the unique challenges of AHF in Ethiopia. This could include raising awareness about early warning signs, improving access to diagnostic tools and timely treatment, and addressing adherence

barriers.

4. Contributing to the Global Understanding of AHF:

- The study's findings on the unique characteristics of AHF in Ethiopia will contribute to the broader global understanding of this complex disease. This knowledge exchange can inform research and interventions in other resource-limited settings with similar epidemiological profiles.

In conclusion, this study addresses critical knowledge gaps and aims to improve the management of AHF in Ethiopia. By providing a more comprehensive understanding of the burden, risk factors, and predictors of poor outcomes, the study has the potential to significantly improve patient care, optimize resource allocation, and contribute to better health outcomes for Ethiopians suffering from this debilitating condition.

2. LITERATURE REVIEW

2.1 Demographics and epidemiology of AHF

2.1.1 Global Reach and Rising Burden of Heart Failure

Heart failure (HF) constitutes a global pandemic, affecting an estimated 64 million individuals worldwide (Seferovic et al., 2021). This prevalence is projected to increase, driven by population aging, with US projections suggesting a 46% rise by 2030 and a corresponding 127% healthcare cost escalation (Seferovic et al., 2021).

Developed nations report an HF prevalence of approximately 1-2% in adults, rising to $\geq 10\%$ in those over 70 (van Riet et al., 2016). However, epidemiological studies face limitations due to , Differing definitions and population selection ,Data scarcity in certain regions , Reliance on administrative data (e.g., ICD codes) lacking accuracy and completeness , Limited capture of self-reported data and outpatient care (van Riet et al., 2016).

Despite these limitations, estimates suggest a median global prevalence of 17 per 1,000 individuals, ranging from ≤ 12 in some countries to >30 in others (Seferovic et al., 2021). Echocardiographic screening studies further reveal an 11.8% prevalence of any HF in those ≥ 60 and 1% in younger populations (Seferovic et al., 2021).

2.1.2 Scarcity of Data on Heart Failure in Sub-Saharan Africa: A Call for More Research

Data on heart failure (HF) in sub-Saharan Africa (SSA) remains remarkably limited, primarily originating from urban hospital settings (Sani et al., 2017; Ogah et al., 2014; Pio et al., 2014). This scarcity paints an incomplete picture, especially considering existing studies suggest:

High prevalence: Studies from Burkina Faso, Nigeria, and Togo report AHF accounting for a significant portion of cardiac cases (17.62% in one report) (Sani et al., 2017; Ogah et al., 2014; Pio et al., 2014).

Unique demographics: Unlike developed nations, HF in SSA affects a younger demographic, primarily targeting middle-aged individuals (Sani et al., 2017; Ogah et al., 2014; Dokainish et al., 2016).

These findings highlight the crucial need for more comprehensive data collection across SSA. By expanding beyond urban hospitals and incorporating rural settings, we can gain a richer understanding of HF prevalence, demographics, and etiologies in this diverse region. Such robust data is essential for developing effective prevention, diagnosis, and treatment strategies tailored to the specific needs of SSA populations.

2.2 Clinical Characteristics of AHF Patients

The results of a retrospective study conducted by Esubalew.W et al [9] ten years ago at this hospital showed that rheumatic heart disease was the most common (30 percent) cause of HF, followed by right side heart failure (20.4%), idiopathic dilated cardiomyopathy (18.1%), and ischemic heart disease (14.9 percent) and 8.3% of patients' causes were discovered to be hypertension.

key characteristics of patients admitted with acute heart failure (AHF): [6], [7], [8], [9]

Demographics and Presentation:

- New-onset HF: A majority (60.6%) of patients presented with newly diagnosed HF, indicating a critical need for early detection strategies.
- Comorbidities: Chronic obstructive pulmonary disease (COPD) emerged as the most prevalent comorbidity (36.7%), highlighting the interplay of respiratory conditions with AHF.

- Severity: The vast majority (90.3%) presented in severe NYHA Class IV, emphasizing the urgent need for intervention.

Hemodynamic Parameters:

- Low blood pressure: Mean systolic and diastolic blood pressure were low (107.5/67.9 mmHg), potentially requiring careful management of hemodynamic support.
- Elevated heart rate: The average heart rate of 98.0 bpm indicates tachycardia, a common sign of cardiac stress in AHF.

Echocardiographic Findings:

- Predominant preserved ejection fraction: A significant portion (74.3%) had preserved ejection fraction, suggesting the need for diagnostic tools beyond ejection fraction alone.

Precipitating Factors:

- Infectious triggers: Pneumonia emerged as the leading precipitant (47.5%), followed by atrial fibrillation (34.4%) and anemia (24.4%), highlighting the importance of infection control and addressing co-morbidities.
- Medication non-adherence: Drug discontinuation contributed to AHF in 22.5% of cases, underlining the importance of medication adherence education and support.

Underlying Etiologies:

- Rheumatic heart disease (RHD): The leading cause of AHF (48.5%), indicating a crucial area for preventive measures and early intervention.
- Valvular heart disease: Degenerative and rheumatic valvular abnormalities were significant contributors (22.5% and 19.5% respectively), highlighting the need for valve assessment and management.
- Chronic kidney disease (CKD): The most common co-morbidity (10.7%), emphasizing the complex interplay between cardiac and renal dysfunction.

2.3 In-Hospital Outcomes of AHF Patients

Medication adherence is a predictor of health outcomes. A study by Jia-Rong Wu et.al [5] found that non-adherence to heart failure medications was associated with negative treatment outcomes. Systolic blood pressure is an independent predictor of morbidity and mortality in patients with heart failure with either reduced or relatively preserved systolic function. Patients with lower SBP at admission had higher in-hospital and post discharge mortality rates. Higher SBP at admission was associated with lower in hospital mortality rates: 7.2% (>120 mm Hg), 3.6% (120-139 mm Hg), 2.5% (140-161 mm Hg), and 1.7% (>161 mm Hg) ($P<.001$ for overall difference (15)). Systolic blood pressure is an independent predictor of morbidity and mortality in patients with heart failure with either reduced or relatively preserved systolic function,

Global hospitalized heart failure registries reveal that the in-hospital mortality ranges from 4% to 30% and the median length of stay (LOS) is 4 to 20 days. The most recent information based on the continuing get with the guidelines- heart failure registry GWTG-HF registry of the American Heart Association showed a median LOS of roughly 4 days and an in-hospital mortality of < 3%. Age, cardiac and noncardiac comorbidities, systolic blood pressure, renal function (i.e., blood urea nitrogen and serum creatinine), serum sodium, hemoglobin, NP concentration, troponin, QRS duration, and use of evidence-based medications are the most widely acknowledged independent predictors of morbidity and mortality in heart failure patients

The most prevalent precipitants of acute heart failure exacerbation include non-adherence to sodium restriction recommendations, pulmonary infections, cardiac arrhythmias, and improper utilization of heart failure medications [6].

The study by DeVore AD et.al [7] found that hospitalized patients were not only likely to experience worsening heart failure, but also frequently developed AHF (acute heart failure), which

significantly increased their risk of death.

Systolic blood pressure is an independent predictor of morbidity and mortality in patients with heart failure with either reduced or relatively preserved systolic function. Patients with lower SBP at admission had higher in-hospital and post discharge mortality rates. Higher SBP at admission was associated with lower in hospital mortality rates: 7.2% (>120 mm Hg), 3.6% (120-139 mm Hg), 2.5% (140-161 mm Hg), and 1.7% (>161 mm Hg) ($P<.001$ for overall difference. [8]

A study by M. Tigabu at the University of Gondar hospital in 2021 revealed Atrial fibrillation (AOR=9.46; 95% CI: 1.49–60.29), concurrent ischemic heart disease (AOR=8.23; 95% CI: 1.15–58.89), being admitted with reduced left ventricular ejection fraction (AOR=5.36; 95% CI: 2.81–35.52), presence of orthopnea (AOR=6.63; 95% CI: 2.94–46.76), and using intra- nasal oxygen therapy (AOR=9.41; 95% CI: 1.35–65.82) were significantly associated with in-hospital mortality in patients with acute heart failure. [8]

2.4 Conceptual Framework

The conceptual framework is adapted from different literatures. It assesses factors such as, socio-demographic, disease characteristics, precipitating factors that affect the outcome of heart failure admitted patients. (fig. 1).



Figure 1. Schematic presentation of conceptual frame work on factors affecting in hospital outcome of heart failure patients.

3. OBJECTIVES OF THE STUDY

3.1 General objective

The main aim of this study was to assess the clinical characteristics and in-hospital outcome of heart failure patient among the hospitalized patient at medical ward at, at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

3.2 Specific objectives

To determine the major in hospital outcome of HF patients among the medically admitted patients at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

To better characterize the risk factors of HF among the medically admitted patients at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

To determine the main reason for the decompensation (i.e., to assess the precipitant causes) among the medically admitted patients at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

To determine the proportion of patients with appropriate guideline directed medical therapy among the medically admitted patients at St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

4. METHODS AND MATERIALS

4.1 Study setting

St. Paul Hospital Millennium Medical College (SPHMMC) is the second largest government hospital in Ethiopia. It is situated in Addis Ababa's Gullele sub city. The hospital has 2800 clinical, academic, administrative, and support staff members that provide medical specialty services to patients who are referred from all across the nation. The College has a catchment population of more than 5 million people and has an inpatient capacity of more than 700 beds, but it also treats 1200 emergency and outpatient patients on average every day.

Medical ward offers care to patients who require admission for a variety of medical conditions, including acute decompensation of heart failure. It has 100 beds, around 30 of which are set aside for cardiovascular conditions. Approximately 900 HF patients were admitted to medical ward in just the 2021 and 2022 Gregorian calendar.

The study was from 2023 to 2024 Gregorian calendar.

4.2 Study design

A single center hospital based , cross- sectional study was used

4.3 Source population

The source population was all patients who were admitted during the study period to medical ward of St Paul Hospital Millennium Medical College in Addis Ababa, Ethiopia.

Study population

The study population were those patients admitted for the acute decompensation of heart failure patients admitted patients to medical ward in St Paul Hospital Millennium Medical College in Addis Ababa, Ethiopia.

Sampling frame

The sampling was all patient who were admitted for AHF form the hospital registration book

4.4 Eligibility criteria**Inclusion criteria for patients**

Those patients willing and able to give informed consent to participate in the study and those who were 18 years of age and above, who was diagnosed with heart failure and admitted to medical ward

Exclusion criteria for patients

Patients not meeting the inclusion criteria or patients not voluntary to participate were excluded from this study excluded from the study

4.5 Sample size

For the participating patients, using the prevalence of related study conducted at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, the p value is 32%. With 95% confidence level and 0.05 margin of error a sample size is calculated by using single proportion formula:

$$\begin{aligned} n &= \frac{(Z_{\alpha/2})^2(p)(1-p)}{d^2} = \frac{(1.96)^2(0.32)(1-0.32)}{(0.05)^2} \\ &= 332.37 \approx 332 \end{aligned}$$

Sampling procedure

This study will employ consecutive sampling, a non-probability method suited to our limited patient population in the medical ward. In this approach, every patient who meets the study's inclusion criteria will be invited to participate until the desired sample size is reached. This method offers an advantage over convenience sampling by minimizing selection bias, as subjects aren't chosen based on readily available convenience, but strictly adhere to predefined criteria.

4.6 Study variables

Dependent variable: The outcome patients admitted for the heart failure

Independent variable

Socio-demographic variables: Age, Sex, Educational Status, Marital Status, Address, Monthly income, Having community-based health insurance

Disease characteristics: Duration of heart failure , clinical profile of HF , Presence of comorbidities, use of other medications

Death

Discharge from hospital

Length of hospital stay

Complication arising during hospitalization

Condition during discharge

4.7 Operational definitions

In-hospital mortality: AHF patient died in the hospital after he/she was admitted to the medical ward; AHF: Development or change of signs and symptoms of new onset of HF and/or decompensation or worsening of chronic stable HF while New-onset HF: AHF which occurs in patients without a history of HF.

Acutely decompensated chronic heart failure (ADCHF):AHF which occurs in patients with a history of chronic HF while reduced ejection fraction and preserved ejection fraction: patients whose LVEF was $\leq 40\%$ and $\geq 50\%$, respectively based on echocardiographic finding.

Non-compliance with medication: any form of deviation from compliance like losing one appointment, missing doses, etc. (instructions not understood, cost, not availability of drug.

This research operationalized length of hospital stay as the temporal gap between the documented dates of patient admission and discharge.

4.8 Data collection metho, Tool and procedure

The information was gathered through a thorough review of patient records using a structured format that includes socio-demographic factors, disease characteristics, medications patients are taking, complications that occurred before hospital discharge, potential precipitants, and the outcome of the hospitalization.

Two trained general practitioners conducted data collection between March and December 2023, receiving compensation based on the number of patients documented.

4.9 Data quality control

The questionnaire was pre-tested in 5% of the total sample size to avoid any confusion during

actual data collection period. One day training was given for data collectors on the importance, objectives, and method of data collection. There was on-going supervision by the principal investigator. Furthermore, data was checked during entry into the computer before analysis.

4.10 Data processing and analyses

Categorical data are presented as numbers of patient's and percentages, Continuous variables are presented as median and interquartile range (IQR) because of non-normal distribution. Categorical data were compared by the Pearson's χ^2 test or Fisher's exact test if at least one cell had an expected value less than 5. Continuous data were compared by non-parametric Mann-Whitney U test or Kolmogorov-Smirnov test. Multivariate logistic regression was performed to assess the effect of several variables on the all-cause in-hospital mortality results are presented as odds ratio (ORs) with corresponding 95% confidence intervals (CIs) and were estimated using logistic regression model. We included variables that were statistically significant in the univariate logistic regression analysis ($p < 0.2$) of factors associated with in-hospital mortality in a multivariate logistic regression model. Variables with a significant association with death are characterized as independent predictors of mortality. All tests were 2-tailed, a P value less than 0.05 is considered as a statistically significant difference. Statistical analysis was performed using statistical software SPSS version 26.

4.11 Ethical consideration

Before collecting any data, permission was obtained from the institutional review board of St. Paul's Hospital Millennium Medical College, ensuring the study adhered to ethical guidelines. Potential participants were fully informed about the study's objectives, their right to participate or decline, and the measures taken to ensure the confidentiality of their information. Only after providing written consent were individuals included in the data collection process. This transparent

and ethical approach helped build trust and protect participant rights throughout the study.

4.12 Plan for dissemination of results

The research findings will be presented and defended to the department of internal medicine, SPHMMC and submitted to the department of public health. In addition, the research report will be archived in the main Library of SPHMMC. The outcome of the study will be presented at different seminar, research symposium and conferences. All attempts will be made to publish the findings of this study on peer reviewed reputable local and international journal.

5. RESULTS

5.1 Socio demographic characteristics of respondents

During 11 months from February 12 to December 30 ,2023 totally 323 patients with AHF were admitted to our department meeting the inclusion criteria, form which 189 (56.9%) were females and the median age at the time of hospitalization was 55 years with IQR (38-67) (**Table 1**). In total 195 (58.7%) patients were older than 50 years. Of these, 205(61.7%) patients are urban residents,208 (62.7%) are married. The median (IQR) SBP and DBP were 120 (120-140) and 80 (80-90) and heart rate was 93.5(80-117.25).

Table 1: Baseline characteristics, outcome of hospitalized acute heart failure patient Saint Paul's Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

	Age ,median (IQR)	55 (38-67)	
	Duration hospital stay, median (IQR)	12 (6-20)	
	female	189	56.9
Place of residency	urban	205	61.7
Educational level			
	informal	83	25
	primary	71	21.4
	Secondary	155	46.7
	tertiary	23	6.9
Marital status			
	divorced	17	5.1
	married	208	62.7
	single	57	17.2
	widower	50	15.1
Health insurance covered	yes	210	63.3
Monthly income in ETB	< 1,500 ETB	171	51.5
	1501-3500 ETB	108	32.5
	3501-5500 ETB	37	11.1
	>5500 ETB	16	4.8
Comorbidities			
	Diabetes mellitus	89	26.8%
	Arterial hypertension	156	47%
	anemia	47	14.2%
	Chronic kidney disease	41	12.3%
	Stroke	21	6.3%
	Coronary heart disease	15	5.4%
	Peripheral artery disease	6	1.8%
	Atrial fibrillation	53	16 %
	airway disease (COPD/ASTHMA	49	14.8%
	Dyslipidemia	44	13.3%
	Others	92	27.7 %
	Systolic blood pressure, median (IQR)	120	(120-140)
	Diastolic blood pressure, median(IQR)	80	(80-90)
	Heart rate, median (IQR)	93.5	(80-117.25)
	X- ray pulmonary congestion	275	82.8

	X –ray pleural effusion	189	56.9
	NYHA Class III-IV	316	95.2
	NYHA class I-II	16	4.8

The major etiologies of hospitalized patients with HF were IHD 23.4%(**Table 2**), HHD 21.2%, RHD 20.6%, non-ischemic/idiopathic cardiomyopathy 15.3% and right-side heart disease(pulmonary hypertension) 11.8%. The comorbidities included HTN 47% , DM 26.8%, Afib 16% , COPD/asthma 14.8%, anemia 14.2 % , dyslipidemia 13.3% ,CKD 12.4 %. The AHF was classified as de novo in 11.4% patients (without a previous diagnosis of heart failure), the rest of patients had a recognized chronic heart failure before admission and presented as a decompensation of chronic heart failure 88.6%.

Table 2: Underlying cause of heart failure, Saint Paul’s Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

Type of cardiac disease	Responses (N= 332)	
	N	Percent
RHD	66	20.60%
Ischemic heart disease	75	23.40%
Hypertensive heart disease	68	21.20%
Degenerative valvular heart disease	13	4.00%
Non-ischemic/idiopathic cardiomyopathy	49	15.30%
Right side heart disease (pulmonary hypertension)	38	11.80%
Tachyarrhythmia	4	1.20%
Arterial hypertension	3	0.90%
other	5	1.60%

The most common precipitating factors are listed in (**Table 3**).The most common precipitant factors were infection occurred in 39.2% followed by non-adherence 20.5% then tachyarrhythmias 11.4%. More than one causative and precipitating factor can participate in the development and sudden decompensation of heart failure in many patients.

Table 3 : Precipitating factors for heart failure, Saint Paul’s Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

Precipitating factors	Responses N=332)	
	N	Percent
Pneumonia	130	39.2
Tachyarrhythmia	38	11.4
STEMI	20	6
Bradycardia	2	0.6
Exacerbation of airway disease	32	9.6
NSTEMI	11	3.3
Non adherence	68	20.5
Uncontrolled arterial hypertension	7	2.1
Pregnancy	16	4.8
Anemia	24	7.2

Those with HF with reduced ejection fraction (HF_{rEF}: LVEF< 40%) , HF with mildly reduced ejection fraction (HF_{mrEF}: LVEF40-49%) and HF with preserved ejection fraction (HF_{pEF}: LVEF> 50 %) accounted for 31.6%, 3.3% and 65.1% of the cohort, respectively. HF_{pEF} was more prevalent in female patients (61.7%) than in male patients . During hospitalization, diuretics were prescribed for 96.1% of patients. Pharmacological, diagnostic and other therapeutic intervention during the patient’s hospitalization are reported in (**Table 4**). Among the complication occurred during AKI occurred in 34%, shock 16.3%, HAI 14.2%, respiratory failure 13% , others 2.4%.

The median of EF was 60 IQR(35-60), most of the patients 65.1% had EF 50. Afib was detected in 21.7%, most of the patient at admission were in severe heart failure with NYHA class III-IV was 95.2% , pulmonary congestion was confirmed on CXR 82.8%.

Table 4 : Treatment and diagnostic procedures during hospitalization, Saint Paul’s Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

Treatment and diagnostic procedures	Responses (N=332)	
	N	Percent
Pulmonary ventilation	42	12.7
IV furosemide	319	96.1
Noradrenaline	43	13
Dobutamine	9	2.7
Amiodarone	13	3.9
Hemodialysis	13	3.9
IV antibiotics	196	59
others	16	4.8

5.2 In- hospital death

The median duration of hospital stay was 12 (IQR 6-20) days. The in-hospital mortality rate was 13.8%, the median duration of hospitalization was 13 days for non survivors. among the cause of death, sepsis was the most common cause of death, accounting for 54.3%. there were significant differences in demographic and clinical characteristics and hospital course between survivors and non survivors (**Table 5**). Those, who died in the hospital, compared with those, who survived, had a significantly higher rate of IHD 39.1% vs 19.9% ($P=0.05$), had developed complication like AKI 73.9% vs 27.6% ($P<0.001$), shock 76.2% vs 6.6% ($P<0.001$), arrhythmia 26.1% vs 3.1% ($p<0.001$), HAI 37% vs 10.5% ($p<0.001$), respiratory failure 63% vs 4.9% ($p<0.001$), had received artificial ventilation 65.2% vs 4.2% (<0.001), vasopressor 54.2% vs 6.3% ($p<0.001$), hemodialysis 19.6% vs 1.4% ($P<0.001$), AT Admission non survivors had lower SBP median (IQR) 120 (110-125) vs 130 (120-150) ($P<0.001$), higher heart rate, median (IQR) 120(110-125) vs 90 (80-110) ($P<0.001$). had more CXR evidence of pulmonary congestion 97.8% vs 80% ($P=0.01$), had more anemia 43% vs 9.4% ($P<0.001$).

Table 5 : Treatment and diagnostic procedures during hospitalization, Saint Paul's Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

In-hospital mortality variable	Survivors		Deceased		P value
Age, median (IQR)	55	40-70	50	35-62	0.11
Duration of hospital stay, median (IQR)	12	(6-20)	13	(6-23)	0.1
Female sex	168	58.7	21	45.70%	0.96
Residency (urban)	174	84.8%	31	15.2%	0.39
Heath insurance	183	64%	27	58.70%	0.49
IHD	57	19.90%	18	39.10%	0.05
HHD	62	21.70%	6	13%	0.178
DVHD	9	3%	4	8.70%	0.9
Non ischemic/idiopathic DCM	45	15.70%	4	8.40%	0.212
Cor pulmonale	35	12.20%	3	6.50%	0.258
CRVHD	54	18.90%	9	19.60%	0.913
AKI	79	27.60%	34	73.90%	<0.001
Shock	19	6.60%	35	76.20%	<0.001
Arrhythmia	9	3.10%	12	26.10%	<0.001
HAI	30	10.50%	17	37%	<0.001
Respiratory failure	14	4.90%	29	63%	<0.001
Artificial pulmonary ventilation	12	4.20%	30	65.20%	<0.001
Furosemide	273	95.50%	46	100%	0.228
Vasopressor	18	6.30%	25	54.30%	<0.001
Hemodialysis	4	1.40%	9	19.60%	<0.001
Antibiotics	164	57.30%	32	69.60%	0.118
SBP, median (IQR)	130	120-150	120	110-125	<0.001
DBP, median (IQR)	80	80-90	80	70-90	0.11
HR, median (IQR)	90	80-110	120	110-125	<0.001
EF, median (IQR)	60	38-60	55	25-60	0.035
CXR pulmonary congestion	230	80%	45	97.80%	0.01
Atrial fibrillation	64	22.40%	8	17.40%	0.58
NYHA class III/IV	271	94.80%	45	97.80%	0.32
DM	78	27.30%	11	23.90%	0.229
HTN	135	47.20%	21	45.70%	0.249
CKD	35	12.50%	6	13%	0.306
Hyperactive airway disease (COPD/Asthma)	45	15.70%	4	9%	0.108
Anemia	27	9.40%	20	43.00%	<0.001
Dyslipidemia	37	12.90%	7	15.20%	0.297
Pneumonia	171	59.80%	32	69.60%	0.448
Non adherence	59	20.60%	9	19.60%	0.868
Tachyarrhythmia	34	11.90%	4	8.70%	0.568

The multivariate logistic analysis showed that IHD (OR 9.96; 95 CI 0.97-102.3; P=0.05), DM (OR 0.78; CI 95 0.01-0.45;P =0.04), presence of shock during hospitalization (OR 32.5; CI 95 4.5-235.3; P=0.01),anemia (OR 4.76; CI 95 0.99-22.89;P=0.05). were positively associated with in-hospital mortality.(**Table 6**).

Table 6: Univariate and multivariate logistic regression model for in- hospital death Saint Paul's Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023

In-hospital mortality variable	univariate analysis		multivariate analysis	p value
	OR(95%CI)	P value	OR(95%CI)	
Age, median (IQR)	0.98(0.97-1.00)	0.11	0.98(0.94-1.01)	0.197
Duration of hospital stay, median (IQR)	1.03(0.99-1.06)	0.1		
Female sex	0.59(0.31-1.1)	0.99		
Residency (urban)	1.33(0.68-2.57)	0.396		
Health insurance	1.25(0.66-2.35)	0.49		
IHD	2.58(1.33-4.99)	0.05	9.96(0.97-102.3)	0.05
HHD	0.54(0.22-1.33)	0.178	3.49(0.43-28.1)	0.24
DVHD	2.93(0.86-9.94)	0.9		
Non ischemic/idiopathic DCM	0.51(0.17-1.49)	0.212	1.03(0.09-11.24)	0.976
Cor pulmonale	0.5(0.14-1.69)	0.258		
CRVHD	0.97(0.44-2.14)	0.913		
AKI	7.42(3.6-15.0)	<0.001	1.66(0.39-6.95)	0.487
Shock	44.7(19.6-101.7)	<0.001	32.5(4.5-235.3)	0.01
Arrhythmia	10.86(4.26-27.6)	<0.001	5.15(0.57-46.8)	0.145
HAI	5.00-(2.46-10.15)	<0.001	0.39(0.06-2.53)	0.327
Respiratory failure	33.4(14.8-74.08)	<0.001	2.66(0.36-19.3)	0.333
Artificial pulmonary ventilation	42.8(18.5-98.9)	<0.001	1.65(0.24-11.2)	0.606
Furosemide	1.16(1.11-1.22)	0.228		
Vasopressor	17.7(8.3-37.56)	<0.001	1.46(0.19-10.9)	0.714
Hemodialysis	17.14(5.0-58.47)	<0.001	7.93(0.25-246.8)	0.238
Antibiotics	1.7(0.87-3.32)	0.118	1.48(0.34-6.48)	0.599
SBP, median (IQR)	0.97(0.95-0.98)	<0.001	1.02(0.98-1.06)	0.253
DBP, median (IQR)	0.97(0.94-0.99)	0.11	0.95(0.88-1.01)	0.134
HR, median (IQR)	1.03(1.02-1.04)	<0.001	1.03(1.0-1.05)	0.2
EF, median (IQR)	0.98(0.96-0.99)	0.03	1.02(0.97-1.07)	0.41
CXR pulmonary congestion	10.95(1.4-81.2)	0.01	1.91(0.18-20.1)	0.134
Atrial fibrillation	0.73(0.32-1.64)	0.58		
NYHA class III/IV	1.05(1.02-1.09)	0.32		

DM	0.83(0.4-1.73)	0.229	0.78(0.01-0.45)	0.04
HTN	0.94(0.5-1.75)	0.249		
CKD	1.07(0.42-2.72)	0.306	0.19(0.01-2.22)	0.189
COPD/Asthma	0.51(0.17-1.49)	0.108	0.13(0.01-1.14)	0.065
Anemia	7.37(3.6-14.9)	<0.001	4.76(0.99-22.89)	0.05
Dyslipidemia	1.2(0.5-2.89)	0.297		
Pneumonia	0.65(0.32-1.3)	0.448		

5.3 Length of hospitalization

The LOS data were normally distributed. The mean ($\pm$ SD) and median (IQR)LOS were 14.28 ($\pm$ 9.05) and 12(6-20)days respectively.

Predictors of length of hospital stay

The study identified a moderately strong positive association between length of hospital stay and various factors such as advanced age, the presence of specific cardiac diagnoses (RHD, IHD, cor pulmonale), comorbidities including diabetes and chronic kidney disease, elevated diastolic blood pressure, chest X-ray findings like pleural effusion, and in-hospital complications such as shock and respiratory failure. Age significantly predicated Length of hospital stay (LOS) , $F(1,330)=12.114$, $P < 0.001$, Which indicates that the age can play a significant role in shaping LOS (b= -0.188 , $p<0.001$). these results clearly direct the positive affect of the age, moreover , the $R^2 = 0.035$ depicts that the model explains 3.5 % of the variance in length of hospital stays. **Table 7** .shows the summary of the findings.

Table 7: Univariate logistic regression model for length of hospital stays Saint Paul's Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023.

Hypothesis	Regression weights	beta coefficient	R2	F	t- value	p - value
Age	Age→ LOS	-0.188	0.035	12.114	-3.481	<0.001
Average monthly income	Average monthly income → LOS	0.062	0.004	1.259	1.122	0.263
RHD	RHD→ LOS	0.149	0.22	7.422	2.724	0.007
IHD	IHD→ LOS	-0.004	0	0.12	-0.109	0.913
HHD	HHD→ LOS	0.065	0.012	4.091	2.023	0.44
DVHD	DVHD→ LOS	-0.003	0	0.005	-0.07	0.944
DCMP	DCMP→ LOS	0.009	0	0.059	0.242	0.809
Cor_pulmonale	Cor pulmonale→ LOS	-0.112	0.023	7.701	-2.775	0.006
Tachyarrhythmia	Tachyarrhythmia → LOS	-0.119	0.007	2.387	-1.545	0.123
DM	DM→ LOS	0.107	0.033	10.318	3.212	<0.001
HTN	HTN→ LOS	0.006	0	0.033	0.181	0.875
Anemia	Anemia → LOS	0.068	0.008	2.591	1.61	0.108
CKD	CKD→ LOS	0.187	0.057	18.215	4.268	<0.001
COPD-asthma	COPD -asthma → LOS	-0.097	0.017	5.399	-2.323	0.021
Dyslipidemia	Dyslipidemia → LOS	-0.025	0.001	0.317	-0.563	0.574

Pneumonia	Pneumonia → LOS	0.121	0.048	16.461	4.057	<0.001
Non adherence	Non adherence → LOS	-0.015	0	0.157	-0.397	0.692
SBP	SBP→ LOS	0.001	0.01	3.257	1.805	0.072
DBP	DBP→ LOS	0.005	0.048	16.649	4.08	<0.001
NYHA CLASS	NYHA CLASS→LOC	-0.055	0	0.446	-0.668	0.505
HR	HR → LOS	0.001	0.004	1.369	1.17	0.243
EF	EF→ LOS	-0.001	0.083	2.237	-1.496	0.136
CXR -pleural effusion	CXR – pleural effusion → LOS	0.136	0.059	19.756	4.445	<0.001
Mechanical ventilation	Mechanical ventilation → LOS	-0.05	0.004	1.203	-1.097	0.274
AKI	AKI→ LOS	0.051	0.007	1.017	1.008	0.315
Shock	Shock → LOS	-0.121	0.05	7.797	-2.792	0.006
Arrhythmia	Arrhythmia → LOS	-0.126	0.029	4.329	-2.081	0.039
Respiratory failure	Respiratory failure→ LOS	-0.123	0.046	7.129	-2.67	0.008

The dependent variable(duration of hospitalization) was regressed on predicting variables of age , the presence of RHD ,cor_pulmonale , DM .CKD . admission DBP ,presence of CXR – pleural effusion , receiving inpatient intravenous furosemide , development of shock, respiratory failure. The independent variables significantly predict length of stay , $F(11, 132) = 7.472$, $p < 0.001$, which indicates that the 11 factors under study have a significant impact on duration of hospitalization, moreover, the $R^2 = 0.384$,depicts that the model explains 38.4% of the variance in duration of hospitalization , Table 8 shows the summary of the findings.

Table 8: Multivariant logistic regression model for length of hospital stay Saint Paul’s Hospital Millennium Medical College, Addis Ababa, February 12 to December 30 ,2023.

Variables	Unstandardized Coefficients		Standardized Coefficients	t- value	P -value	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Age	-0.001	0.001	-0.048	-0.54	0.59	-0.003	0.002
RHD	0.129	0.063	0.193	2.039	0.043	0.004	0.254
Cor_pulmonale	-0.044	0.061	-0.055	-0.709	0.48	-0.165	0.078
DM	0.034	0.043	0.064	0.788	0.432	-0.052	0.12
CKD	0.11	0.05	0.167	2.185	0.031	0.01	0.21
DBP_at_admission	0.005	0.002	0.244	3.197	0.002	0.002	0.008
CXR/x ray_pleural_effusion	0.151	0.042	0.283	3.628	<0.001	0.069	0.234
Intravenous furosemide	0.33	0.216	0.107	1.532	0.128	-0.096	0.757
Shock	-0.022	0.048	-0.041	-0.46	0.646	-0.117	0.073
Respiratory failure	-0.151	0.053	-0.267	-2.836	0.005	-0.257	-0.046

6. DISCUSSION

AHF patients admitted to a tertiary care hospital were younger and had pneumonia as a major precipitating factor. The leading underlying disease was ischemic heart disease (IHD) and major co- morbid disease was arterial HTN. 13.8% of the patient had died in the hospital.

Patients admitted in this study were young (median = 55 years). This was comparable to studies (47 years) from Esubalew.W form (51 years) [6] , study of tirfe [7] (48.36) but contrary to registries in ADHERE (mean+ 72.4)[8] , OPTIMIZ- HF (mean = 73)[9], Korean Acute Heart Registry [10] (mean = 68.5) and the sub-Saharan Africa survey of Heart Failure cohort (mean = 52.3) Reason for younger age admission could be related to the high prevalence of PRH in Ethiopia [11]

More than half of the AHF patients in this study were Female 189(56.9%) which was comparable to (59.3%) from Tigabu registry studies in sub- Saharan Africa survey on heart failure (50.8%), acute decompensated heart failure registry (ADHERE) (52.0%) and organized program to initiate lifesaving Treatment in Hospitalized patients with heart failure (OPTUMUZE-HF) (52.0%) [6], [8], [9]However, the (42%) from the Esubalew.W. W the European registries Euro Heart Failure Survey II (EFS II) (39.0%), Heart Failure Pilot Study (ESC- HF pilot) (47.0%) and the Acute Heart Failure Global Registry of Standard Treatment (ALARM-HF) (37.6%) studies female had lower frequency as compared to males[12], [13], [14].

In the present study leading precipitating factors were pneumonia, non – adherence (drug discontinuation) , atrial fibrillation. Similar tour study, in the OPTIMIZE-HF registry study pneumonia, Ischemia/acute coronary syndrome and arrhythmia were leading precipitating factors [13] This was also comparable with the ALARM-HF registry study where arrhythmia, infection and non – compliance to medication were the most frequent precipitating factors . In the current study

drug discontinuation as precipitating factor was reported in 20.5% of the patient and almost 154 (46.4%) patients had a primary school and no formal education. Adherence to heart failure medication regimen could be influenced by inadequate support, lack of education. In addition to optimal pharmacological treatment patient education on medication adherence had improved outcomes, [2], [12], [13].

The leading underlying disease found was IHD this was supported by different studies. (27.0%) from Tigabu IHD was commonest etiology, THESUS–HF study where hypertensive and ischemic heart disease(IHD) were the primary causes [5]. in contrary to other studies from Ethiopia where RHD The study at Jimma Specialized Hospital in Ethiopia showed RHD was the commonest diagnosis among patients presented to the cardiac clinic . In Tikur Anbessa Specialized Hospital, the VHD was the commonest diagnosis among patients with cardiovascular diseases . This was also similar to studies done in sub-Saharan Africa where cardiomyopathy and RHD accounted for almost half of all cases presented to hospitals [1] .

This study showed that treatment was targeted mainly towards symptom relief, the underlying and/or co-morbid disease were most commonly treated by frusemide, spironolactone, digoxin and warfarin[11], [16], [17].

The present study showed in-hospital mortality of 13.8% which is comparable with mortality found in BLH 17.2%, THESUS-HF cohort study . (10.6%) This was higher than the study of systematic review and meta- analysis in low- and middle-income countries that a 2.2% of hospital admission was AHF with mean in hospital mortality of 8%.Globally, hospitalized patients had higher mortality (30.6%) and African patients had the highest adjusted hazard of death (34%) within 1 year [18]. This variation in mortality might be related to the difference in health-care infrastructure, quality of care, environmental and genetic factors in different regions of the world[9], [19], [20],

[21], [22].

This study addresses a critical gap in understanding Acute Heart Failure (AHF) in Africa, where research on its causes, treatments, and outcomes remains limited. By focusing on patients in an Ethiopian tertiary care hospital, this study sheds light on the clinical characteristics, underlying conditions, co-morbidities, treatment outcomes, and predictors of poor outcomes specifically for AHF patients in this setting[23]. These findings hold significant value for various stakeholders: Policymakers: The insights gained can inform policymakers in developing targeted strategies to improve treatment outcomes, enhance the quality of care, and strengthen preventive and diagnostic services for AHF in the region. Healthcare providers: Understanding the specific characteristics and challenges faced by AHF patients in this context can equip healthcare professionals with better-tailored treatment approaches and improve overall patient care Researchers: This study paves the way for further research by identifying areas where deeper investigation is needed to optimize AHF management in African settings[22]. Overall, this study contributes valuable knowledge that can lead to more effective management of AHF in Africa, ultimately improving patient outcomes and quality of life.

Limitations

This study acknowledges several limitations:

- Single-center, small sample size: Restricting the study to a single center with a limited number of participants hinders the generalizability of the findings to broader populations.
- Missing biomarker data: The absence of crucial biomarkers like BNP, NTproBNP, and high-sensitivity C-reactive protein weakens the prediction of AHF outcomes in this analysis.
- Incomplete retrospective data: Reliant on retrospective data collection, the study couldn't

gather complete information on cardiac troponin, BUN, CBC, and INR, potentially affecting the comprehensiveness of the analysis.

7. Conclusion

This study in Ethiopia revealed a concerning high in-hospital mortality rate of 13.8% among patients admitted with acute heart failure (AHF). Ischemic heart disease (IHD) emerged as the most common underlying condition, while pneumonia served as the leading trigger for AHF episodes. Notably, the presence of IHD, diabetes mellitus (DM), anemia, and shock during hospitalization emerged as significant predictors of poor outcomes.

These findings underscore the crucial need for meticulous attention to comorbid diseases upon presentation with AHF syndromes.

8. Recommendation

Recommendations for Improving AHF Outcomes in St. Paul's Hospital Millennium Medical College:

Based on the findings of this study, which revealed a high in-hospital mortality rate and identified key predictors of poor outcomes among AHF patients, several recommendations can be made to improve patient care and outcomes at St. Paul's Hospital Millennium Medical College:

Early Identification and Proactive Management:

Develop screening protocols: Implement screening tools to identify patients at risk for AHF, particularly those with existing conditions like IHD, diabetes, or anemia.

Enhance community outreach: Increase awareness of AHF risk factors and symptoms through community education programs to encourage early presentation for medical evaluation.

Strengthen primary care management: Equip primary care providers with better diagnostic tools and training to manage chronic conditions that can contribute to AHF, potentially preventing acute episodes.

Targeted Interventions for High-Risk Patients:

Prioritize rapid risk assessment: Employ standardized risk assessment tools upon admission to identify patients with shock, anemia, or other co-morbidities requiring immediate intervention.

Optimize medication management: Ensure evidence-based use of medications like ACE inhibitors, beta-blockers, and mineralocorticoid receptor antagonists, while closely monitoring for potential adverse effects.

Improving Quality of Care and Data Collection:

Invest in continuous medical education: Provide healthcare professionals with regular training on the latest guidelines and best practices for AHF management.

Strengthen data collection and analysis: Implement robust systems for collecting comprehensive patient data, including co-morbidities, treatment protocols, and long-term outcomes, to monitor trends and inform further improvement strategies.

Collaborate with other healthcare institutions: Foster partnerships with national and international organizations to share expertise, best practices, and resources for improving AHF care in Ethiopia.

Further Research:

Investigate the specific reasons for the high prevalence of pneumonia as a precipitating factor for AHF in this population.

Conduct studies to evaluate the effectiveness of different treatment interventions for AHF patients in the Ethiopian context.

Explore the feasibility and impact of implementing telemedicine or other remote care models for managing chronic conditions and preventing AHF episodes.

By implementing these recommendations and fostering a culture of continuous improvement, St. Paul's Hospital Millennium Medical College can play a significant role in reducing AHF mortality and enhancing the quality of care for patients with this debilitating condition.

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ANNEXES

Annex I Participants Information Sheet and Informed Voluntary Consent Form for Participants selected for the Study

My name is _____ I am working as data collector for the study being conducted in S; I

kindly request you to lend me your attention to explain you about the study.

Study Title: Clinical characteristic & in hospital outcome of acute heart failure patients admitted at medical ward

a St Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia.

Purpose: - The study will be useful to evaluate the clinical traits, in-hospital outcomes, and factors influencing them among heart failure patients admitted to wards at St Paul Hospital Millennium Medical College, Addis Abeba, Ethiopia.

Procedure and duration: I will be able to use your medical record and extract the information I need for my

research if you give me permission to do so .

Risks and benefits: - There is very little risk involved in taking part in this study; other than the time it will take you to complete the interview, there is none. You won't directly gain from taking part in this study, but the results will be beneficial to decision-makers.

Confidentiality: - We will treat the data you give us as confidential. There won't be anything that can be used to identify you. The study's findings will apply to the whole population under investigation and will not be specific to any one person. No references will be made in oral or written reports that could associate participants with the research; the questionnaire will be coded to omit revealing names.

Right: - It is optional to take part in this study. You have the right to say that you will not take part in this study. You have the option to withdraw from the study at any point if you choose to participate initially, and you won't lose any benefits to which you would otherwise be eligible.

Contact address:-If you have any questions or enquiries at any time about the study or the procedures, please contact and communicate with Principal investigator:- Dr.Temesgen Tefera :- +251935626713, temesgentefera21aki@gmail.com

Declaration of informed voluntary Consent:

I fully comprehend the aim of the study, the steps involved, the risks and advantages, the concerns regarding participant confidentiality and the contact information in case I have any questions. I've given them the chance to ask me questions about anything that's unclear. I was made aware that I might withdraw from the study at any moment, thus I hereby sign my name as my voluntary agreement to take part in this study.

Name and Signature of Participants: _____ date ____/____/____

Name and Signature of data collector: _____ date ____/____/____

Name of data collector: _____ Signature _____

Name of Supervisor: _____ Signature _____

Date: _____

Thank You!!!

Annex II Assurance of Investigator

In accordance with the terms and conditions set forth by the Research and Publication Directorate and/or Department of Public Health of St. Paul's Hospital Millennium Medical College, I, the undersigned resident, hereby accept all obligations for the scientific, moral, and technical conduct of the research project, as well as for the provision of required progress reports.

Name of the Resident: _____

Signature: _____

Date: _____

Approval of Advisors

Name of Public Health Advisor: _____

Signature: _____

Date: _____

Name of Clinical Advisor: _____

Signature: _____

Date: _____