ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE
DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE

CLINICAL PRESENTATION, AND MANAGEMENT OUTCOME OF ACUTE HEART FAILURE PATIENTS PRESENTED AT THE EMERGENCY DEPARTMENT OF TIKUR ANBESSA SPECIALIZED HOSPITAL IN ADDIS ABABA, ETHIOPIA

By: MELAKU SINTAYEHU (BSC ECCN)

A THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES DEPARTMENT OF EMERGENCY MEDICINE IN PARTIAL FULFILMENT FOR THE REQUIREMENT OF MASTER IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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ADDIS ABABA, ETHIOPIA

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A RESEARCH THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES DEPARTMENT OF EMERGENCY MEDICINE IN PARTIAL FULFILMENT FOR THE REQUIREMENT OF MASTER IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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APPROVAL BY THE BOARD OF EXAMINATION

This thesis by **Melaku Sintayehu Shiferaw** entitled "Clinical presentation and management outcome in acute heart failure patients at Tikur Anbessa Specialized Hospital, Ethiopia" is accepted in its present form by the board of examiners as satisfying thesis requirement for the partial fulfilment of the requirements for the master of science emergency medicine and critical care nursing.

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STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is entirely my original work. I have followed all ethical principles in the preparation, data collection, data analysis, and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis. This thesis submitted to Addis Ababa university college of health sciences department of emergency medicine and critical care, for partial fulfilment of the requirements for the master of science emergency medicine and critical care nursing.

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List of abbreviations and acronyms

ADHF---------- ----Acute Decompensated heart failure.
AHF---------- ----Acute Heart Failure
AMI----------Acute Myocardial Infarction
AOR----------Adjusted odds ratio
BNP---------- ----------B-type natriuretic peptide
BUN ----------Blood Urea Nitrogen
CHF---------- Chronic Heart Failure
CI -------- ----------Confidence interval
CICU---------- Cardiac intensive care unit
COPD ------ ----------Chronic Obstructive Pulmonary Disease
CPR---------- ----------Cardio Pulmonary Resuscitation
DIB ----------Difficult in Breathing
DVHD----------Degenerative valvular heart disease
HEENT---------- ----------Head, Eyes, Ears, Nose, Throat
HHD---------- ----------Hypertensive Heart Disease
ICU ----------Intensive Care Unit
LOS ----------Length of Stay
LVEF---------- ----------Left Ventricular Ejection Fraction
MICU----------Medical intensive Care Unit
NIV---------- Non-Invasive Ventilation
PE---------- ----------Pulmonary Embolism
PND----------paroxysmal nocturnal dyspnea
SPSS---------- ----------Statistical package for the Social Sciences
SSA----------Sub-Saharan Africa
USA----------United States of America

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Abstract

Background: - Acute heart failure is the most common cause of emergency presentation with dyspnoea. It is one of the common causes of emergency department mortality. Acute heart failure patients commonly presented with dyspnoea, orthopnoea and paroxysmal nocturnal dyspnoea.

Objective: - To assess the clinical presentation and management outcome of acute heart failure patients presented at emergency department of Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2023.

Methods: - A hospital-based retrospective cross-sectional study design was employed with a total of 235 patients' chart which was selected using a systematic random sampling technique. Data were entered into Epi Data version 4.6 and exported to SPSS version 27 for analysis. Binary logistic regression was used to identify factors associated with mortality of acute heart failure patients. And variables with p value< 0.05 were considered to be statistically significant. The findings of study were presented using statements, tables, and figures.

Results: A total of 235 patients' medical record were reviewed. More than half 137(58.3%) of patients were females. The median age of the participants was 39 years (IQR 27 to 58). Emergency department mortality of AHF patients was 14% with 95% CI (9.4-18.7). Diastolic blood pressure less than 60 mmHg, paroxysmal nocturnal dyspnoea, cardiogenic shock and comorbidity were significant factors associated with emergency department mortality of acute heart failure patent at p-value<0.05 with AOR (95% CI, 4.13, 1.5- 11.2), (95% CI,3.3, 1.3- 8.5), (95%CI, 6.4, 1.12-19.3), (95% CI, 4.8,1.3-18.2) respectively.

Conclusion and Recommendation: This study showed that mortality in acute heart failure patients was high. Diastolic blood pressure less than 60 mmHg, presence of comorbid conditions and cardiogenic shock were significant factors associated with mortality in acute heart failure patients. Greater emphasis is recommended to reduce emergency department mortality of acute heart failure patients. Interventions related to acute heart failure mortality factors is recommended.

Key word: - Acute heart failure, Clinical Presentation, management outcome, TASH.

Chapter: One-Introduction

1.1. Background

Acute heart failure (AHF) is a wide range of disease states with a variety of clinical manifestations, but they are all frequently characterized by either a sudden onset or a gradual worsening of signs and symptoms, requiring immediate medical attention and prompting a need for immediate hospitalization(1). The most common reason for the onset of acute heart failure (AHF) is acute coronary syndrome (ACS). Additionally, chronic heart failure (HF) can be worsen due to various factors such as ischemic disease, infections, uncontrolled hypertension, arrhythmias, cardiac conduction issues, excessive salt intake, and failure to adhere to prescribed medications (2).

According to a 2016 report from the European Society of Cardiology (ESC), AHF is also referred to as a clinical syndrome and is defined by symptoms like fatigue, ankle edema, persistent coughing or wheezing, shortness of breath, and congestion signs. It is the most prevalent cause of acute dyspnea in older patients who present to the emergency room, and it is also the most common reason for death in those who present with dyspnea (3).

Acute heart failure (AHF) has a wide spectrum of disease states that it might manifest as, CS, hypertensive HF, right ventricular (RV) failure, and the classic pulmonary edema decompensating chronic HF. Pathophysiologically, it can occur when the left ventricular ejection fraction (LVEF) is low (40%), moderate (40-49%), or high (>50. About half of all AHF patients have maintained LVEF, and they typically present to hospitals with acute congestion that necessitates prompt medical attention with diuretics and, usually urgent admission to the hospital (2).

Heart failure (HF) is a serious health issue that affects 64.3 million people worldwide, with highly variable epidemiology within and between nations. The international Congestive Heart Failure (INTER-CHF) study, which was conducted in sixteen countries in Africa, Asia, the Middle East, and South America, had six- and twelve-month follow-ups. It revealed that the death rate was highest in Africa (34%) and lowest in China (7%), South America (9%), and the Middle East (9%), with regional disparities persisting even after multivariable adjustment. Southeast Asia had the middle death rate (15%), and China and South America had the lowest death rates (at 9% each)(4).

In SSA, HF primarily affects young to middle-aged people. It is more prevalent when people are in the prime of their lives, between the third and fifth decade of life(4).Studies carried out in three university hospitals in Ethiopia reveal high rates of in-hospital mortality (from 10.6%-20.2%)(5–7).

According to recommendations, clinical presentation-based classifications are the most useful in practice. It aids medical professionals in quickly starting the required treatment and identifying patients who are high risk. The diagnostic workup for AHF starts at the time of the first medical contact at the ED and continues throughout the initial patient pathway in order to determine the clinical presentation and quickly identify and treat any potentially reversible causes, precipitants, or coexisting life-threatening conditions (8).

On admission, a quick and immediate examination, diagnostic tests, and pharmacologic and non-pharmacologic treatment should begin. During the initial phases of the diagnostic workup, attention should be paid to determining cardiopulmonary stability based on the degree of dyspnea, hemodynamic status, and heart rhythm (3).

Acute care is the first phase of in-hospital management of AHF, followed by stabilization and discharge in the second and third phases. The primary objectives of the first phase are the quick treatment of life-threatening situations, the efficient relief of congestion and/or peripheral hypoperfusion along with the stabilization of the patient's hemodynamic, and the preservation of important organ function. The major objectives of the second phase are to switch from intravenous to oral medicine. The assessment of discharge preparedness, creation of a chronic disease management strategy, and transition to outpatient treatment are all part of the third phase (10).

Initially, in the first hour, all individuals with dyspnea should have their oxygen saturation (SpO2) checked. When SpO2 falls below 90%, oxygen therapy should be started, and if necessary, the fraction of inspired oxygen (FiO2) level should be increased up to 100%. On the other hand, hyperoxia induces vasoconstriction and may reduce cerebral and coronary blood flow, hence it should be avoided (9).

1.2. Statement of the problem

There is a global urgency to find safe and efficient AHF therapies and better out comes, despite the fact that the causes of AHF and the acute precipitants are highly heterogeneous(9)In comparison to (CHF), acute heart failure (AHF) patients' presentation and care have received less attention over the past 20 to 30 years. These patients' hospitalization indicates a poor prognosis with a high likelihood of rehospitalization and mortality after discharge because their disease frequently manifests quickly and frequently in the context of underlying cardiac diseases(10).

The World Bank estimates that the annual cost to the world economy is 108 billion dollars, with an estimated £980 million spent in the UK on managing HF (11). Another data in Brazil hospital admission is about 190,000 patients yearly, with a 13% in-hospital mortality rate(11)).

In Africans, the median age of patients who presented with HF was 52.3 years, showing that middle-aged populations were most affected by HF, which could have an influence on the economy and society(6)).

Acute heart failure (AHF) appeared to be a prevalent presentation in the SSA emergency scenario, despite the limited data. According to a recent meta-analysis, AHF is responsible for between 9.4 and 42.5% of adult medical inpatient admissions(12).

According to the literature titled "What's Next for Acute Heart Failure Research," the management of AHF relies heavily on opinions and experience rather than research (9). This highlights the need for global research in various settings to develop evidence-based treatment guidelines for this life-threatening medical issue. In Ethiopia, there are few literatures and publications that explain the clinical characteristics and outcomes of such deadly clinical syndrome (AHF), despite its significant and prevalence according to study result in Gonder university specialized hospital, Jimma university medical centre and TASH respectively (7,13,14) So the current study is necessary and timely to update the emergency department management outcomes of patients with AHF who are admitted to the emergency room.

1.3. Significance of the study

Primarily, the current study will provide additional knowledge to identify acute heart failure (AHF)specific clinical presentations to health care workers and those patients on heart failure treatment and follow up, aid health science students and academics to emphasize the clinical characteristics and management options of AHF with their students, and serve as the baseline data to update treatment guidelines.

It will also aid medical professionals, including ED doctors, identifying the gaps in management and choosing the best alternatives of patient management for better patient outcomes, researchers may utilize the findings of this study as a platform for future investigations that rely on numerous studies and potential observational studies.

Chapter -Two-Literature review

2.1.Definition of acute heart failure

Acute heart failure (AHF) refers to the rapid onset or deterioration of symptoms and signs of heart failure (HF). It is a life-threatening medical condition that requires prompt and accurate evaluation and treatment(15)The pathophysiology of AHF is thought to be the result of the interaction of the underlying substrate, initiating mechanisms or triggers, and amplifying mechanisms, all of which contribute to a common set of clinical signs and symptoms (primarily connected to congestion or end-organ dysfunction, or both)(15).

One of its defining features is an excessive accumulation of fluid, which often leads to noticeable signs and symptoms related to congestion(17,18) AHF is a common illness that frequently leads to hospitalization in elderly patients. It also has a poor prognosis and is associated with high mortality and rehospitalization rates (18). New onset HF patients may have a greater in-hospital mortality but lower post-discharge mortality and rehospitalization rates than patients with acutely decompensated CHF (8).

Eighty percent of patients with AHF have deteriorating CHF, whereas 20% have new cases of the condition. Identifying the cause of the presentation should be the first step in the diagnosis. This includes checking for myocardial ischemia, uncontrolled hypertension, atrial or ventricular arrhythmias, worsening renal function, nonadherence to medication, and sodium and fluid restriction (17).

A comprehensive history that considers symptoms, previous cardiovascular history, and suspected cardiac and noncardiac precipitants should be used to make the first diagnosis of AHF. The physical examination of a patient with AHF often reveals some combination of increased congestion and, less frequently, decreased peripheral perfusion, which is further supported by necessary follow-up tests such imaging and laboratory analysis (with specific biomarkers)(14).

2.2. Acute Heart Failure in the ED

Diagnosing and treating AHF in emergency departments can be difficult due to the complexity of the condition and the need for careful decision-making to achieve hemodynamic balance, improve functional capacity, and reduce mortality and length of stay. This task is often complicated by the organizational structure and procedures of EDs, which prioritize rapid stabilization, treatment, and discharge for acute emergencies such as shock, arrhythmias, or ST-segment myocardial infarction. As a result, the early identification and management of complex forms of AHF, which are often related to decompensation of underlying chronic HF, can be challenging(20).

Seventy percent of hospital admissions for patients with AHF are due to repeated episodes, and nearly 50% of patients with AHF are readmitted within 6 months of being discharged(20)

AHF patients might have a wide range of underlying heart conditions, risk factors, comorbidities, and precipitants that cause acute decompensation. The management of acute and chronic HF can also have an impact on early readmission and length of stay (LOS)-related resource consumption. In addition, the pathway for admission and care (emergency department, ward, or intensive care unit) may have an impact on the timing of intravenous therapy for AHF and results(19).

According to research, the percentage of patients with AHF who are brought to the ED by EMS varies between 11% and 57%. Unfortunately, AHF patients generally have a poor prognosis, with in-hospital mortality rates ranging from 3.8% to 6.6%, and roughly one-fifth of them passing away within a year of follow-up. Additionally, studies suggest that patients who utilize EMS to reach the ED have higher rates of mortality within 30 days and during their hospital stay, as compared to those who self-present.(22).

2.3. Acute Heart Failure clinical presentation in the ED

Understanding the importance of hemodynamic monitoring in AHF requires a clear understanding of the various clinical manifestations. AHF can present as acute decompensated heart failure, acute pulmonary edema, isolated right ventricular failure, or cardiogenic shock. These clinical manifestations are identified by the presence of signs of peripheral hypoperfusion or congestion, which indicate reduced delivery of oxygen to tissues or excess fluid in the lungs' intravascular compartment. Patients with heart failure can be classified as "wet" or "dry" depending on the presence of congestion, and "cold" or "warm" depending on the presence of hypoperfusion, based on the Forrester classification established in the 1970s. Acute

decompensated heart failure (ADHF) is the most common type of AHF, accounting for 50-70% of cases (7).

According to global studies conducted in 44 countries, at the presentation, vital signs were comparable everywhere. In all locations, congestion signs and symptoms were very common, while dyspnea at rest was less common in North America (38.0% vs. all other regions combined70.1%)(5).

A recent observational study in China, revealed 36.1% of patients experienced orthopnea, while 63.06% had New York Heart Association functional Class IV upon admission. In Thailand, the typical clinical symptoms of AHF are dyspnea (96.7%), fatigue (36%), peripheral edema (59.5%), and pulmonary rales (84.5%) in accordance with guidelines. Most patients had normal blood pressure (59.5%), while systolic hypertension and hypotension presented in 36.9% and 3.6% of cases, respectively(23).

According to a risk stratification research conducted in Japan, roughly 80–90% of patients with AHF appear on physical and radiographic tests with dyspnea and indications of pulmonary congestion(25).Another study conducted by (Hunter, Benton R. et.al) shows that about 50% of patients with AHF report having symptoms typically associated with HF, such as orthopnea and paroxysmal nocturnal dyspnea, and these symptoms are less than 75% specific for the diagnosis (22).

In a retrospective descriptive analytical study conducted in Madagascar, the prevalent clinical features of AHF were dyspnea (88.9%), bilateral pulmonary crepitations (79.4%), ankle swelling (71.4%), and gallop rhythm (52.4%)(23).

A recent study in Tanzania found that all patients had difficulty in breathing (100%), with most experiencing chest pain (84.9%). Tachypnea was the most commonly reported abnormal vital sign (92.3%), while tachycardia was present in 50% of patients (2).

A cross-sectional study conducted at Ethiopia's Gondar University Comprehensive Specialized Hospital revealed that the majority of patients (60.6%) admitted were diagnosed with heart failure for the first time. Additionally, the study found that peripheral edema (80.5%) and dyspnea (88.05%) were common symptoms among these patients (5).

According to a supplementary prospective observational study conducted at Gondar University Comprehensive Specialized Hospital, patients exhibited symptoms of orthopnea, peripheral edema, and exertional dyspnea upon admission (89.7%), (85.6%), (72.2%), respectively(26).

A further prospective observational study performed in Ethiopia at TASH reveals that paroxysmal nocturnal dyspnea (49.7%) was the most common symptom at admission, followed by neck vein distension (68.3%). Rales and acute pulmonary edema were two more key criteria identified (18.3% and 12.4%, respectively)(6).

Additional prospective observational study performed in Ethiopia at Jimma University medical centre shows that common signs and symptoms seen in patients were paroxysmal nocturnal dyspnea (99.5%), cardiomegaly (91.5%), and neck vein distension (88%) (7).

2.4. Management of acute heart failure in the ED

Acute heart failure (AHF) treatment research is a top priority around the world. Despite the fact that the causes of HF and the acute precipitants are highly heterogeneous, AHF management hasn't altered much in the last 40 years, and 80% of patients with AHF have routinely been treated with intravenous (IV) diuretics (11).

The "golden hour" approach taken for individuals with acute myocardial infarction could be paralleled to the early and vigorous management of AHF. Early treatment of AHF patients begins in the pre-hospital context, which includes the patient's home and the emergency room. To identify extremely early indicators of deterioration, patients with AHF syndrome must be regularly examined (SPO_2, blood pressure, respiratory rate, and ECG)(1).

Hospital management of patients with suspected AHF follows a timely, step-by-step process. Triage should be carried out first. The second step is to confirm the AHF diagnosis using clinical symptoms and plasma natriuretic peptide measurements. Third, it is important to determine the causes of AHF, which include the CHAMP acronym for acute coronary syndrome, hypertension emergency, arrhythmia, acute mechanical cause, and pulmonary embolism. Fourth, the effects of AHF on organ damage should be evaluated(1).

According to a global analysis of 18,553 AHF patients Intravenous loop diuretics were the most often prescribed drugs for the treatment of AHF and Angiotensin converting enzyme inhibitors (ACEI)/angiotensin receptor blockers (ARBs), beta-blockers, and aldosterone inhibitors were given for 78%, 67%, and 27% of patients with decreased LVEF, respectively, according to an observational study conducted on 1658 AHF patients in France(21).

Recent studies suggest that early therapy is associated with better prognosis, so the failure of recent acute heart failure studies to report clinical benefits with specific treatments may be due to both the delay from presentation to treatment and the neglect of precipitating factors since acute heart failure prognosis has been reported to be associated with the underlying precipitant of worsening heart failure(26).

The literature generally agrees that not all AHF exacerbations require the same care. In fact, effective treatments for some forms of heart failure may be harmful or ineffective when used to other forms. A fundamental understanding of the underlying pathology and the causes of the acute exacerbation is instead necessary for effective management of AHF (13).

Around 70% of patients in the Japanese data used furosemide, compared to up to 90% of those hospitalized with AHF in the USA registry. Additionally, recent observational research in Japan discovered that the highest daily dose of furosemide was less than 200 mg or less than half the levels used in the USA(27).

One piece of literature indicated that people with AHF have a high risk of complications in the first hour following the onset of the illness. Therefore, it is becoming more widely understood that the "time-to-treatment" strategy, which is well-established in ACS, should be considered in AHF to decrease adverse outcomes.

In fact, early prehospital care lowers mortality. Additionally, immediate treatment is necessary to prevent newly diagnosed AHF from progressing to chronic HF. In particular, patients should be taken to a hospital with a cardiology department, emergency department (ED), or CCU/ICU with understanding of AHF as soon as possible (8).

As evidenced by the prospective observational hospital study carried out in the medical ward at Gondar University Hospital, nearly all patients (98.9%) received furosemide treatment while they were hospitalized. The most often prescribed drugs after furosemide were aspirin (37.3%), atorvastatin (36.95%), and spironolactone (27.8%). Enalapril, spironolactone, and furosemide were prescribed upon discharge for patients in proportions of (75.3%), (30.4%), and (24.0%), respectively. In addition, 34.2% of patients received mechanical ventilation by intranasal oxygen treatment(7).

2.5.Outcome of Acute Heart Failure Patients

Certain AHF patients may be eligible for home discharge after stabilization, medication adjustment, and close outpatient follow-up scheduled within the following 72 hours. Elderly people' outcomes from heart failure were said to be worse than those of non-elderly patients (3).

According to a meta-analysis of 31 Israel research, women with heart failure (HF) do better than men in terms of survival. However, the patient populations included in these trials were limited(29).

Recent research suggests that early treatment is linked to a better prognosis, so the failure of recent acute heart failure studies to report clinical benefits with particular treatments may be attributed to both the delay from presentation to treatment and the neglect of precipitating factors because the prognosis of acute heart failure has been reported to be linked to the underlying precipitant of worsening heart failure(27).

Patients with AHF who have elevated SBP tend to do better both in the short and long terms. Baseline SBP was highly related with death in patients with LVEF 40%, while it was not associated with mortality in LVEF 40%, according to randomize control trials done in USA(29).

Another retrospective cohort study conducted in USA indicates that, early IV furosemide administration has been independently linked to lower in-hospital mortality (IHM) rates. Its increased mortality in patients with AHF has been demonstrated to be independently predicted by this multi-organ failure. Strong indicators of poor outcomes include indications of untreated congestion and its most severe symptom(31).

As 5-year follow up study conducted in China Beijing, concluded that patient age, heart rate, serum sodium, BUN, were independent predictors for outcomes and also low diastolic BP has more relevant effect on outcomes(32).

According to the SSA study, the 30-day mortality rate ranged from 14.7 to 35%. After 60 and 180 days, patients' reported rates of readmission or death were 15–57.8 and 21.9–57.9%, respectively. Cancer, severe lung disease, hospitalisation for blood pressure, heart rate, congestion symptoms, renal function, and ejection fraction are frequently seen as predictors of readmission or death (3).

2.6. Conceptual Framework

This conceptual framework was developed after reading different literatures and it shows the relationship between ED outcome of AHF and independent variables, example; hypertension and comorbidities, abnormal vitals (high/low BP, tachycardia, tachypnea, SPO2 < 93%) and also late recognition of warning signs like difficulty in breathing, chest pain, orthopnea, easy fatigue will result into poor outcomes need of ICU admission, CICU admission or finally death at ED(3). (Figure- 1)

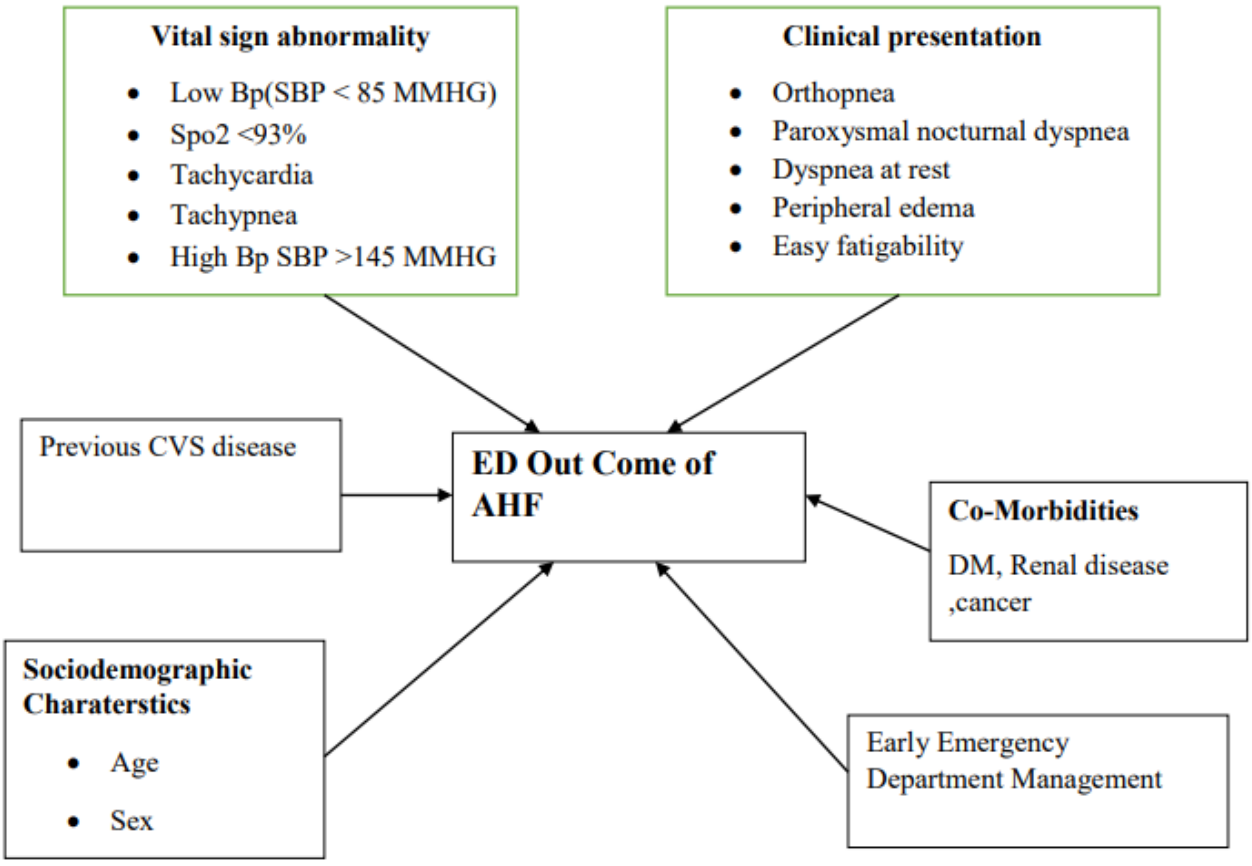

Figure:1-Conceptual Framework Adapted from study conducted in Dareselam Tanzania 2020.

Chapter -Three-Objectives of the study

3.1. General Objectives

To assess clinical presentation and management outcome of acute heart failure patients presented at Emergency Department of Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2023

3.2. Specific Objectives

- To describe clinical presentations among acute heart failure patients presented at the emergency department in Tikur Anbessa Specialized Hospital
- To assess the management outcomes of acute heart failure patients presented at the emergency department of Tikur Anbessa Specialized Hospital
- To identify factors associated with management outcomes of patients with acute heart failure presented at emergency department of Tikur Anbessa Specialized Hospital

Chapter -Four-Methods and Materials

4.1.Study setting and period

The study was conducted at Tikur Anbessa Specialised Hospital (TASH), Addis Ababa, Ethiopia. TASH is an advanced medical care facility with more than 800 beds at the tertiary level. It provides inpatient, outpatient, and emergency care and employs about 1700 medical and non-medical personnel. TASH treats 310,000 outpatients and 32,000 inpatients annually. Around 29,000 people receive treatments at the ED annually, and on average 50 patients seek emergency care each day. The Emergency Department (ED) was staffed by committed emergency medical residents, surgical residents, interns, pharmacists, nurses, and emergency nurses, and was managed by consulting professionals from many disciplines. TASH is a crucial component of Ethiopia's healthcare system and offers advanced medical services and is considered as a last referral level in the country(14).

The study was conducted at the ED of TASH from March 20 ,2023 to April 20,2023

4.2. Study design

Institution based retrospective cross-sectional study design was employed.

4.3. Source of population

All patients with the diagnosis of AHF or ADHF presented at adult ED of TASH from February1 -2022 to January – 30,2023.

4.4. Study population

Selected patients with the diagnosis of AHF or ADHF who presented at adult ED of TASH from February1 -2022 to January – 30,2023.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria

Chart of adult patients with a confirmed diagnosis of AHF presented at ED of TASH from February 1 -2022 to January – 30,2023.

4.5.2. Exclusion criteria

Incomplete charts, unknown outcome, non-confirmed diagnosis of patients with Acute heart failure.

4.6. Sample Size Determination

The required sample size was calculated by using the single population proportion formula:

The proportion(P) was taken from the previous study conducted at Tikur Anbessa Specialized Hospital 17.2% of mortality rate for patients with AHF (6).

$$n = \frac{\left(z\frac{\alpha}{2}\right)^2 P(1-P)}{d^2} = \frac{(1.96)^2 0.172(1-0.172)}{(0.05)^2} = 218.8 \sim 219$$

Whereas

$z\frac{\alpha}{2}$ = 1.96 at 95% confidence interval

Margin of error (d) 5%

By adding 10% of chart non-retrieval rate, the final sample size was 241.

4.7.Sampling Technique

A systematic random sampling technique was used to select sampled patients' chart. Lists of charts were taken from medical registration book at ED. The total number of patients with the diagnosis of AHF during the study period was 1052. The sampling fraction (K) was determined by dividing total number of AHF patients to sample size (1052/241= 4). The first chart was selected by lottery method, then next charts were selected by adding four until determined sample size was achieved.

4.8.Dependent and independent variables

4.8.1. Dependent variable: ED outcome: - death, improved.

4.8.2.Independent variables

- Demographic data: age, sex,
- Comorbidities
- Clinical presentation
- Management at given at ED

4.9. Data Collection tool and procedures.

The structured data collection tool used was adopted from the previous study conducted at Dareselam Tanzania(3). Slight modification was done on it and it contains four components

a. patient's demographic data such as Age, sex and ED stay in hour

b. Clinical presentation at emergency department during their admission, vital sign at admission, primary and secondary survey, previous comorbid illness and their actual clinical diagnosis at ED.

c. Emergency department (ED)management, such as drug treatment, non-invasive management, invasive treatment like endotracheal intubation, pleural tapping, thoracentesis

d. Management outcome of patients after ED intervention. The data was collected by two trained BSc nurse and one MSc nurse supervisor.

4.10.Data Quality Control

The pre-test was done on 5% of sample size at St. Paul's hospital to assure clarity before the actual data collection. Depend on the result of pre-test, minor adjustment was done by omitting part of questionnaires with laboratory investigation values.

One day training was given for data collectors and supervisor to clarify the objective of the study and data collection process. Onsite supervision was carried out to solve any ambiguity related with data collection tool and process. Completeness and consistency of the data was checked daily, and corrective measures were taken immediately.

4.11.Data analysis

The collected data was cleaned, coded and entered to Epidata version 4.6 then transported to Statistical Package for Social Sciences (SPSS) software version 27 further analysis.For categorical variables, frequency and percentage were used and for continuous variables, mean, median, standard deviation and interquartile range were used. Binary logistic regression analysis was used to check associations between dependent and independent variables. In bivariable analysis, variables with p-value less than 0.25 were candidate for multivariable logistic regression. In multivariable logistic regression, variables with p-value less than 0.05 were taken as statistically significant. Hosmer Lemeshow model was used to show model fitness of the statistics. Multicollinearity test was carried out to identify correlation between independent variables by using variance inflation factor (VIF). Finally, the results were presented by tables, chart and graphs.

4.12. Operational Definitions

Acute heart failure: -signs of new-onset HF and/or decompensation or deterioration of chronic stable HF or newly recognized diagnosis of AHF identified at ED.

Clinical Presentation: - are signs that reflect the physiological abnormality of AHF patients presented at emergency department and that can be identified by report from the patient's own expression and observation by emergency department physicians, prior to the use of medical devices at the time of patient assessment or treatment.

Management Outcome: - the condition of patients with diagnosis of AHF at ED and discharge from ED after management. And described as improved and died at ED.

Adult patients: Age 13 years and above was considered as adult patient.

De novo heart failure: A form of AHF diagnosed in the patient for the first time**.**

4.13. Ethical considerations

Ethical clearance letter was obtained from Addis Ababa University School of Medicine department of Emergency Medicine research committee. Permission was taken from TASH's emergency service director to access the patient's data. The data was kept confidential throughout the data collection and analysis process. Any personal identifiers were not utilized.

4.14. Dissemination of the results

The findings of this research will be submitted to Addis Ababa University School of Medicine, specifically the Department of Emergency Medicine. The results will also be submitted to the emergency department of TASH and the emergency service director. possibly to be presented at relevant workshops and publish it in peer-reviewed national and international journals.

CHAPTER – 5: Results

5.1. Socio-demographic characteristics of acute heart failure patients

Out of a total 241 sampled patients 'chart, 235 were studied with a retrieval rate of 97.5%. The median age of patients was 39 years with interquartile range of 27-58 years. Majority of study participants 107(45%) were in the age category between 30-60 years and 137(58.3%) of patients were females. The average ED length of stay was 72 hours (**Table** 1).

Table 1: Socio-Demographic Characteristics of AHF Patients Admitted to Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia from February,1-2022 to January – 30,2023 (n=235)

Variable	**Description**	**Frequency**	**Percent**
Age	14-29 years	74	31.5
	30-60 years	107	45
	>60 years	54	23
Gender	Male	98	41.7
	Female	147	58.3
ED length of stay in hour	Less than 24hrs	13	5.5
	24 to <=72hrs	94	40
	>72hrs to <=144hrs	76	32.3
	>144hrs	52	22.1

5.1.1. Vital Sign taken at Triage.

Regarding vital signs taken at triage, majority of patients had normal range of systolic blood pressure 141(60%), diastolic blood pressure 158(75.7%), pulse rate 121(51.5%), respiratory rate 155(66%). More than half of study participants 126(53.6%) had oxygen saturation greater than 93% (**Table** 2).

Table 2: Vital Signs of AHF Patients taken at Triage of Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia from February1 -2022 to January – 30,2023(n=235

Variable	Description	Frequency	Percent
Systolic BP	>=140 mmhg	31	13.2
	>=90 to 140mmhg	141	60
	Less than 90mmhg	63	26
Diastolic BP	Less than 60 mmhg	57	24.3
	Greater than 60 mmhg	158	75.7
Pulse rate	Less than 60 beat/min	11	4.7
	60 to 100 beat/min	121	51.5
	Greater than 100 beat/min	103	43.8
Respiratory rate	Less than 20 br/min	27	11.5
	20 to 30 br/min	155	66
	Greater than 30 br/min	53	22
Oxygen Saturation	Less than 93%	109	46.4
	Greater than 93%	126	53.6
Altered mental status	GCS <=8	55	23.4
	GCS 9 to 12	18	7.7
	GCS greater than 12	162	68.9

5.1.2. Clinical presentations at ED

About 214(91.1%) of patients were presented with dyspnea followed by, orthopnea 155(66%), cough 137 (58.3%) and, paroxysmal nocturnal dyspnoea 99(42.1%) (**Figure-*2*).**

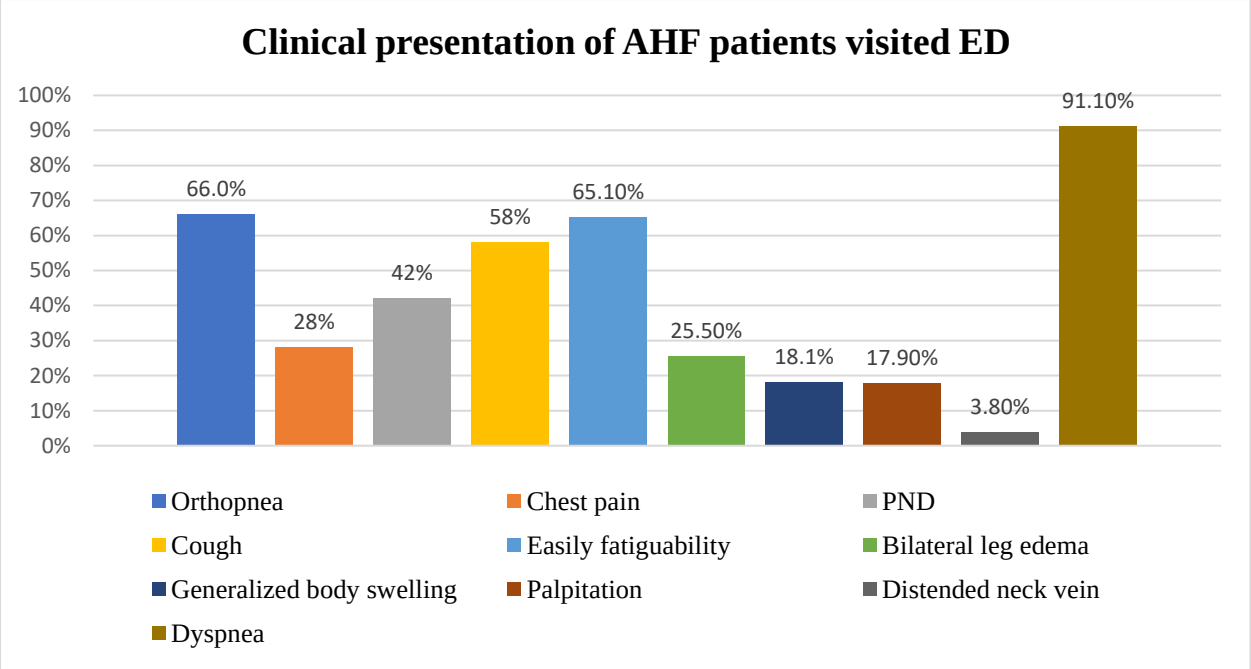

Figure**: 2-**Clinical presentation of AHF Patients admitted to ED of Tikur Anbessa Specialized Hospital, Ethiopia from February1-2022 to January – 30,2023

5.1.3. Underlying causes for AHF

According to this study, chronic rheumatoid heart disease was found to be the most prevalent underlying cause of ADHF/AHF which accounts 105 (44.7%), followed by dilated cardiomyopathy 39(16.6%), ischemic heart disease 24(10.2%) and hypertensive heart disease 14(6%). (**Figure-3*)***

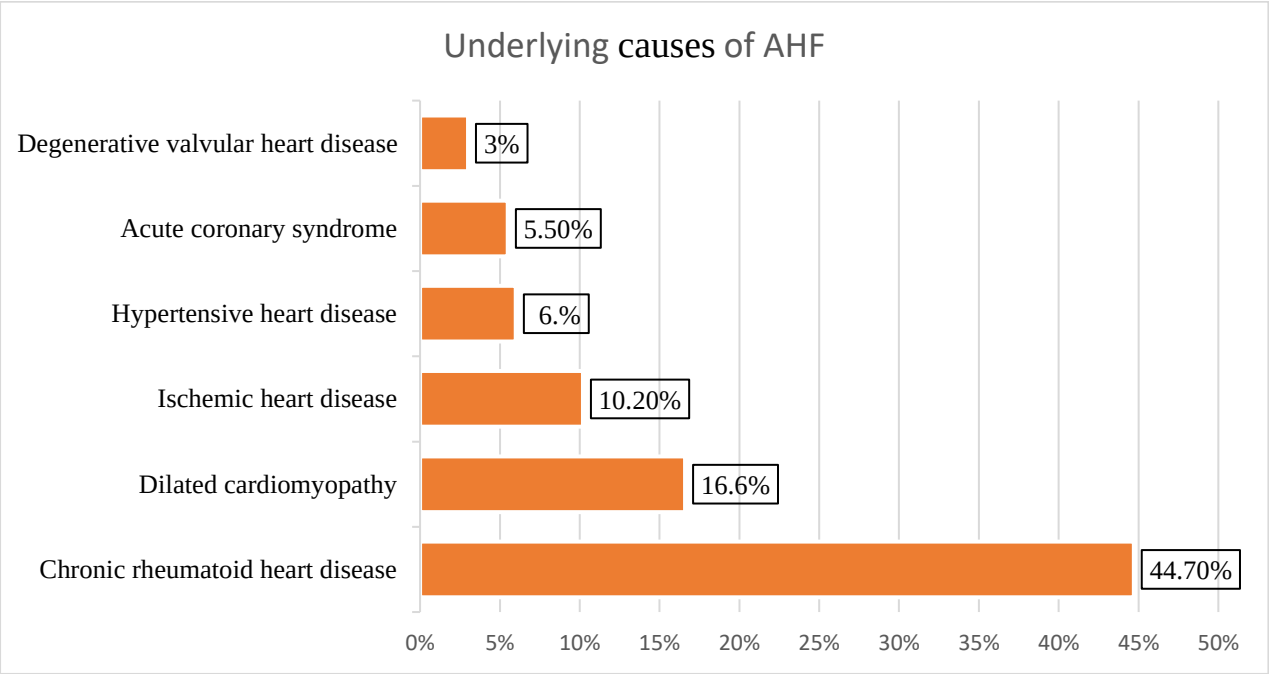

Figure 3: Underlying Diseases which causes AHF Patients to be Admitted to Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia from February1-2022 to January– 30,2023(n=235)

5.1.4. Comorbidity

Hypertension was the most prevalent comorbid condition which accounts 52(22.1%) followed by diabetic mellitus and malignancies which accounts 8.5% and 8.1% respectively. (**Table**-3).

Table 3: Comorbid Disease Conditions of AHF Patients Admitted to Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia, from February 1-2022 to January – 30,2023(n=235)

Variables	Frequency	Percent
Hypertension	52	22.1%
Diabetes Mellitus	20	8.5
Malignancies	19	8.1
Acute kidney injury	11	4.7
HIV infection	8	3.4
Others comorbidities	42	17.9
NB: -Others *hepatitis *stroke *Tuberculosis*Thyroid storm*acute abdomen*ARDS*Epilepsy *mental illness*Asthma and COPD *electrolyte imbalance.		

5.1.5. Complications of AHF

The most frequently identified complications in AHF patients were atrial fibrillation 45(19.1%), followed by cardiogenic shock and cardiogenic pulmonary edema which accounts 14% and 11.5% respectively. (**Table**- 4)

Table- 4:Complicating Factors of AHF Patients Admitted Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia, from February 1 -2022 to January – 30,2023) (n=235)

Variables	Frequency	Percent
Atrial fibrillation	45	19.1
Cardiogenic shock	33	14
Cardiogenic pulmonary edema	27	11.5
Pulmonary hypertension	25	10.6
Pleural effusion	12	5.1
Mitral regurgitation	10	4.2

5.2. Management of AHF patients at the Emergency Department.

The majority of patients at emergency department received diuretics, antibiotics, oxygen therapy through intranasal administration and antiarrhythmics which accounts 98.7%,91.5%, 88.1%, and 46% respectively (**Table- 5).**

Table **5:** Emergency Management Provided to AHF Patients Admitted to Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia from February 1 -2022 to January 30- 2023(n=235)

Variables	Frequency	Percent
Diuretics	232	98.7%
Antibiotics	215	91.5%
Oxygen therapy by nasal prong	207	88.1%
Antiarrhythmics	108	46%
Anti-hypertensive	86	36.6%
Inotropes/Vasopressor support	77	32.8%
Intravenous fluid	60	25.5%
Electrolyte replacement	34	14.5%
Oxygen therapy by facemask	32	13.6%
Blood Transfusion (BT)	9	3.8%
Pleural tapping	8	3.4%
Cardiopulmonary resuscitation	8	3.4%
CPAP	6	2.6%
Vasodilators/Nitro glycerine	6	2.6%
Intubation	3	1.27
Cardioversion/defibrillation	3	1.27
Pericardiocentesis	2	0.9

5.3. ED Management Outcome of AHF Patients

Regarding the emergency department outcome, mortality of patients with AHF was 14%. Whereas 86% were improved. From those who were improved, 42.1% were discharged directly to home from the ED, 22.6% were admitted to the CICU and 10.2% were admitted to the medical ICU (**Table-6).**

Table 6*:* Management Outcome of Patients with AHF/ADHF Presented at Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia, From February1 -2022 to January – 30,2023(n=235)

Variables	Category	Frequency	Percent (%)
Management outcome	Death	33	14
	Survived	202	86
Survived	Discharged home from ED	99	42.1
	Admitted to Medical ward	26	11.1
	Admitted to CICU	53	22.6
	Admitted to MICU	24	10.1

5.4. Factors associated with management outcome of AHF/ADHF Patients

Diastolic blood pressure, paroxysmal nocturnal dyspnea, presence of chest pain, dyspnoea, cardiogenic pulmonary edema, cardiogenic shock, comorbidity, vasopressor treatment and antiarrhythmics were found to be associated with ED mortality at bivariable analysis with a p-value less than 0.25.

In multivariable analysis, diastolic blood pressure, the presence of paroxysmal nocturnal dyspnea, cardiogenic shock, and comorbidity were significantly associated with ED mortality for patients with AHF at p-value <0.005.

Patients with diastolic blood pressure less than 60 mmHg have 4 times mortality rate compared to patients with diastolic blood pressure greater than 60 mmHg (AOR = 4.13, 95% CI: 1.52-11.19, p-value = 0.005).Patients with paroxysmal nocturnal dyspnea had 3.3 times higher mortality rate compared to those patients without paroxysmal nocturnal dyspnoea (AOR = 3.3, 95% CI: 1.32–8.5, p-value = 0.011).AHF patients developed cardiogenic shock increased the mortality rate by 6.4 times compared to those without cardiogenic shock (AOR = 6.4, 95% CI: 1.12, 19.3, p-value = 0.001). AHF patients with comorbidity increased the mortality rate by 4.8 times compared with those without comorbidity (AOR = 4.8, 95% CI: 1.29, 18.2 p-value = 0.019). (**Table- 7).**

Table 7: Factors Associated with ED mortality for AHF Patients Admitted to Emergency Department of Tikur Anbessa Specialized Hospital, Ethiopia from February1 -2022 to January – 30,2023 (n=235)

Variables	**Category**	**Died** n (%)	**Survived n (%)**	**Bivariable**	**Multivariable analysis**	
				COR,95% CI	AOR,95%CI	**P-value**
DBP	< 60mmhg	14(24.5)	43(75.4))	2.7(1.26,5.87)	4.13(1.52,11.19)	**0.005****
	>=60mmhg	19(11.9)	159(89)	1	1	
PND	Yes	22(22)	77(77)	3.3(1.49,7.07)	3.3(1.32,8.5)	**0.011***
	No	11(8.1)	125(91.9)	1	1	
Chest pain	Yes	6(9)	60(90)	2.7(0.92,7.97)	3.1(3,1.32,8.5)	0.070
	No	27(15.9)	142(84)	1	1	
Dyspnea	Yes	32(14.8)	183(85)	3.4(0.47,0.27)	3.7(0.38,36.2)	0.259
	No	1(5)	19(95)	1	1	
Cardiogenic PE	Yes	6(22)	21(77)	1.9(0.70,0.78)	0.38 (0.11,1.24)	0.108
	No	27(14.9)	181(87)	1	1	**1**
Cardiogenic shock	Yes	11(33.3)	22(66.6)	4.1(1.7,9.55)	6.4(1.13,19.3)	**0.001****
	No	22(10.9)	180(89)	1	1	
Comorbidity	Yes	30(17.4)	142(82.5)	4.2(1.24,14.37	4.8(1.3,18.19)	**0.019***
	No	3(4.7)	60(95.3)	1	1	
Vasopressors	Given	17(22)	60(77.9)	2.5(1.03,4.59)	0.65(0.81,2.1)	0.655
	Not given	17(11.2)	151(89.8)	1	1	
Antiarrhythmics	Yes	24(19.3)	99(79.8)	2.6(1.14,5.8)	1.5(0.58,0.92)	0.098
	No	9(8.03)	103(91.97)	**1**	**1**	

Chapter -6: Discussion

The findings of this study revealed that the overall emergency department mortality for AHF patients was found to be 14% with 95% CI (9.4- 18.7). Factors associated with emergency department mortality were: diastolic blood pressure less than 60mmHg, presence of paroxysmal nocturnal dyspnea, cardiogenic shock and comorbidity.

This finding is lower than studies conducted in Jimma (21%) and Tanzania, (28.6%) (3,7).This might be because of the variance in study setting, characteristics, sample size used.

It is in line with the previous studies conducted in different areas. A study conducted in Gonder (13) was mortality of 10.6% and Jimma 10.2% (32,33). But this study was higher than studies conducted in Thailand (34) Poland(33) and United Kingdom which is (5.8%), 8% and 10 %) respectively.

The possible reason for the discrepancies might be due to variance in study setting, study design, sample size variation and difference in level and standard of care.

The common clinical presentations identified in this study for AHF patents presented to ED were dyspnea on exertion, orthopnea, easily fatigability, paroxysmal nocturnal dyspnoea and palpitation.

This finding agrees with the studies conducted in Jimma (35) Gonder(36), Tanzania (3), Poland (37) other countries (38) where most of these clinical presentations were predominantly found. The similarity of study findings might be due to pathological nature of AHF and its complications.

In this study, diastolic blood pressure less 60mmHg, was associated with ED mortality for AHF patients. This result is in line with the finding in USA(39,40) where AHF patients with diastolic blood pressure less than 70mmHg were 1.5 times risk of mortality and the study conducted in China (31,41)were 1.3 times mortality rate for AHF patients with DBP less than 60mmHg. The possible reason might be due to low diastolic blood pressure resulted in oxygen deprivation for heart and ischemia. Such a sustained amount of ischemia weakens the heart over time resulting multiorgan failure ending with death (31).

Our study finding indicated that cardiogenic shock was found to be associated with emergency department mortality. This finding agrees with the study in Jimma (42)which revealed 98% likelihood of death in AHF patients who develop cardiogenic shock. It is also similar with the American Heart Association(26) finding, which revealed patients with ADHF who develop cardiogenic shock have a 30-day death rate of about 50% and in France Tenfold of death in patients with cardiogenic shock(43).

The possible reason for the close similarity of the finding might be due to severe and complicated nature of cardiogenic shock despite emergency department management.

Paroxysmal nocturnal dyspnea is another factor associated with AHF mortality in ED identified by the current study. This finding is in line with study in Jimma which revealed Paroxysmal nocturnal dyspnea is associated with mortality of ADHF patients, USA (19) has a 30-day mortality rate of 16% for PND patients. The possible reason might be due to severe nature of paroxysmal nocturnal dyspnea, which causes long stay of AHF patients in hospital, need to be admitted to (ICU) and require mechanical ventilation.

Furthermore, the presence of comorbidity was linked to higher mortality rates in patients with acute heart failure. A similar study in Jimma (35) revealed that AHF patients with comorbidity upon admission had a five times higher risk of mortality than those without comorbidity.

Possible reason might be due to additional strain loaded on heart function by comorbid conditions make difficulties for heart to function, increases the risk of different complication, and difficulties in adherence with treatments given.

6.1 Strengths:

This was study done in the higher-level tertiary hospital in Ethiopia where patents referred from different corners of the country making the representativeness to be better.

The data used in this study was real complete data from patients' chart and can generate necessarily adequate information about this particular clinical syndrome (AHF). It is a specific study conducted to show ED management outcome for AHF patients in the area.

6.2. Limitations:

This study was conducted at a single centre and relied on chart reviews, which may limit the generalizability of the findings.

Additionally, the diagnosis of acute heart failure may vary between physicians, which could impact the consistency of patient categorization. Due to retrospective study design, there were missed variables for the study.

6.3.Conclusion:

This study showed that mortality in acute heart failure patients was high. Common clinical presentations for AHF patients at ED were dyspnoea on exertion, orthopnea, easily fatigability, paroxysmal nocturnal dyspnoea and palpitation. Diastolic blood pressure less than 60 mmHg, presence of comorbid conditions and cardiogenic shock were significant factors associated with ED mortality for acute heart failure patient

6.4 Recommendations

To TASH

Better to give greatest emphasis to improve care for AHF patients so as to reduce ED mortality Early identification and intervention for AHF patients is recommended to prevent complications, mortality and improve survival.

To Clinicians

Due attention should be given to patient's vital sign and clinical presentation while evaluating AHF patients at admission especially when combinations of major clinical presentation were present. Clinicians better give great attention to AHF patients from developing the potential complications.

Researchers

Better to conduct prospective study to look at some of the potential predictors of mortality and causative factors contributing to AHF mortality.

References

1. Chioncel O, Mebazaa A, Harjola VP, Coats AJ, Piepoli MF, Crespo-Leiro MG, et al. Clinical phenotypes and outcome of patients hospitalized for acute heart failure: the ESC Heart Failure Long-Term Registry. Eur J Heart Fail. 2017 Oct 1;19(10):1242–54.
2. Takagi K, Kimmoun A, Sato N, Mebazaa A. Management of Acute Heart Failure during an Early Phase. International Journal of Heart Failure. 2020;2(2):91.
3. Rwegoshora Ss. Profileand Outcome of Patients Presenting with Acute Heart Failure in Emergency Medicine Department at Muhimbili National Hospital, Dar Es Salaam Tanzania. 2020.
4. S. Ogah O, Adebiyi A, Sliwa K. Heart Failure in Sub-Saharan Africa. In: Topics in Heart Failure Management. IntechOpen; 2019.
5. Tigabe M, Fentahun A, Getawa S, Gelaye KA, Gebreyohannes EA. Clinical characteristics and in-hospital outcome of acute heart failure patients admitted to the medical ward of university of gondar comprehensive specialized hospital, northwest Ethiopia. Vasc Health Risk Manag. 2021; 17:581–90.
6. Tirfe M, Nedi T, Mekonnen D, Berha AB. Treatment outcome and its predictors among patients of acute heart failure at a tertiary care hospital in Ethiopia: A prospective observational study. BMC Cardiovasc Disord. 2020 Jan 20;20(1).
7. Elsah Tegene (◊aletheiaelsah@gmail.com) JimmElsah Tegene GMTDLDIT. Acute heart failure outcome and predictors ofoutcome among patients admitted to JimmaUniversity Medical Center, Southwest Ethiopia.
8. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Vol. 42, European Heart Journal. Oxford University Press; 2021. p. 3599–726.
9. Collins SP, Levy PD, Fermann GJ, Givertz MM, Martindale JM, Pang PS, et al. Article type: Special Contribution What's Next for Acute Heart Failure Research? Endorsed by the Society for Academic Emergency Medicine.
10. Kurmani S, Squire I. Acute Heart Failure: Definition, Classification and Epidemiology. Vol. 14, Current Heart Failure Reports. Current Science Inc.; 2017. p. 385–92.

11. Madrini Junior V, Wozniak de Campos I, Alvarez Ramires FJ, Bacal F. INSUFICIÊNCIA CARDÍACA AGUDA: ICA - COMO AVALIAR O PERFIL HEMODINÂMICO E QUANDO INTERNAR. Revista da Sociedade de Cardiologia do Estado de São Paulo. 2018 Dec 15;28(4):428–33.
12. Bukhman AK, Nsengimana VJP, Lipsitz MC, Henwood PC, Tefera E, Rouhani SA, et al. Diagnosis and Management of Acute Heart Failure in Sub-Saharan Africa. Vol. 21, Current Cardiology Reports. Current Medicine Group LLC 1; 2019.
13. Tigabe M, Fentahun A, Getawa S, Gelaye KA, Gebreyohannes EA. Clinical characteristics and in-hospital outcome of acute heart failure patients admitted to the medical ward of university of gondar comprehensive specialized hospital, northwest Ethiopia. Vasc Health Risk Manag. 2021; 17:581–90.
14. Tirfe M, Nedi T, Mekonnen D, Berha AB. Treatment outcome and its predictors among patients of acute heart failure at a tertiary care hospital in Ethiopia: A prospective observational study. BMC Cardiovasc Disord. 2020 Jan 20;20(1).
15. Hsu CH, Li WT. Critical Care of Acute Heart Failure. In: Topics in Heart Failure Management. IntechOpen; 2019.
16. Sani MU. CHARACTERISTICS AND OUTCOMES OF ACUTE HEART FAILURE IN SUB SAHARAN AFRICA.
17. Boombhi J, Moampea M, Kuate L, Menanga A, Hamadou B, Kingue S. Clinical Pattern and Outcome of Acute Heart Failure at the Yaounde Central Hospital. OAlib. 2017;04(03):1–8.
18. Tubaro M, Vranckx P, Price S, Vrints C, editors. The ESC Textbook of Intensive and Acute Cardiovascular Care [Internet]. Vol. 1. Oxford University Press; 2015. Available from: https://academic.oup.com/esc/book/38752
19. Weintraub NL, Collins SP, Pang PS, Levy PD, Anderson AS, Arslanian-Engoren C, et al. Acute heart failure syndromes: Emergency department presentation, treatment, and disposition: Current approaches and future aims: A scientific statement from the American Heart Association. Vol. 122, Circulation. 2010. p. 1975–96.
20. Fabbri A, Marchesini G, Carbone G, Cosentini R, Ferrari A, Chiesa M, et al. Acute heart failure in the emergency department: a follow-up study. Intern Emerg Med. 2016 Feb 1;11(1):115–22.
21. Filippatos G, Angermann CE, Cleland JGF, Lam CSP, Dahlström U, Dickstein K, et al. Global Differences in Characteristics, Precipitants, and Initial Management of

Patients Presenting with Acute Heart Failure. JAMA Cardiol. 2020 Apr 1;5(4):401–10.

22. Harjola P, Tarvasmäki T, Barletta C, Body R, Capsec J, Christ M, et al. The emergency department arrival mode and its relations to ED management and 30-day mortality in acute heart failure: an ancillary analysis from the EURODEM study. BMC Emerg Med. 2022 Dec 1;22(1).
23. Raharinavalona SA, Raherison RE, Ralamboson SA, Andrianasolo RL, Dave A, Rakotomalala P. Predictors of intra-hospital mortality in patients with acute heart failure and type 2 diabetes seen at the Soavinandriana Hospital Center: a retrospective study. 2022; Available from: https://doi.org/10.21203/rs.3.rs-1941880/v1
24. Shiraishi Y, Kawana M, Nakata J, Sato N, Fukuda K, Kohsaka S. Time-sensitive approach in the management of acute heart failure. Vol. 8, ESC Heart Failure. Wiley-Blackwell; 2021. p. 204–21.
25. Kebede B, Dessie B, Getachew M, Molla Y, Bahiru B, Amha H. Clinical Characteristics, Management, and Length of Hospital Stay Between Patients with New-Onset and Acute Decompensated Chronic Heart Failure: A Prospective Cohort Study in Ethiopia. Research Reports in Clinical Cardiology. 2021 Nov;Volume 12:57–66.
26. Freund Y, Cachanado M, Delannoy Q, Laribi S, Yordanov Y, Gorlicki J, et al. Effect of an emergency department care bundle on 30-day hospital discharge and survival among elderly patients with acute heart failure the ELiSABETH randomized clinical trial. JAMA - Journal of the American Medical Association. 2020 Nov 17;324(19):1948–56.
27. Tanaka TD, Sawano M, Ramani R, Friedman M, Kohsaka S. Acute heart failure management in the USA and Japan: overview of practice patterns and review of evidence. Vol. 5, ESC Heart Failure. Wiley-Blackwell; 2018. p. 931–47.
28. Chodick G, Weitzman D, Blaustein RO, Shalev V, Bash LD. Differences in short and long-term survival between males and females with new-onset heart failure: A retrospective cohort study. Vol. 41, European Journal of Internal Medicine. Elsevier B.V.; 2017. p. e21–3.
29. Grand J, Miger K, Sajadieh A, Køber L, Torp-Pedersen C, Ertl G, et al. Systolic blood pressure and outcome in patients admitted with acute heart failure: An analysis

of individual patient data from 4 randomized clinical trials. J Am Heart Assoc. 2021 Sep 21;10(18).

30. Iqbal AM, Mohammed SK, Zubair N, Mubarik A, Ahmed A, Jamal SF, et al. The Impact of Door to Diuretic Time in Acute Heart Failure on Hospital Length of Stay and In-Patient Mortality. Cureus. 2021 Jan 17;
31. Li Y, Sun XL, Qiu H, Qin J, Li CS, Yu XZ, et al. Long-term outcomes and independent predictors of mortality in patients presenting to emergency departments with acute heart failure in Beijing: a multicenter cohort study with a 5-year follow-up. Chin Med J (Engl). 2021 Aug 5;134(15):1803–11.
32. Beri B, Fanta K, Bekele F, Bedada W. Management, clinical outcomes, and its predictors among heart failure patients admitted to tertiary care hospitals in Ethiopia: prospective observational study. BMC Cardiovasc Disord. 2023 Dec 1;23(1).
33. Krzysztofik JM, Sokolski M, Kosowski M, Zimoch W, Lis A, Klepuszewski M, et al. Acute heart failure in patients admitted to the emergency department with acute myocardial infarction. Kardiol Pol. 2017 Apr 14;75(4):306–15.
34. Phrommintikul A, Buakhamsri A, Janwanishstaporn S. Clinical Practice Guideline Heart Failure Council of Thailand (HFCT) 2019 Heart Failure Guideline: Acute Heart Failure Correspondence to. Vol. 102, J Med Assoc Thai. 2019.
35. Assefa E, Tegene E, Abebe A, Melaku T. Treatment outcomes and associated factors among chronic ambulatory heart failure patients at Jimma Medical Center, South West Ethiopia: prospective observational study. BMC Cardiovasc Disord. 2023 Dec 1;23(1).
36. Tekle MT, Bekalu AF, Tefera YG. Length of hospital stay and associated factors among heart failure patients admitted to the University Hospital in Northwest Ethiopia. PLoS One. 2022 Jul 1;17(7 July).
37. Ponikowski P, Jankowska EA. Pathogenesis and Clinical Presentation of Acute Heart Failure. Revista Española de Cardiología (English Edition). 2015 Apr;68(4):331–7.
38. Filippatos G, Angermann CE, Cleland JGF, Lam CSP, Dahlström U, Dickstein K, et al. Global Differences in Characteristics, Precipitants, and Initial Management of Patients Presenting with Acute Heart Failure. JAMA Cardiol. 2020 Apr 1;5(4):401–10.
39. McEvoy JW, Chen Y, Rawlings A, Hoogeveen RC, Ballantyne CM, Blumenthal RS, et al. Diastolic Blood Pressure, Subclinical Myocardial Damage, and Cardiac

Events: Implications for Blood Pressure Control. J Am Coll Cardiol. 2016 Oct 18;68(16):1713–22.

40. Tringali S, Oberer CW, Huang J. Low diastolic blood pressure as a risk for all-cause mortality in VA patients. Int J Hypertens. 2013;2013.
41. Wang Z, Yu C, Cao X, He Y, Ju W. Association of low diastolic blood pressure with all-cause death among US adults with normal systolic blood pressure. J Clin Hypertens. 2023 Apr 1;
42. Meshesha MD, Kabthymer RH, Abafogi MM. Mortality and Its Associated Factors among Hospitalized Heart Failure Patients: The Case of South West Ethiopia. Cardiol Res Pract. 2021;2021.
43. Arrigo M, Jessup M, Mullens W, Reza N, Shah AM, Sliwa K, et al. Acute heart failure. Vol. 6, Nature Reviews Disease Primers. Nature Research; 2020.

Appendixes

Appendixes-1

Data Collection Tool.

Patients Aged ≥13 year

Patient initials Date /Month /Year----------/----------/----------

MRN----------

A. Demographics

Age in years_____ Gender 1. male 2. Female Length of ED stay in Hour_____

B. Initial vital signs at ED

SBP/DBP	
PR	
RR	
SPO2	
GCS	

C.CLINICALCHARACTERSTICS

Patients chief complaint.

1._____5. _____

2. _____6. _____

3. _____

4. _____

EMERGENCY DEPARTMENT DIAGNOSIS

1. _____

2._____

3. _____

D. OTHER PREVIOUS DISEASE STATUS

1	Known CVS Disease	
2	Hypertension	
3	Diabetes mellitus	
4	co-morbidities	
5	Other specify	

E. PHYSICAL EXAMINATION: -

PRIMARY SURVEY

	Normal	Abnormal	Not Done	Comments if any
Air way (A)				
Breathing(B)				
Circulation(C)				
Disability(D)				

SECONDARYSURVEY

SYSTEMS.	Normal	Abnormal	Not done	Comments if any
HEENT				
Respiratory system				
Cardiovascular system				
Gastro intestinal system				
Genito urinary system				
Muskulo skeletal system				
Central nervous system				

INTRAVENOUS (IV) FLUIDS **AMOUNTS IN ML**

1---------- ----------

2.---------- ----------

3.---------- ----------

4.---------- ----------

BLOOD PRODUCTS **AMOUNTS IN ML**

---------- ----------

---------- ----------

EMERGENCY DEPARTMENT SUPPORTIVE TREATMENT

1. Positioning ----------

2. Suctioning ----------

3. Oxygen therapy by nasal prong----------

4. Oxygen therapy by facemask----------

5. Oxygen therapy by non-rebreather mask----------

6. Oxygen therapy by CPAP----------

7. Oxygen therapy by intubation ----------

8. No oxygen therapy given ----------

SPECIFIC NON-INVASIVE TREATMENT RECEIVED

1. Diuretics ----------

2. Anti-hypertensive ----------

3. Vasodilators ----------

4. Nitro glycerides----------

5. Antibiotics ----------

6. Iv fluids----------

7. Inotropes/Vasopressors----------

8. Electrolyte replacement ----------

9. Anti-arrhythmic drugs ----------

10. CPR ----------

11. Blood transfusion----------

12.other anti-failure drugs----------

ED INVASIVE TREATMENTS RECIEVED

1. Intubation ----------

2. Pleural tapping ----------

3. Synchronized cardioversion----------

4. Defibrillation----------

5. Pericardiocentesis----------

6. Others ----------

Final Patient Outcome at Emergency Department

1. Died while in ED ----------

2. Improved

Admitted to Medical Ward ----------

Admitted to CICU ----------

Admitted to MICU----------

Discharged Home from ED----------

Appendixes-2

Informed Consent form (English version)

Introduction:

Greetings, My name is Melaku Sintayehu Shiferaw, and I am a second-year masters student at Addis Ababa University studying emergency medicine and critical care nursing. As part of my research plan, I'm conducting the a fore mentioned study. In the event that I or my research assistant approach you, I now seek your cooperation and participation in my study. Your choice to participate or not will have no bearing on how your patient or patient information is treated, managed, or harmed. If there is anything about this subject that you do not understand, kindly ask questions.

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