



St. Paul's Hospital Millennium Medical College

Graduate Study Program

**TREATMENT OUTCOME OF PATIENTS WITH ACUTE CORONARY
SYNDROME AND ITS MODIFIED RISK FACTORS IN SAINT PAUL'S HOSPITAL
MILLENNIUM MEDICAL COLLEGE, ADDIS ABABA ETHIOPIA**

SHARON YESEMSEW (M.D., EMCC Resident)

December, 2023

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**A RESEARCH PAPER SUBMITTED TO THE DEPARTMENT OF EMERGENCY
MEDICINE AND CRITICAL CARE, ST. PAUL'S HOSPITAL MILLENNIUM
MEDICAL COLLEGE FOR THE PARTIAL FULFILLMENT OF**

THE REQUIREMENTS FOR SPECIALITY IN EMERGENCY MEDICINE AND

CRITICAL CARE SPECIALITY TRAINING

December 2023

Addis Ababa

Ethiopia

Abstract

Background: Acute coronary syndrome is a coronary artery disease caused by a narrowing or blockage of the artery lumen. Because of the decreased oxygen supply, artery narrowing or blockage causes myocardial cell death. In Ethiopia, the treatment outcome of ACS has been observed to be poor, with an increase in patient death and in-hospital complications. Controlling cardiovascular risk factors is critical for avoiding negative cardiovascular outcomes. As a result, early detection and intervention of standard modifiable risk factors such as hypercholesterolemia, hypertension, smoking, and diabetes mellitus are critical.

Objectives: To assess the treatment outcome of ACS patients and its modified risk factors in those patients who are admitted in Saint Paul's hospital millennium medical college in Addis Ababa, Ethiopia from December, 2020- November, 2023 G.C.

Methods: A Hospital based cross-sectional study among ACS patients at SPHMMC was conducted from December, 2020 to November, 2023 G.C. All in hospital ACS patients were used as a sample study population. Data was collected using a Data abstraction sheet from the participants' medical records. Data was entered in to kobo toolbox application format and was analyzed using SPSS 26 the results. P-value < 0.05 to be considered as statistically significant association.

Result: A total of 144 patients' data were examined; their mean (SD) age was 57(10.4), and more than half of them were male. The most typical clinical presentation was chest pain and shortness of breath. The identified modified risk factor is hypertension. Overall, ACS mortality rate was 6.9%. The adjusted multivariable regression model showed, developing cardiogenic shock, serum creatinine level and receiving treatment with beta blockers were found to have statistically significant association with mortality. Patients who developed cardiogenic shock were 3 times more likely to die than patient who did not develop cardiogenic shock (AOR: 3.296, 95% CI:1.590,6.351, p-value: 0.024). patients with serum creatinine 1.2 mg per dL and above were 25 times more likely to die than patients with serum creatinine less than 1.2 mg per dL (AOR:25.504, 95% CI: 1.299, 50.06, p-value: .033). patients which received beta blocker were less likely to die than patients who did not received beta blockers (AOR: 0.013, 95% CI: 0.003,0.930, p-value: 0.046).

Conclusion and recommendation: ACS and other related vascular disease rising in alarming rate and becoming the public health burden. Hypertension and Diabetes mellitus are the commonest risk factor with undeniable rate of dyslipidemia. And to have a favorable outcome in patients with ACS there should be wide distribution for accessibility for the advanced therapy like PCI in at least territory hospitals & availability of thrombolytic in public pharmacy. It also good if equipping the local health centers with ECG machines, in order to avoid unnecessary delayance in referring the patients.

Keywords: Acute coronary syndrome, ACS treatment outcome, ACS risk factors

ACKNOLEGMENT

Above all, I'm grateful to God for making it possible for me to carry out this study. I am incredibly appreciative to SPHMMC and the Emergency Medicine and Critical Care Department in particular for providing me with this opportunity to conduct research and improve my research skills. Furthermore, I would like to sincerely thank everyone who has helped me in any way during this process, especially my advisors, Dr. Menbeu Sultan & Dr. Mohammed Kelifa. In closing, I would like to express my gratitude to my families for their unwavering support throughout every stage of my life.

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ACRONYM AND ABBREVIATIONS

ACS	Acute Coronary Syndrome
AKI	Acute Kidney Injury
CABG	Coronary artery bypass graft
CPR	Cardio pulmonary resuscitation
CVD	Cardiovascular disease
DM	Diabetics mellitus
ECG	Electrocardiography
ED	Emergency Department
HTN	Hypertension
HICs	High income countries
IHD	Ischemic health disease'
LICs	Low-income countries
MICs	Middle income countries
MI	Myocardial Infraction
NSTEMI	Non – ST- Elevation Myocadiac Infraction
PCI	Percutaneous coronary Intervention
SMuRF	Standard modified risk factors
STEMI	ST- Elevation Myocadiac Infraction
SPHMMC	Saint Paul's hospital millennium medical college
UA	Unstable Angina
WHO	World health organization

1. INTRODUCTION

1.1. Introduction

Acute coronary syndrome (ACS) refers to a spectrum of conditions compatible with acute myocardial ischemia and/or infarction that are usually due to an abrupt reduction in coronary blood flow. (1) Acute coronary syndrome is most commonly caused by coronary atherosclerotic plaque and subsequent intracoronary thrombus formation, which leads to myocardial ischemia. If coronary blood flow is interrupted long enough, myocyte necrosis (infarction) can occur. (2)

Acute coronary syndrome (ACS) includes Unstable Angina (UA) and Myocardial Infarction (MI) which is usually divided into ST-segment elevation, Myocardial Infarction (STEMI) or new onset Left Bundle Branch Block (LBBB), and ACS without ST-segment elevation (NSTEMI).(3) UA and NSTEMI are similar in pathophysiology and clinical presentations; but their difference is elevation of myocardial necrosis biomarkers in NSTEMI.(3)

UA was diagnosed with angina usually lasting for ≥ 20 min, onset within one month or angina occurring within a crescendo pattern. It also diagnosed with ST segment depression ≥ 0.5 mm or T inversion ≥ 0.3 mv in any two leads. NSTEMI was diagnosed with the presence of elevated Troponin I levels as an indicator of myocardial necrosis in addition to other features of UA. STEMI was diagnosed with the presence of clinical symptoms of MI lasting ≥ 30 min with ECG changes of either ST elevation of at least 0.1mv in two contiguous precordial leads or two limb leads, or the presence of a new LBBB. (4)

Advanced age, male gender and a family history of ischemic heart disease have been identified as non-modifiable risk factors. Smoking, hypertension (HT), diabetes mellitus (DM), dyslipidemia, obesity and a sedentary lifestyle were identified as modifiable risk factors. The risk factors contributing to the development of IHD were summarized by the Framingham Heart Study providing crucial information regarding intervention for primary and secondary prevention of IHD. (4)

According to World Health Organization (WHO) prediction, cardiovascular disease (CVD) will continue to be the leading cause of mortality globally up to 2030. (5) Acute coronary syndrome (ACS), which encompass ST-elevation myocardial infarction, non-ST-elevation myocardial infarction (NSTEMI), and unstable angina (UA) are the commonest causes of mortality in patients

with CAD.(1) Deaths from IHD and ACS occur, on average, at younger ages in LMICs than in high income countries, often at economically productive ages, and similarly frequently affect the poor within LMICs.(6)

Whereas, the CAD death rate has declined in high-income countries, and the incidence of ACS is increasing in sub-Saharan Africa, where their management remains a challenge. (7) Studies done in Ethiopia during late 1960s and 1970s showed CVD to account for 4% to 13% of medical admissions to hospitals in Addis Ababa. (8) With introducing a huge armamentarium of invasive and non-invasive therapeutic strategies, the mortality related to ACS has significantly reduced in the developed world over the past 20 years. But the mortality remains high among developing countries. (9)

The control of cardiovascular risk factors is paramount in the prevention of adverse cardiovascular outcomes including stroke and acute coronary syndrome (ACS). (10) Hence, early identification and intervention of standard modifiable risk factors, such as hyper cholesterolemia , hypertension, smoking and diabetes mellitus, are essential in reducing the atherosclerotic cardiovascular disease risk of all individuals and prevention of cardiovascular disease. (11)

A greater understanding of the outcome of ACS patients and its modified risk factors is needed. This information will help in developing a predictive model used in immediate intervention with patients and families, and clinical decision making at the time of ACS patient admission. Therefore, we conducted a retrospective cross-sectional study on assessing the outcome of ACS and the modified risk on patient admitted in the SPHMMC.

1.2. Statement of the problem

ACS is a leading cause of mortality and morbidity, accounts for 50% of all CVD deaths and more than 2.5 million hospitalizations worldwide each year. (12) According to World Health

Organization (WHO) prediction, cardiovascular disease (CVD) will continue to be the leading cause of mortality globally up to 2030. (13) Based on the report of Heart Disease and Stroke Statistics; the global prevalence of ischemic heart disease (IHD) was estimated about 110.6 million. (7) Ischemic heart disease (IHD) is the greatest single cause of mortality and loss of disability-adjusted life years worldwide, and a substantial portion of this burden falls on low- and middle-income countries (LMICs). (14) CAD is the second leading cause of death in both men and women in Europe, accounting for 21% and 22% of all deaths, respectively. Every sixth man and every seventh woman in Europe will die from myocardial infarction (MI). (8)

A prospective study was conducted in Africa, Sub-Saharan countries 5.1% ACS patients comprising of 56% with STEMI and 44% of them NSTEMI/UA. The study shows hospital mortality was about 6%–10% in the setting. (13) Moreover, another prospective study in Sub-Saharan Africa, 13.5% was the prevalence of ACS. About 71.5% of the total had final diagnosis of STEMI type and 28.5% of them were NSTEMI. The in-hospital mortality was reported to be 10% . (14)

Ethiopia, the second-most populous country in Africa (over 100 million people), is facing an increase in cardiovascular disease (CVD) burden. (8) A study done in Ethiopia with AMI in-hospital mortality was 29.4%. (12) Similarly, another study from Tikur Anbessa Specialized Hospital conducted on the chart review of patients reported that in-hospital mortality was 27.4%. The study shows patient have also heart failure (16.1%), cardiogenic shock (11.3%) and major arrhythmia (8.1%) were common in-hospital complications .(8)

The treatment outcome of ACS was observed poor in Ethiopia, in which patient death and in-hospital complications are increasing. Poor treatment outcome of ACS patients could be due to lack of adequate and/or timely use of evidence-based medical and non-medical therapy utilization which in turn progresses into complications, and mortality. (15) The fact that evidence-based invasive and non-invasive management prevents ACS associated morbidity and mortality. Therefore, Patients with ACS require intensive treatment and diagnostic evaluation for greatly improved treatment outcome as well as prolonged survival and better quality of life. (12)

In the study setting, little is known about the incidence of ACS admissions and patients' prognosis. Therefore, the study contribute a lot on improving the quality of healthcare for patients with ACS

by identifying gaps and directing potential solutions. The study assessed risk factors, management practice, treatment outcome and predictors of in-hospital mortality for ACS.

1.3. Significant of the Study

Overall, the burden of ACS and its complication is much greater in developing countries due to additional risks associated with lack of adequate and/or timely use of evidence-based medical and non-medical therapy utilization, as well as a lack of, or inadequacy of, medical installation and staffs, lack of rapid transfers of the patient to other departments or hospital (for definitive treatment), which all aggravate illnesses and outcome of ACS and could cause death and poor outcome and also increases the ED burden.(6) These and other modifiable risk factors have a direct relationship with the morbidity and the mortality pattern of ACS patients in ED. (12)

Those modifiable risk factors are believed to be multifactorial and include both a significant burden of it bad outcome as well as limited access to quality. (16) Hence it is important to understand the profile of ACS patients in each setting in order to better predict outcome and choose

strategies especially in primary care settings so as to manage patients appropriately with immediate referrals to tertiary care centers.

So, in Ethiopia studies that assess the outcome of ACS patients and its modifiable risk factors in admitted to the hospital are scanty. This research achieves possible intervention and strategies needed to be developed for improving the outcome of ACS patients and its preventive factors that lead to death and to initiate early management and life style modifications. So, this view of assessing the outcome of ACS patients has broadened our understanding and it modified associated factors toward it.

The study tries to show concrete evidence regarding the study Recommendation and necessary steps suggests to alleviate the problem related to the study by healthcare professionals, policy makers and concerned bodies. The study also provides useful baseline information for further studies and the findings also guide of interest to other African countries with high growing rates of poor prognosis ACS to help improve their future management of these patients.

2. Literature Review

2.1 Assessment of treatment outcome of ACS patients and its modified risk factors

A study done in US in 2022 on a title of Event Rates and Risk Factors for Recurrent Cardiovascular Events and Mortality in a Contemporary Post-Acute Coronary Syndrome Population Representing 239 234 Patients During 2005 to 2018 in the United States shows the 5-year event rate for the primary end point representing nonfatal myocardial infarction, nonfatal ischemic stroke, and cardiovascular death was 33.4%. The risk of experiencing the primary end point was ≈ 6 -fold higher immediately after discharge as compared with the period 1+ years after hospitalization. The study shows Patients with ACS remain at very high risk of experiencing recurrent cardiovascular events, particularly early. (17)

Another study done in 2021 on a title of Prognostic Outcomes in Acute Coronary Syndrome Patients without Standard Modifiable Risk Factors in Multi-Ethnic Study Of 8680 Asian Patients shows 8.6% were Standard modified risk factor. SMuRF-less patients were significantly younger and had fewer comorbidities including stroke and chronic kidney disease, but higher rates of

ventricular arrhythmias and inotropic or invasive ventilation requirement compared to the SMuRF group. higher rates of cardiovascular mortality, cardiogenic shock and stroke in SMuRF-less patients compared to SMuRF patients. Both groups had similar readmission and heart failure rates and higher cardiovascular mortality in the SMuRF-less group compared to SMuRF group. (11)

In sir lank a cross sectional descriptive study done on Epidemiology and risk factors of patients with types of acute coronary syndrome presenting to a tertiary care hospital in Sri Lanka shows had a mean age of 61.3 ± 12.6 and male sex showed higher association with all three types of ACS compared to female. higher mean age of 62.2 ± 11.4 years amongst unstable angina (UA) patients and 61.9 ± 14.5 years amongst non ST elevation myocardial infarction (NSTEMI) patients compared to 59.2 ± 11.2 years for ST elevation myocardial infarction (STEMI) patients with no significant statistical difference ($P = 0.246$). Smoking and alcohol abuse are significantly associated with STEMI. Patients with NSTEMI or Unstable Angina had higher rates of hypertension and were more likely to have a history of ACS or stable angina than STEMI patients. Patients with NSTEMI were more likely than patients with STEMI or UA to have dyslipidemia.(4)

Another study done on Risk stratification and in-hospital outcome in patients with acute coronary syndrome in 2021 shows age groups and type of ACS were having a statistically significant association. A majority of patients with ACS were seen in the 55–74 years age group. Tobacco abuse was more common in STEMI patients as compared to other types of ACS. There was significant variation between risk stratification of ACS patients by Thrombolysis in Myocardial Infarction and Global Registry of Acute Cardiac Events scores. Single vessel disease (SVD) patients dominated both the STEMI [26 (50.9%)] and UA [13 (52%)] groups. A majority of patients underwent percutaneous intervention and Coronary artery bypass graft (CABG) was done in 0.5% cases. All conventional risk factors were represented in all types of ACS but hypertension and tobacco abuse were more consistent risk factors associated with STEMI. (18)

A prospective, multicenter, multinational, observational study from 6 countries done on atypical presentation of acute coronary syndrome in 2019, a baseline characteristics, therapy, and in-hospital outcomes were analyzed and compared in the three groups shows a in comparison to typical chest pain, patients with atypical pain or dyspnea were older and had more cardiovascular risk factors. These two groups were significantly less likely to receive evidence-based therapy and coronary angiography and suffered worse in-hospital outcomes. the absence of typical chest pain

was associated with higher mortality rate. Across ACS, patients presenting without chest pain were frequently underestimated, less well treated with evidence-based therapy, and had worse in-hospital outcomes. Clinical presentation of ACS may provide additional prognostic impact particularly in high-risk populations. (19)

In 2023 a systematic reviews study on Acute Coronary Syndromes in Sub-Saharan Africa shows a prevalence of acute coronary syndrome among patients admitted for cardiovascular disease ranging from 0.21% to 22.3%. Patients were younger, with a minimum age of 52 years and there was a significant male predominance. Hypertension was the main risk factor. The clinical presentation is dominated by ST-elevation sudden cardiac arrest. Percutaneous coronary intervention is not widely available but was performed in South Africa, Kenya, Côte d'Ivoire, Sudan, and Mauritania. Fibrinolysis was the most accessible means of revascularization, with streptokinase as the molecule of choice. Hospital mortality was highly variable between 1.2% and 24.5%. Mortality at follow-up varied from 7.8% to 43.3%. (13)

A study done on a prospective observation study on the title of Management of acute coronary syndrome in South Africa shows from all ACS 41% had a discharge diagnosis of ST-segment elevation myocardial infarction (STEMI) and 59% a diagnosis of NSTMI, including 32% with NSTEMI and 27% with unstable angina (UA). During hospitalization, most patients received aspirin and a lipid-lowering medication, received a beta-blocker, and an ACE inhibitor. Thrombolytic therapy was used in only 18% of subjects. Angiography was undertaken in 93% of patients, of whom 53% had a percutaneous coronary intervention (PCI) and 14% were referred for coronary artery bypass surgery. All-cause death at 12 months was 5.7%, and was higher in patients with STEMI versus non-ST-elevation ACS. Clinical factors associated with higher risk of death at 12 months included age ≥ 70 years, presence of diabetes mellitus on admission, and a history of stroke/ transient ischemic attack (TIA). (20)

A retrospective cross-sectional study done in 2019 on the title of Treatment Outcomes of Patients with Acute Coronary Syndrome Admitted to Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia shows 72.6% were diagnosed with ST segment elevation myocardial infarction (STEMI). The mean age was 56.3 ± 13.7 years. The average length of hospital stay was 9.77 ± 6.42 days. The average time from onset of ACS symptoms to presentation in the emergency department was 3.8 days (91.7 hours). In about 61.3% patients, hypertension was the leading risk factor for

development of ACS, and 36.4% of ACS patients were either Killip class III or IV. The in-hospital mortality was 27.4%. The predictors for in-hospital mortality were age, time from symptom onset to presentation, previous history of hypertension, being Killip class III and IV and STEMI diagnosis. (8)

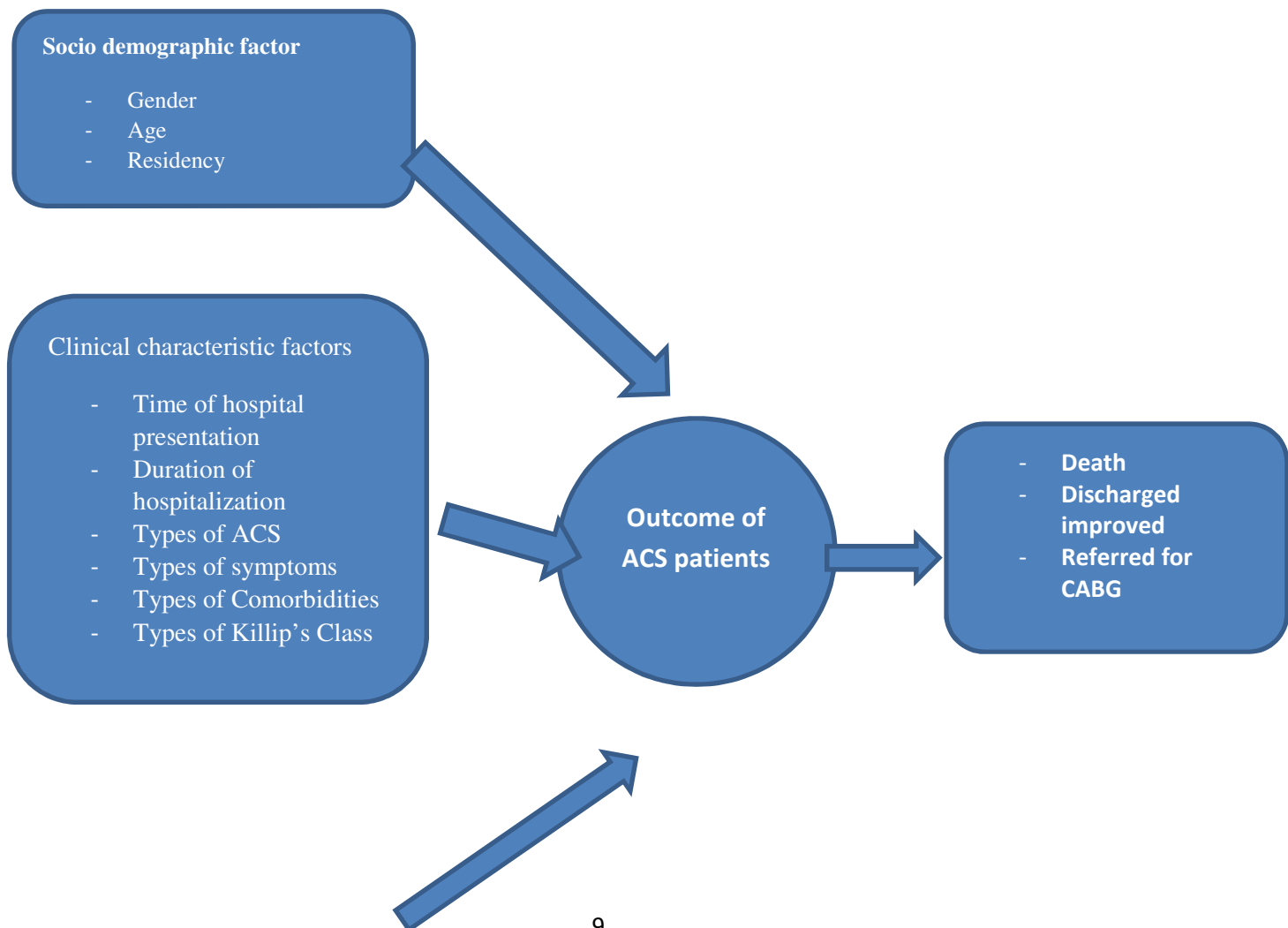
In 2021 A prospective observational study on Management quality indicators and in hospital mortality among acute coronary syndrome patients admitted to tertiary hospitals in Ethiopia shows 61% were presented with ST-elevation myocardial infarction (STEMI). The mean age of the study participant was 55.8 ± 11.9 years and 62.4% were males. The all-cause in hospital mortality rate was 20.4%. Rural residence, symptom onset to hospital arrival > 12 h and Cardiogenic shock were independent predictors of time to in-hospital death among ACS patients. In the present study, the use of guideline-directed in-hospital medications was sub-optimal. The overall in-hospital mortality rate was unacceptably high and highlights the urgent need for national quality improvement focusing on timely initiation of evidence-based medications, reperfusion therapy, and strategies to reduce pre-hospital delay. (21)

A retrospective cross- sectional study done on treatment outcome of acute coronary syndrome patients admitted to Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia in 2020 shows in-hospital mortality was found to be 24.5%, and hypertension was the most frequent risk factor of ACS. catheterization and primary percutaneous coronary intervention were done in 27.1%, and 3.9% respectively. The commonly prescribed discharge medications were aspirin (98.2%), statins (94.7%) and clopidogrel (92%). Nonuse of beta-blockers, in-hospital complication of cardiogenic shock and left ventricular ejection fraction of 30% were independent predictors of in hospital mortality. The study suggests the proportion of in-hospital mortality due to ACS was found to be high. Therefore, timely evidence-based therapy should be implemented in the setup (12)

2.2. Conceptual framework

The study was center on this perceived conceptual framework on outcome of ACS patients and its modified risk factors affecting the outcome among those admitted in SPHMMC which are sociodemographic factors (Gender, Age, and Residency), Clinical characteristics factors (Time of hospital presentation, Duration of hospitalization, Types of ACS, Types of symptoms, Types of comorbidities, Types of Killip's class) and Interventional factors (Types of management). This

conceptual frame work adapted from a recent Ethiopian literature and modified accordingly to fit this study.



Interventional factors

- Types of management given

Figure 1 schematic presentation of sampling procedure for ACS patients in St. Paul hospital millennium medical college Addis Ababa, Ethiopia from December 2020-November 2023

3. Objectives

3.1. General Objectives

- The aim of the study was to assess the treatment outcome of patients with acute coronary syndrome and its modified risk factors in Saint Paul's hospital millennium medical college, Addis Ababa, from December, 2020 to November, 2023.

3.2. Specific Objectives

- To determine the treatment outcome of patients with acute coronary syndrome admitted in SPHMMC, Addis Ababa, Ethiopia from December, 2020 to November, 2023.
- To identify risk factors associated with the acute coronary syndrome admitted in Emergency department of SPHMMC, Addis Ababa, Ethiopia from December, 2020 to November, 2023.

4 Methods and Materials

4.1 Study area

The study was conducted in Saint Paul's hospital millennium medical college.

St. Paul millennium medical college was established through a decree of the council of Ministers in 2010, although the medical school opened in 2007 and the hospital was established in 1968 by the late Emperor Haile Selassie I. It is governed by a board appointed by the Federal Ministry of Health. The college-initiated Ethiopia's first integrated modular and hybrid problem-based curriculum for its undergraduate medical education and diversifying post graduates' programmers. (22) The college has almost 3000 clinical, academic and administrative and supporting staffs that provide medical specialty service to patients who are referred from all over the country. The hospital has over 730 inpatient beds and sees an average of 58 emergency patients every day.

4.2 Study period

The study was conducted from December, 2020 to November, 2023G.C.

4.3 Study design

A hospital based retrospective cross-sectional was conducted to assess the treatment outcome of ACS and its modified risk factors in SPHMMC, Addis Ababa, Ethiopia from December, 2020-November, 2023.

4.4 Source Population and study population

4.4.1 Source population:

- Source population was all patients admitted in SPHMMC from December, 2020 to November, 2023.

4.4.2 Study population:

- Study population was all ACS patients admitted in SPHMMC from December, 2020 to November, 2023 who fulfill the inclusion criteria.

4.5 Eligibility: Inclusion and Exclusion Criteria

4.5.1 Inclusion Criteria:

- All patients who have a diagnosis of “ACS” on medical chart
- Age above 18 years old

4.5.2 Exclusion Criteria:

- Patient card with incomplete medical record
- Patients with PCI and CABG
- Patients who are foreign nationality
- Patient who are pregnant

4.6 Sample size determination

The sample size for the prevalence was calculated by using single proportion formula:

The actual sample size for the study determined by using single population proportion formula

for single proportion population, $n_i = \frac{(Z_{\alpha/2})^2 \times p(1-p)}{d^2}$

Where n_i = Initial estimated sample size
 Z = Confidence level (alpha, α)
 P = prevalence
 d = marginal error

To determine the sample size the following assumption was used.

Since there was no similar study, the prevalence is assumed to be 50%, 5 % margin of error, 95% CI, and 10% for non-response rate.

$$N(1) = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2} = 384$$

A data obtained from September, 2022 to February, 2023 in SPHMMC Emergency Department shows an average of 9 ACS per month and making our sample size 216. Initially, we planned to conduct a 24-month study, but the sample we obtained through chart review that met the inclusion criteria was insufficient, so we extended our study period to 36 months (December 2020 to November 2023).

However, data of Emergency department ACS patients among SPHMMC which was found in the registry of HMIS and patient medical record from December, 2020 to November, 2023 was 144. All the ACS patients admitted in the SPHMMC from December, 2020 to November, 2023 was our sample size.

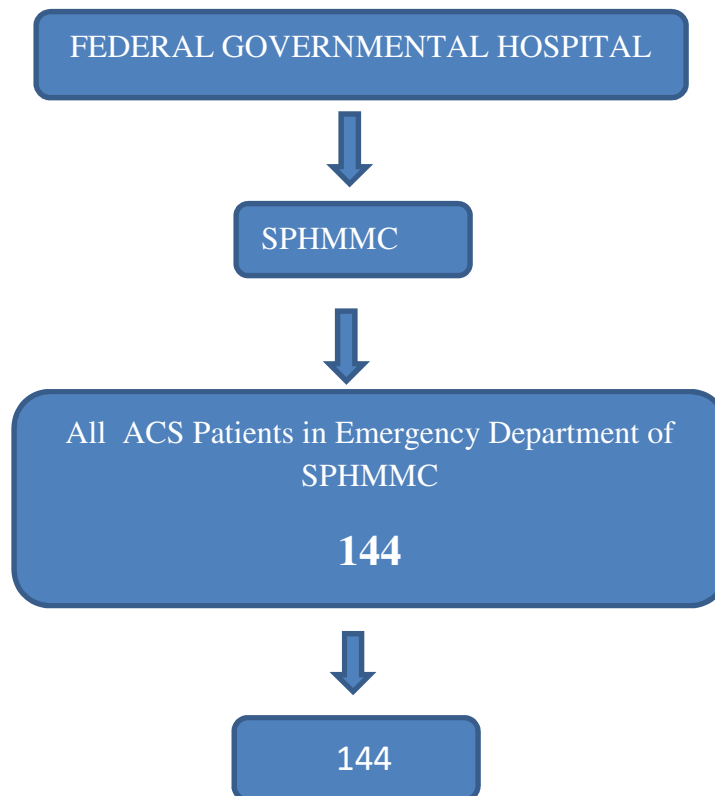


Figure 2 Schematic presentation of sampling procedure for ACS patients in St. Paul hospital millennium medical college Addis Ababa, Ethiopia from December 2020-November 2023

4.7 Operational Definition

Outcome: the patient's outcome following medical intervention, which may include referral for CABG, improvement upon discharge, or death. The favorable outcome is discharge with improvement and the unfavorable outcomes are death and referred for CABG.

Adult: defined as those who are older than 18 years in this research.

4.8. Study variable

4.8.1. Dependent Variables

- Treatment Outcome of ACS in patients in SPHMMC.

4.8.2. Independent Variables

- Sociodemographic factors (Gender, Age, Residency)
- Clinical characteristics factors (Time of hospital presentation, Duration of Hospitalization, Types of ACS, symptoms, Killips class and comorbidities)
- Interventional factors (Types of management)

4.9 Data collection and Methods

Data was collected through chart review using a Data abstraction sheet, which was developed after thoroughly reviewing previous relevant literatures and modified after intensive literature reviews used to collect the data. (12) Data was collected from Hospital HMIS data registries and from patient medical record.

The Questioner was consists of a total of 12 questions which contain part I: Patient demographic variables contain 3 questions. Part II: contain patient clinical characteristics questions (3 questions), part III: Symptoms and Risk factors (3 questions) and part 4: Its management and outcome measure (3 questions) Four trained BSC nurses was recruited and participate throughout the data collection and was trained for one day by the principal investigator on the study instrument and data collection procedures. The checklist was filled and collected by the trained BSC nurse from patient medical record.

4.10 Data quality assurance

After Training was given to data collectors (2 BSC nurses) to ensure the validity and reliability of the data collection tool, pre-test was done on 5% of the total sample size 3 week before the actual data collection and the questionnaire was checked for its clarity, understandability and simplicity. The researcher was responsible on monitoring the data collection process. The filled questionnaire was checked for its completeness to assure the quality of data and the investigator was responsible for supportive supervision on the spot and on reviewing all filled questionnaires on daily basis.

4.11. Data processing and analysis

After the data was at hand then it entered into Kobo tool box. Random checking was done to verify the validity of the entered data. Frequencies and percentage was obtained from each variable and displayed on the table & graphs. The strength of association between variables was determined using odds ratio, with 95% confidence interval. P-values of 0.05 or lower were taken to declare that there was association. Multivariable regression was used to indicate how significantly factors associated with dependent variable are.

4.12. Ethical Consideration

The hospitals administrations was informed about the purpose of the study, anticipated benefits, selection criteria, and data collection procedures and a written legal ethical clearance regarding the study was obtained from Institutional Revised Board of St. Paul's Hospital Millennium Medical College ethical clearance approved by the letter given on August 2023 with the Ref number 137.

4.13. Dissemination of the result

The research paper will submit to SPHMMC and AaBET hospitals. The findings of this study will distributed to different organizations that have helped the project to be carried out; if possible, the findings will be presented in different seminars, meetings and workshops and may be published in scientific journals.

5 Results

In the study, 144 medical records were reviewed.

5.1 Sociodemographic profile of patients

Among the patients more than half of were male and between 40-59 years with the mean (SD) age of patients was 57.18 (10.24) years and the majority lives in Addis Ababa.

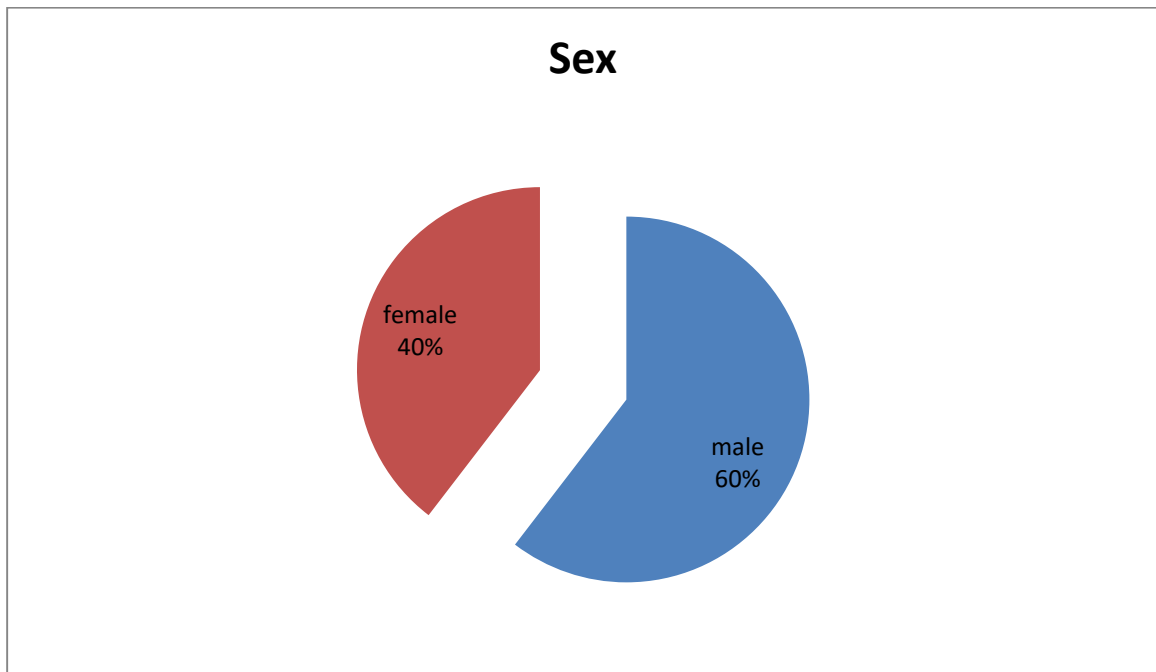


Table 1: Sociodemographic profile of patients St. Paul Hospital Millennium Medical College from November 2020 –December 20

Variable		Frequency	Percentage
Age group	< 60 years	88	61.1
	60-79 years	51	35.4
	80 years and above	5	3.5
Region of residency	Addis Ababa	95	66.0
	Oromia	39	27.1
	SNNPR	6	4.2
	Amhara	4	2.8

5.2 Clinical characteristics

The median (IQR) duration of symptom was 24 hours (12-72) hours. 35 patients (24.3%) showed up two to twelve hours after the start of symptoms.

Chest pain was the most common symptom among the patients. It occurred in 120 (83.3%) of the patients. 109 (75.5%) had comorbidity. Hypertension was the most commonly occurred comorbidity which is followed by diabetes mellitus and cardiac disease. STEMI was the commonest type of ACS with 74 (51.3%) which is followed by non STEMI 55 (38.2 %) and the rest was unstable angina 15(10.4%) Almost three fourth of the patients belong to Killip class I category.

The mean (SD) SBP and DBP were 135.78 (34.99) mm Hg and 80.75 (21.68) mmHg respectively. 17 (11.8%) have an initial SBP 180 mmHg and above and 5 (3.5%) have an initial DBP 120 mmHg and above. At presentation, 22 individuals, or 15.3%, had hypotension. The mean HR and RR was 85.21 (23.7) beats

per min and 18.06 (4.362) breaths per min respectively. The mean Temperature was 35.89 (3.04) degree Celsius. The median (IQR) oxygen saturation was 94.50 (93.0-96.0) percent. 125 (86.8%) had oxygen saturation 90% and above.

The mean hemoglobin level was 13.78 (2.26) mg per dL. Only 3 (2.1%) had hemoglobin level less than 9 mg per dL. The mean platelet count was 257,458.72 (116,611.97) per dL. 18 (12.5%) were thrombocytopenic. The median cardiac troponin level was 652.0 (253.25-1842.5). 132 (93.0%) had cardiac troponin level 14 ng per dL and above. The median glucose level 129.5 (103.5-172.5) mg per dL. 27 (18.8%) had RBS value above 200 mg per dL. The median TG, HDL, LDL were 120 (95-146), 42.0 (36.5-47.0) and 85.0 (68.0-104.0). HDL level was above 60 mg per dL in 9 (6.4%) and LDL was above 100 mg per dL in 40 (28.4%) patients. BUN and SCr was 21 (14.0-28.0) and 0.8 (0.6-1.04) mg per dL. SCr was above 1.2 mg per dL in 23 (16.0%) of the patients. The mean serum Na and K 135.0 (132.0-140.0) meq per L and 4.04 (3.70-4.62) meq per L respectively.

The median (IQR) duration of hospitalization was 6 (5-8) days. Three fourth of the patients stayed less than 7 days in the hospital.

Table 2: investigation result and killip category of ACS patients at St. Paul Hospital Millennium Medical College from November 2020 – December 2023

Variable		Frequency	Percentage
Duration of symptoms	Less than 2 hours	9	6.3
	2-12 hours	35	24.3
	12-24 hours	37	25.7
	24-72 hours	38	26.4
	More than 72 hours	25	17.4
Initial SBP	Less than 120 mmHg	43	29.9
	120-129 mmHg	25	17.4
	130-139 mmHg	11	7.6
	140-179 mmHg	48	33.3
	180 mmHg and above	17	11.8
Initial DBP	Below 80 mmHg	69	47.9
	80-89 mmHg	33	22.9

	90-119 mmHg	37	25.7
	120 mmHg and above	5	25.7
Initial BP	Below 90/60 mmHg	22	15.3
	90/60 mmHg and above	122	84.7
Heart rate	Less than 100	110	76.4
	More than 100 bpm	34	23.6
Respiratory rate	12-24 breath per min	136	95.1
(n=143)	> 24 breaths per min	7	4.9
Oxygen saturation	Less than 90%	19	13.2
	90% and above	125	86.8
Hospitalization	Less than 7 days	106	74.1
duration	7 days and more	37	25.9
ACS type	STEMI	74	51.3
	Non -STEMI	55	38.2
	Unstable angina	15	10.4
Hemoglobin	Less than 9 mg per dL	3	2.1
	9 mg per dL and above	141	97.9
Platelet count	Less than 150,000	18	12.5
	1500,000 and above	126	87.5
RBS	Less than 70 mg per dL	1	0.7
	70-200 mg per dL	116	80.6
	More than 200	27	18.8
Triglyceride (n=141)	less than 150 mg per dL	110	78.0
	More than 150 mg per dL	31	22.0
HDL	Less than 60 mg per dL	132	93.6
	More than 60 mg per dL	9	6.4
LDL	Less than 100 mg per dL	101	71.6
	Above 100 mg per dL	40	28.4
Serum creatinine	Less than 1.2	121	84.0
	Above 1.2	23	16.0
Serum Na	Below 135	64	44.4
	135-145	76	52.8
	Above 145	4	2.8

Serum K	Below 3.5	18	12.5
	3.5-5.3	116	80.6
	Above 5.3	10	6.9
Cardiac Troponin I (n=142)	Elevated	132	93.0
	Normal	10	7.0
Any comorbidity	No	35	24.3
	Yes	109	75.7
Killip category	Class 1	88	72.7
	Class 2	15	12.4
	Class 3	4	3.3
	Class 4	14	11.6

5.3 common presenting symptoms

The most common initial presenting symptom was chest pain in 121 patients and followed by shortness of breath which was 71 and it was 83.3% and 49.3% respectively

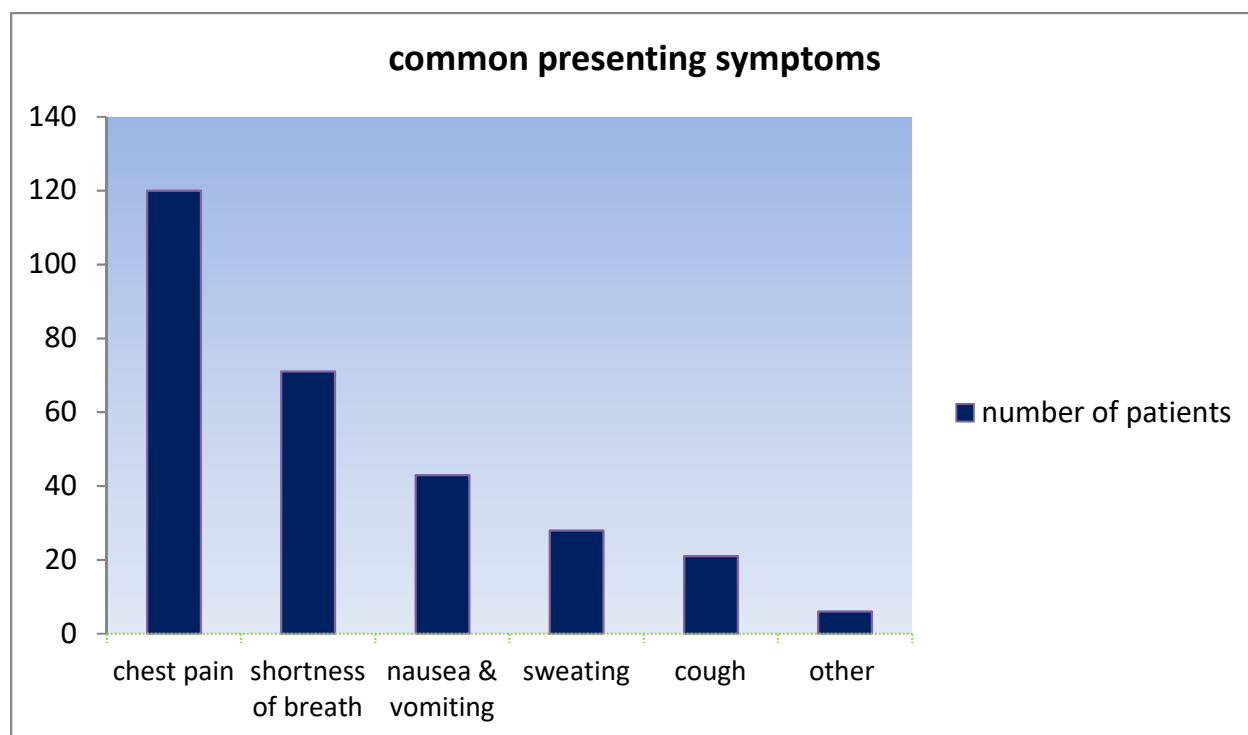


Figure 4 common presenting symptoms in St. Paul hospital millennium medical college from December 2020 - November 2023

5.3 Risk factors & comorbidities for ACS

From the total of 144 patients 109 of them has risk factors & comorbidities and from this hypertension is the most common one accounting 77/109 (70.6%) and followed by diabetes mellitus 39patients (35.7%). Out of all the modified risk factors, smoking has the lowest percentage (7.3%).

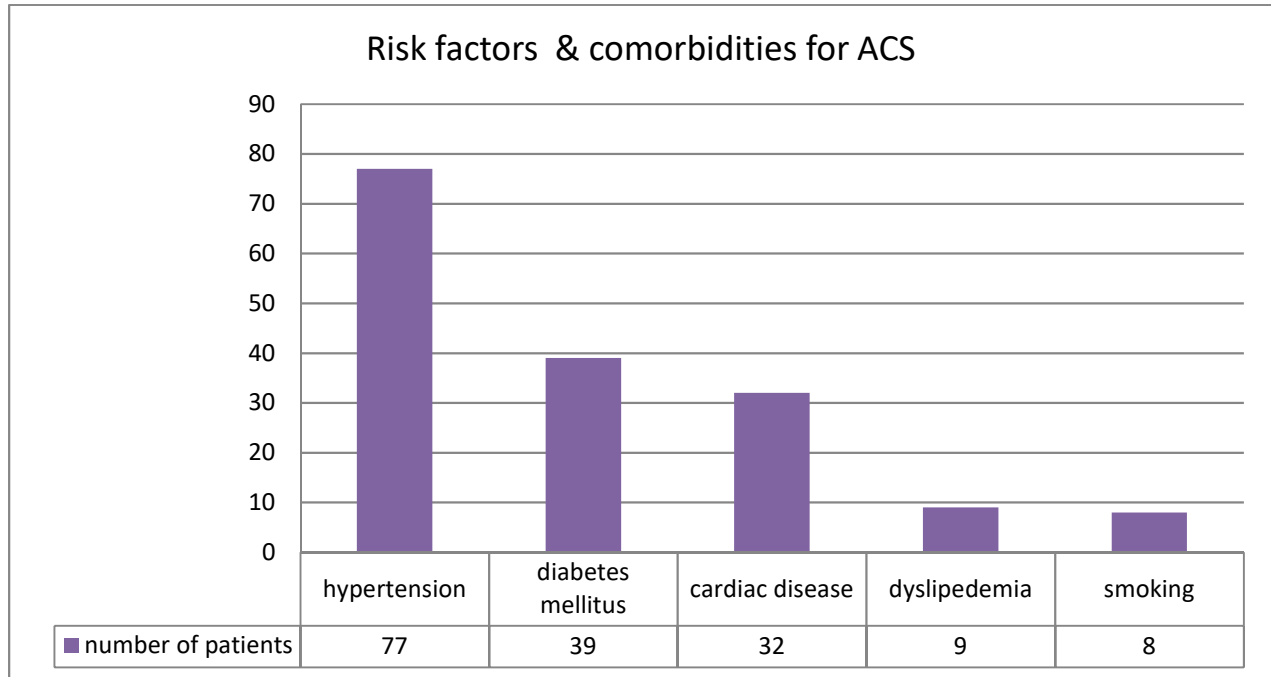


Figure 5 risk factors & comorbidities for ACS patients admitted in St. Paul hospital millennium medical college from November 2020 - December 2023

5.4 Types of complication

Hospital acquired infections were the most frequent complication among ACS patients, followed by arrhythmia and cardiogenic shock, heart failure, and AKI. The rarest complications were major bleeding disorders and reinfarction.

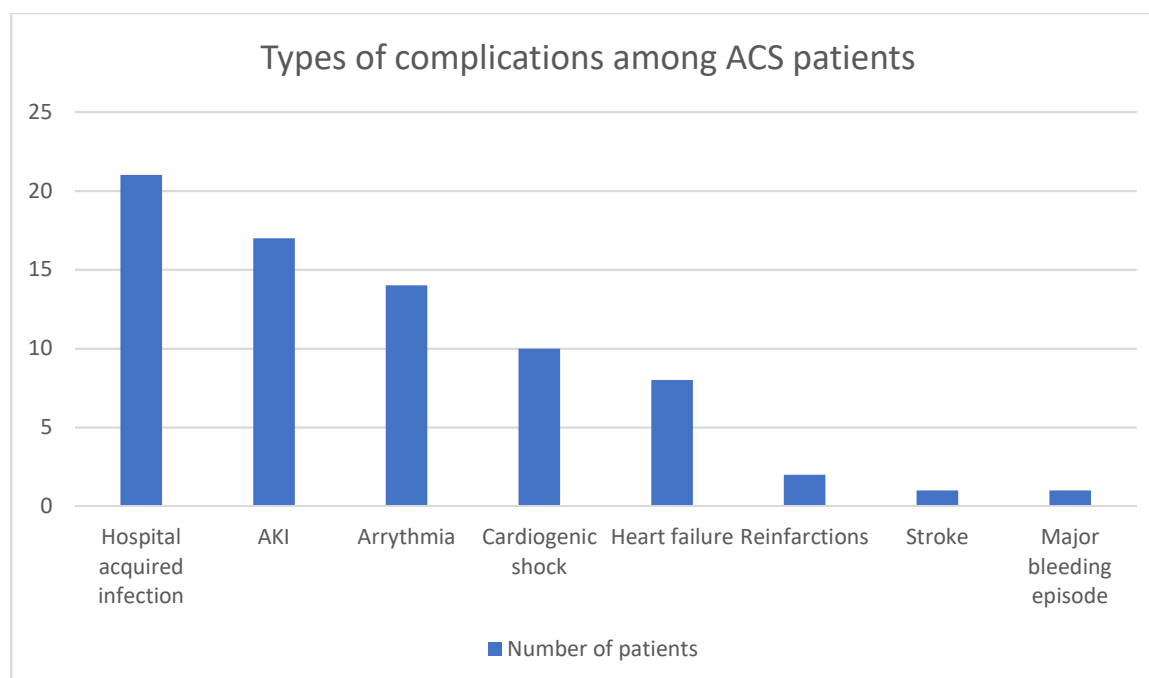


Figure 6: types of complication among ACS patients admitted to St. Paul hospital millennium medical college, Addis Ababa, Ethiopia from November 2020-December 2023

5.5 Interventional factors and patients outcome

Almost all patients received Aspirin, clopidogrel and heparin. 48 (33.4%) of the patients developed any complications. Hospital acquired infection, AKI and arrhythmia were the most common complications. Almost half of the patients were discharged from the ED. There were 10 (7.0%) deaths.

Table 3 intervention factors & outcome of ACS patients from St. Paul Hospital Millennium Medical College from November 2020 – December 2023

Variable		Frequency	Percentage
Treatment	Aspirin	144	100.0
	Clopidogrel	144	100.0
	Heparin	142	98.6

	Statins	128	14.4
	Morphine	114	79.2
	Beta blockers	99	68.8
	Nitrates	60	41.7
	ACEI or ARBs	38	26.4
	PCI	7	4.9
	Cardioversion	5	3.5
	Intubation	4	2.8
	Defibrillation	3	2.1
Disposition location	Inpatient ward	41	28.7
	Discharged from ED	74	51.7
	ICU	28	19.6
Patient outcome	Discharge with improvement	128	89.5
	Death	10	7.0
	Referred for CABG	5	3.5
Place of death (n=10)	ICU	6	60.0
	ED	3	30.0
	Ward	1	10.0

5.6 Factors associated with death from ACS

On bivariable binary logistic regression, hemoglobin level, initial blood pressure, developing cardiogenic shock, receiving beta blockers and serum creatinine level were found to have statistically significant association with death from MI. Patients with hemoglobin level. Patients with initial blood pressure greater than 90/60 mmHg were less likely to die from MI than patients with initial blood pressure less than 90/60 mmHg. Patients who developed cardiogenic shock were more likely to die than patients who don't develop cardiogenic shock. Patients with serum creatinine level greater than 1.2 mg per dL were more likely to die than patients with serum creatinine value less than 1.2 mg per dL. Patients who received beta blockers were less likely to die than patients who did not received beta blockers.

On bivariable binary logistic regression, duration of symptom, type of ACS, presenting symptom, having comorbidities, Killip class, age and sex were not found to have statistically significant association with mortality.

The adjusted multivariable regression model showed, developing cardiogenic shock, serum creatinine level and receiving treatment with beta blockers were found to have statistically significant association with mortality. Patients who developed cardiogenic shock were 3 times more likely to die than patient who did not develop cardiogenic shock (AOR: 3.296, 95% CI:1.590,6.351, p-value: 0.024). patients with serum creatinine 1.2 mg per dL and above were 25 times more likely to die than patients with serum creatinine less than 1.2 mg per dL (AOR:25.504, 95% CI: 1.299, 50.06, p-value: .033). patients who received beta blocker were less likely to die than patients who did not received beta blockers (AOR: 0.013, 95% CI: 0.003,0.930, p-value: 0.046).

Table 4: factors associated with death in St. Paul Hospital Millennium Medical College from November 2020 – December 2023

Variable	Death		COR (95% CI)	P-value	AOR (95% CI)	P-value
	Yes	No				
Hemoglobin						
< 9 mg per dL	2(66.7%)	1(33.3%)	1.00		1.00	
>= 9 mg per dL	8(5.7%)	132(94.3%)	0.030 (0.002-0.371)	.006	0.205 (.005 -7.999)	.397
Initial BP						
< 90/60 mmHg	6 (27.3%)	16(72.7%)	1.00		1.00	
>= 90/60 mmHg	4(3.3%)	117(96.7%)	0.091 (0.023-0.358)	.001	0.147 (.008- 2.882)	.196
Had arrhythmia						
No	3(91.1%)	30(90.0%)	1.00		1.00	
Yes	7(50.0%)	7(50.0%)	10.00 (2.053-48.699)	.004	10.181(0.929-111.614)	.058
Had cardiogenic shock						
No	3 (8.150)	34(91.9%)	1.00		1.00	
Yes	7(70%)	3(30%)	26.444 (4.392-159.213)	.000	3.296 (1.590- 6.351)	.024
Serum creatinine						
Less than 1.2	3 (2.5%)	117 (97.5%)	1.00		1.00	
1.2 and above	7 (30.4%)	16 (69.6%)	17.062 (4.003- 72.732)	.000	25.504 (1.299- 50.06)	.033
Received beta-blockers						
No	9(20.5%)	35(79.5%)	1.00		1.00	
Yes	1 (1.050%)	98(99%)	0.040 (.005- 0.325)	.003	0.013 (0.003-0.930)	.046

6. Discussion

In our research, the majority of patients (65%), were from Addis Ababa, with an average age of 57 & predominantly men are affected. Numerous studies (24) show that the prevalence of ACS rises with age in both men and women, with men having a higher incidence than women in all age groups. Even though the reason why the majority of patients came from Addis Ababa, might be due to the hospital's proximity or possibly a lack of knowledge about the illness in the country's outside capital city as well as the inadequate transportation and referral system, since SPHMMC is one of the major referral hospital in the country. Different researches also show that there is no different outcome in patients with ACS based on their residency according to the study (27) done at Iran. In our result 61% of the population was age <60 and 24% of them doesn't have comorbidity this will affect the outcome of the patient in making delayance of the diagnosis. Even the study held in India which was done on the patients with premature coronary arterial disease in rural youth shows significantly rising which is attributed by lack of awareness of the society about the disease and increasing sedentary way of life style. Among the modifiable Risk factors such as smoking, low HDL levels and abdominal obesity play a major role in this specific population and smoking took the lion share. Regardless of the outcome of the patient it's very poor because of the patient age, having early premature cardiac disease and has less associated risk factors which play a role in making the diagnosis ultimately leads to delay in treatment.

Together with previous studies we found out the incidence of hypertension is the commonest modified risk factor for ACS and which is succeeded by diabetes mellitus, dyslipidemia and smoking. Studies conducted in sub-Saharan countries, Nepal and India, have also revealed comparable characteristic. Early diagnosis is the first step of successful treatment in acute MI but 26 % of our study population doesn't have any risk factors though we didn't address obesity among the modified risk factor on this study.(28) Patients with ACS who do not have traditional cardiovascular risk factors are a distinct group that has significantly worse outcomes despite having a lower prevalence of comorbidities. It is necessary to conduct more research to pinpoint specific risk factors and intervention targets in order to enhance the outcomes for this patient population. About 17.7% of the patients' clinical characteristics do not show signs of chest pain, which could make it more difficult to diagnose ACS. The 12-

lead body surface ECG is still the most crucial initial clinical test for myocardial ischemia and infarction in patients with risk factors and high clinical suspicion, despite the ongoing development of new diagnostic techniques. In our study 70 % of the patients presented after 12 hrs. of the onset of symptom, even though it doesn't have clinical significance. But on the study done in Nepal (31) it is directly proportional with the unfavorable outcome of the illness. Our study also demonstrates that patients were more likely to have an adverse outcome at presentation if their systolic blood pressure and heart rate were lower.

Generally speaking the use of only triple therapy i.e. double anti platelet with anticoagulant currently is not recommended due to an increase of bleeding risk and also with additional of high success of good outcome with reperfusion therapy like thrombolytic which decrease mortality by 18% (28) The reason why thrombolytic were not administered to 35% of patients even though they presented within 12 hours of symptom onset may be due to the drugs' accessibility and affordability, additionally 45.1% of patients had non-STEMI, which disqualifies them from receiving thrombolytic treatment.

On bivariable binary logistic regression, hemoglobin level more than 9 mg per dL were less likely to die from MI than patients with hemoglobin level less than 9 mg per dL and on multivariable binary logistic regression shows no significant effect of low hemoglobin. (26) in a study which was done in Australia shows significant association of low hemoglobin with ACS mortality because the study shows patient who had anemia were less likely to be emergently reperfused with either thrombolytic therapy or primary PCI and also shows in hospital complication of heart failure renal failure & reinfarction were more common among anemic patient. Nevertheless, the question of whether severe anemia is a sign of a poor clinical state rather than a direct cause of increasing short- and long-term morbidity and mortality still needs to be answered.

Overall mortality rate among ACS patient in our study was 7% which is comparable with other studies. (8) In our study cardiogenic shock is the most mortality predictor for ACS patient but our treatment was not combining with surgical revascularization for which we transfer the patients to St. Peter hospital and for other private cardiac center. Due to the

patient's delayed presentation and critical condition, the challenges involved in transferring them to another facility, makes the patient's prognosis worsens.

MI complicated by cardiogenic shock was associated with a mortality rate of 80–90 %. However, with advances in coronary reperfusion techniques over the past few decades, especially with the introduction of primary percutaneous coronary intervention (PCI), the mortality rate has improved to below 50 %.(29) Cardiogenic shock occurs 5-10% In ACS patients and based on the CULPRIT SHOCK trial (31), coronary angiography and revascularization of the infarct related artery reduced 30 day mortality from 51.6 % to 43.3 % with severe LV dysfunction is the most common presentation.(25).

AKI is a well-known serious and fatal MI complication. A study (23) conducted on retrospective evaluation of 5136 patients defined AKI as $\geq$ to 0.5 mg/dl creatinine increased in the first 72h. The primary end point hospital mortality was 4%.(23) AKI is a high mortality predictor for patients admitted to the ICU and 50-90% mortality predictor worldwide.(24) The study conducted in Brazil & Egypt which was an observational prospective study with 33.3% and 40%, respectively. The mortality increases specifically for patients with ACS who develop AKI. In our study with the increment of creatinine with the initial base line serum $cr < 1.2$ and progressive increment with ≥ 0.5 within 72 h has a higher mortality predictor.

B blockers were given within the first 24 hours of admission for patients who met the guidelines' requirements and had a good mortality outcome and this result was also noted on the research done at Ayder hospital in Ethiopia (8). Other than double antiplatelet and anticoagulation b-blocker was in treatment plan to help reduce the workload on the heart and improve blood flow to the heart muscle. They can also help prevent future heart attacks in people who have had an ACS event.(30). However administration of B-blockers was associated with side effects such as hypotension, shock and bradycardia therefore in the early phase of STEMI careful administration is recommended. (32)

6 Strength & Limitation

Strength

Since the subject is uncommon in Sub-Saharan Africa, it could provide additional context for the study. The study tries to identify the most prevalent modified risk factor, particularly for our nation. This study attempt to identify a mortality predictors so that, an action plan can be implemented based on the findings.

Limitation

The primary constraints on this research include the small sample size, and being retrospective cross sectional. Additionally, our limitations included not having proper echocardiography and our lack of an estimated ejection fraction was one of the difficulties particularly because we are focusing on treatment outcome of ACS and ejection fraction is one of the most studied mortality predictor.

7. Conclusion

Since ACS is expected to become more prevalent over the next fifteen years, particularly in developing nations, this research may be helpful. Modified risk factors indicate that hypertension is highly prevalent; making blood pressure control is essential which is also true for diabetes mellitus and dyslipidemia. Cardiogenic shock and AKI has high mortality rate. Since administering B-blockers within the first 24 hours of admission yields better results, this approach ought to be maintained. It has a 15% lower short-term mortality rate. And also applying reperfusion therapy will reduce mortality significantly from the specific studies so using that method will help too.

8. Recommendation

We have recommendations based on the findings of our investigation.

For health care professionals,

Even though traditional management has a significant reduction in mortality, reperfusion therapy should be part of the treatment for a patient diagnosed with ACS. Since the beginning of the medication taken at the emergency department, thrombolytic should be taken into consideration, and attention should be paid to the attitude and practices about reperfusion therapy, including both surgical and medical methods of intervention.

For local health policymakers,

Local policymakers and other interested parties should focus on non-communicable diseases and increase the number of professionals trained to perform surgical procedures such as PCI and CABG. Pharmaceutical companies should play their role to import thrombolytic at the public pharmacy level or, at the very least, in tertiary hospitals.

For researchers,

To confirm and expand on the present findings, multicenter research ought to be taken into account. Anemia with a Hgb level less than 9 from our research variables shows mortality significance on binary regression; this finding may provide clue for the future researches related to ACS even though its association is on binary regression.

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Annexes

QUESTIONNAIRE

Table 3: Data abstraction sheet

Section 1. Socio demographic		
1.1.	Age	_____years
1.2	Sex	a. Male b. Female
1.3.	Residency	a. Addis Ababa b. Oromia c. Amhara d. SNNRP e. Others
Section 2. Clinical Characteristics		
2.1.	Time of hospital presentation from onset of symptom	a) <1 hr b) 1 hr- 12 hr c) 13- 72 hr d) >72 hr
2.2.	Duration of hospitalization (days)	a) <= 7 days b) > 7days
2.3.	Types of ACS	a) STEMI b) NSTEMI c) UA
Section 3: Symptoms and risk factors		
3.1.	Symptoms	a) Chest pain

		b) SOB c) Nausea and vomiting d) Cough e) Sweating f) Syncope g) Others
	Result of blood test	a) HGB b) Platelet c) Serum troponine d) Creatinin e) urea f) Na+ g) K+ h) Glucose, cholesterol level
3.2.	Comorbidities	a. HTN b. DM c. Dyslipidemia d. Obesity e. Cardiac diseases f. Family history of CAD g. Stroke h. Smoking i. Others
3.3.	Killips Class	a. Class I b. Class II c. Class III d. Class IV

4. Interventional factors and its outcome		
4.1.	Management	a) CABG b) thrombolytic c) PCI d) Aspirin e) Clopidogrel f) warfarin g)UFH h) LMWH i) B- Bloker j) ACEI/ARB k) Nitrate l) Statin m) CCB n) Morphine o) Defibrillation p)Cardioversion
4.2.	Complication	A) HF B) MI re infraction C) Major Arrhythmia D) Stroke E) Major Bleeding episode F) Cardiogenic shock
4.3.	Outcome	a) Death b) Discharged improved c) Referred for CABG

APPROVAL SHEET

ASSESSMENT OF TREATMENT OUTCOME OF ACS PATIENTS AND IT MODIFIED RISK FACTORS AMONG THOSE ADMITTED TO THE PATIENT ADMITTED TO SPHMMC, ADDIS ABABA, ETHIOPIA

Submitted by:

_____ Name of Researcher	_____ Signature	_____ Date
----- Name of Researcher	----- Signature	----- Date
_____ Name of Researcher	_____ Signature	_____ Date
----- Name of Researcher	----- Signature	----- Date
_____ Name of Researcher	_____ Signature	_____ Date

Approved by:

1. _____ Name	_____ Signature	_____ Date
2. _____ Name	_____ Signature	_____ Date

3. _____

Name

Signature

Date