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ORIGINAL RESEARCH

Treatment Outcomes of the Acute Coronary Syndrome Among Patients Attending St. Paul Hospital

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Background: Acute coronary syndrome (ACS) patients need intense therapy and diagnostic evaluation for improved treatment. In Ethiopia, where patient deaths and hospital stays are rising, the ACS treatment is thought to be not very effective.

Methods: A retrospective cross-sectional study was conducted at St. Paul Hospital. The data were collected from patients medical records using a structured data abstraction checklist from 2018 to 2020. The data was entered, analyzed, and interpreted using SPSS version 24 software.

Results: Of 157 ACS patients, 69 (43.9%) had a STEMI diagnosis. Age was 63.69 years on average (SD: 8.23). The typical amount of time between the onsets of ACS symptoms to hospital presentation was 79.3 hours (3.3 days). For 104 (66.2%) patients, hypertension was the main risk factor for the development of ACS. Killip class III and IV patients made up about 3.8% of the ACS patients at St. Paul hospital. An EF of less than 40% was present in 36.3% of patients. Loading doses of aspirin (90.4%), anticoagulants (14%), beta-blockers (82.8%), statins (86%), clopidogrel (7.6%), and nitrates (2.5%) are among the medications taken inside hospitals. Of 157 ACS patients, 6 (3.8%) patients with medical records examined died while receiving treatment in the hospital, while 151 (96.2%) patients were discharged alive.

Conclusion: STEMI was the most common diagnosis for ACS patients at St. Paul Hospital. The two main hospital events for these patients were CHF and cardiogenic shock.

Keywords: acute coronary syndrome, treatment outcome, Killip class, Ethiopia

Introduction

Acute coronary syndrome (ACS)-related cardiovascular mortality is increasing in developing countries.[1] ACS is the cause of 50% of all cardiovascular disease (CVD) deaths.[2] ACS is divided into ST-Segment elevation (STEMI) and NON-ST segment elevation (NSTEMI), which includes unstable angina (UA), based on electrocardiographic (ECG) changes.[3] ACS patients have a variety of symptoms, but the most common one is chest pain, which is frequently described as crushing or pressure that can radiate to the jaw, back, and left arm as well as being accompanied by nausea, vomiting, shortness of breath, dizziness, and fainting.[4]

The blood vessels that deliver blood and oxygen to the heart muscle become constricted, which leads to ACS. A heart attack (myocardial infarction) happens when a blood clot or another sort of disease plugs the vessel that is already constricted.[5] Most high-risk patients should be hospitalized, while intermediate-risk patients should go through a structured evaluation after the chest pain unit. Many low-risk patients can be discharged with the right follow-up after receiving an electrocardiogram and careful review for signs and symptoms of cardiac ischemia in ACS.[6]

Obesity, smoking, cocaine use, diabetes mellitus, hypertension, dyslipidemia, and family history of coronary artery disease have all been identified as risk factors for coronary artery disease. These are for men older than 45 and women

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older than 55, with younger men being more affected than women.[7] For a long time, Sub-Saharan Africa suffered from communicable diseases, but today's changes in lifestyle and the availability of foods from Western civilization mean that the region now faces a double disease burden from diabetes and hypertension.[8] Initial treatment for ACS should concentrate on stabilizing the patient's condition, minimizing myocardial damage, and administering antithrombotic therapy to stop further ischemia and relieve ischemic pain.[9]

A prospective study was carried out in Sub-Saharan Africa with 5.1% ACS patients, of which 44% had NSTEMI/UA and 56% had STEMI. A 6–10% mortality rate occurred in hospitals.[10] Similar studies in sub-Saharan African nations found that 13.5% of the population had ACS. About 71.5% of patients with ACS experienced STEMI, while 28.5% of patients experienced NSTEMI. In this setting, hospital mortality was 10%.[11,12]

Ethiopia's CVD prognosis is poor, and ACS is increasingly common. According to a study conducted at Tikur Anbessa Specialized Hospital, 27.4% of patients died while receiving treatment, while the remaining 72.6% were discharged alive.[13] According to a similar study conducted at Ayder Referral Hospital, hypertension was the most common risk factor for ACS patients and their in-hospital mortality was found to be 24.5%.[14] There is no study conducted in St. Paul Hospital. Therefore, this study aimed to assess the treatment outcomes of ACS patients admitted to St. Paul Hospital.

Methods

A retrospective cross-sectional study design was employed to assess the treatment outcome of acute coronary syndrome among patients attending St. Paul Hospital. St. Paul Hospital is located in Addis Ababa, the capital city of Ethiopia. Every day, the hospital treats an average of 1200 emergency and outpatient patients. The hospital has a catheterization laboratory for percutaneous coronary interventions.[15] The study was carried out between 2018 and 2020.

The study included all acute coronary syndrome patients with the diagnoses of STEMI, NSTEMI, and UA who were admitted to the hospital during the study period. ACS patients, who were discharged on medical advice, transferred to another hospital, had incomplete medical records, and lacked cardiac biomarkers and an ECG were excluded from the study. St. Paul Hospital treated ACS patients in accordance with international standards. ACS was determined in a total of 185 patients during the study period. Six patients were discharged against medical advice out of 185 patients, and 13 patients had incomplete medical records. Then, 166 patient medical records that met the study's eligibility criteria were found. Last but not least, 157 patient medical records and nine (5%) of the medical records were used for the study.[15]

After pre-test results in 5% of patient medical records, a structured data abstraction checklist was created using reviews of various standard literature.[13,14,16] Two trained pharmacists collected the data. The pharmacists obtained patient charts from the patient record card and documentation office, and they gathered the data. Ethical clearance was obtained from the ethical review committee of ALKAN Health Science Business and Technology College and ethical committee of St. Paul Hospital Millennium Medical College approved it. Before data collection, permission was obtained from the out-patient directorate of SPHMMC. The study complies with the declaration of Helsinki. Data is collected anonymously based on patients card numbers. Statistical Package for Social Science was used to enter, clean, and analyze the data (SPSS version 24). The patterns of each independent variable as well as the socio-demographic information were described using descriptive analysis. The patient's name was changed to a series of codes to maintain confidentiality. The discharge of ACS patients after improvement was the study main outcome measure. Major adverse cardiovascular events (MACE) were the main cause of death and morbidity in people with STEMI.

Results

Socio-Demographic Characteristics and Clinical Details of Patients

A total of 157 patient medical records were eligible for analysis. The mean age of the patients was 63.69 (SD± 8.23) years. Of 157 patients, 107 (68.2%) patients were male and 50 (31.8%) patients were female. No patient arrived within the first few hours after experiencing ACS symptoms, with the average time being 79.3 (3.3 days) from symptom onset to hospital presentation. From the symptom suggestive of ACS, 129 (82.2%) of the patients had easy fatigue, 114 (72.6%) had shortness of breath, 110 (70.1%) had chest pain, 98 (62.4%) had diaphoresis, and 66 (42%) had nausea or vomiting at the time of admission (Table 1).

Table 1 Socio-Demographic Characteristics and Clinical Details of ACS Patients in St. Paul Hospital, Ethiopia, 2018–2020

Variables	Frequency	Percent%
Sex		
Male	107	68.2
Female	50	31.8
Age		
<55	22	14
55–64	47	29.9
>64	88	56.1
Symptoms		
Easy fatigability	129	82.2
Dyspnoea	114	72.6
Chest pain	110	70.1
Diaphoresis	98	62.4
Nausea/vomiting	66	42
Duration of symptoms from onset to hospital presentation		
<12 hr	18	11.5
12–24 hr	36	22.9
24–48 hr	11	7
48–72 hr	43	27.4
>72 hr	49	31.2

Risk Factors for ACS Patients

In the present study 138 patients (87.9%) had a history of hypertension, 78 patients (49.7%) had a history of dyslipidemia, 47 patients (29.9%) had diabetes, 41 patients (26.1%) had previous history of heart failure, 40 patients (25.5%) had previously experienced a stroke, 22 patients (14%) had previously experienced a myocardial infarction, 19 patients (12.1%) had previously experienced angina pectoris (Table 2).

Table 2 Risk Factors for ACS Patients Admitted to St. Paul Hospital, Ethiopia, 2018–2020

Variables	Frequency
Hypertension	
Yes	104(66.2%)
No	53(33.8%)

(*Continued*)

Table 2 (Continued).

Variables	Frequency
Dyslipidaemia	
Yes	78(49.7%)
No	79(50.3%)
Diabetes Mellitus	
Yes	47(29.9%)
No	110(70.1%)
Smoking history	
Yes	37(23.6%)
No	120(76.4%)
Previous MI	
Yes	22(14%)
No	135(86%)
Heart failure	
Yes	41(26.1%)
No	116(73.9%)
Previous angina	
Yes	19(12.1%)
No	138(87.9%)

Abbreviation: MI, myocardial infarction.

Class of Diagnosis of ACS Patients

Of 157 ACS patients, 69 (43.9%) were diagnosed as STEMI, 50 (31.8%) as NSTEMI, and the rest 38 (24.2%) were UA patients (Figure 1).

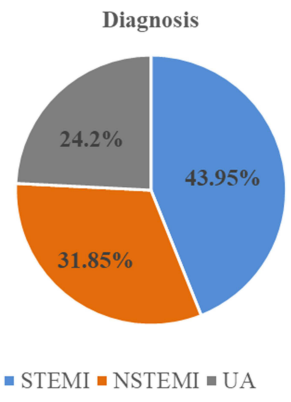

Figure 1 Class of diagnosis for ACS patients in St. Paul hospital, Ethiopia, 2018–2020.
Abbreviations: STEMI, ST-Elevation Myocardial Infarction; NSTEMI, Non-ST-Elevation Myocardial Infarction; UA, Unstable Angina.

Initial Assessment and Investigations

The average systolic and diastolic BP of patients during admission was 155.5 (SD ± 30.33) and 86 (SD ± 21.11), respectively. The mean heart rate during admission was 82.6 (SD ± 16.6) with a minimum of 61 and a maximum of 122. Killip class I of patients during admission was 116 (73.9%). However, Killip class II, III, and IV during admission were 35 (22.3%), 2 (1.3%), and 4 (2.5%) respectively (Tables 3 and 4).

Table 3 Initial Assessment During Admission for Acute Coronary Syndrome Patients Admitted to St. Paul Hospital, Ethiopia, 2018–2020

Variable	Frequency	Percent %
SBP(mmHg)		
<90	8	5.1
90–119	26	16.6
120–139	19	12.1
140–159	65	41.4
>160	39	24.8
DBP(mmHg)		
<60	7	4.5
60–79	32	20.4
80–89	68	43.3
90–99	48	30.6
>100	2	1.3
Killip class		
Class 1	116	73.9
Class 2	35	22.3
Class 3	2	1.3
Class 4	4	2.5

Notes: High in-hospital mortality was documented in Killip class 3 and 4 patients (3.8%). From those admitted patients Echocardiography was done and 8 (5.1%) patients had a severe reduction of EF, 49 (31.2%) had EF between 30–49, 51 (32.5%) had EF of in between 50–59 and the rest 49 (31.2%) had EF of greater than 60.
Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure.

Table 4 Initial Laboratory Investigation for ACS Patients in St. Paul Hospital Ethiopia, 2018–2020

Variables	Frequency	Percent
Serum lipids		
Total cholesterol		
<200	128	81.5
≥200	29	18.5

(*Continued*)

Table 4 (Continued).

Variables	Frequency	Percent
LDL cholesterol		
<100	104	66.2
≥100	53	33.8
HDL cholesterol		
<40	36	22.9
≥40	121	77.1
Triglyceride		
<150	82	52.2
≥150	75	47.8
Ejection Fraction (%)		
<30	8	5.1
30–49	49	31.2
50–59	51	32.5
≥60	49	31.2

Abbreviations: LDL, low-density lipoprotein; HDL, high-density lipoprotein.

Treatment Commenced During Hospitalization

While hospitalized, 138 patients (87.9%) received a loading dose of aspirin (162–325 mg), while all other patients received the maintenance dose. Parenteral anticoagulants were administered to 22 (14%) patients while they were in the hospital. In addition, 130 (82.8%) of the patients who were not contraindicated for beta-blockers received them. About 12 (7.6%) of patients received clopidogrel. Nitrate usage was relatively small; 4 (2.5%) of patients received them. Approximately 135 patients (86%) had their statins started during their hospital stay. Atorvastatin was the most frequently prescribed statin among those (Table 5). Patients with ACS spent a lot of time (14.5 days) in the hospital.

Table 5 Medications are Given for ACS Patients in St. Paul Hospital, Ethiopia, 2018–2020

Medications	Frequency	Percent
Aspirin	142	90.4
Clopidogrel	12	7.6
Beta-blocker	130	82.8
ACEI/ARBs	125	79.6
Statins	135	86
Nitrates	4	2.5
CCBs	60	38.2

Abbreviations: CCB, calcium channel blockers; ACEI, angiotensin-converting enzyme inhibitors; ARBs, angiotensin receptor blockers.

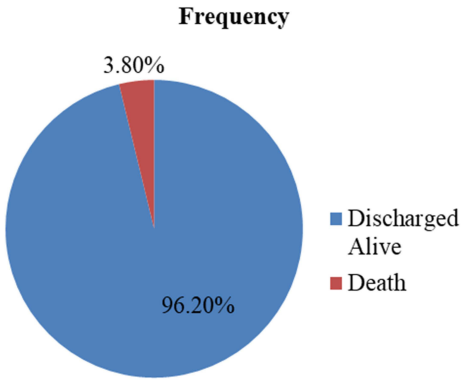

Figure 2 In-hospital mortality of ACS patient admitted to St. Paul hospital, Ethiopia, 2018–2020.

Major In-Hospital Events and Treatment Outcomes of ACS Patients

Six patients (3.8%) out of the 157 patients whose medical records were examined died while receiving treatment in the hospital, while 151 patients (96.2%) were released alive. Patients with a diagnosis of STEMI had a high rate of in-hospital mortality (Figure 2).

Congestive heart failure affected 35 (22.3%) of patients, during their hospital stay. In addition, cardiogenic shock was developed on 32 (20.4%) patients, arrhythmia was developed on 22 (14%) patients and re-infarction was developed on 16 (10.2%) patients during their stay. The leading causes of hospital deaths were cardiogenic shock and congestive heart failure (Table 6).

Discussion

The age distribution of ACS patients in St. Paul Hospital was 63.69±8.23 years which is in line with that of the study in India 60.1±11.2[16] and the global registry of acute coronary events 66.3±10 years.[17] The present study is slightly higher than Djibouti's 52±11 years.[18] In this study, there was an average delay of 79.3 hours (3.3 days) between the onset of symptoms and the start of treatment, which is longer than the average of 12.7 hours obtained from a systematic review of ACS studies conducted in LMICs.[19]

The majority of the patient in our study were diagnosed with STEMI (43.9%) whereas (31.8%) of the patient were NSTEMI and 24.2% were UA patients. In previous studies in Tikur Anbessa Specialized Hospital in which STEMI cases were 62% NSTEM accounts for 28.6% of patients and UA accounts for 9.5% of cases.[20] In addition, in a study

Table 6 Major in-Hospital Event in ACS Patient Admitted to St. Paul Hospital, Ethiopia, 2018–2020

Event	Frequency	Percent (%)
CHF	35	22.3
Cardiogenic shock	32	20.4
Majority arrhythmia in hospital	22	14
Re-infarction at hospital	16	10.2
Stroke at hospital	15	9.6
The major bleeding episode at the hospital	6	3.8

Abbreviation: CHF, congestive heart failure.

conducted in South Africa in which STEMI cases were 41% NSTEMI accounts for 32% of cases and UA accounts for 27% of patients.[21] Patients who were in follow-up at Saudi project for assessment of coronary event registry also showed the same trend in which 45% were STEMI patients, 28% NSTEMI, and the rest 27% were UA patients.[22] However, a high proportion of ST-Elevation was observed when compared to studies from (HICS: GRACE) STEMI 32%. A high proportion of STEMI in our patients might be due to under-diagnosis of Non-STEMI due to atypical presentation.[23] Chest pain is the most common symptom among patients within a study done in Senegal[24] accounting for 95.2% of the patient which is higher than that seen in this study 63.7%. Rather easy fatigability was found to be the commonest presentation 82.2%.

Participants in the current study had a 66.2% history of hypertension, which is comparable to a study done in Nepal, where 64% of ACS patients had hypertension and dyslipidemia, accounting for 49.7% of cases. This is lower than the 83%[17] and 63%[25] seen in Djibouti and Addis cardiac clinics, respectively, and could be the result of less routine testing for dyslipidemia. Our results showed that most ACS patients had at least one risk factor identified, and DM also had a 29% rate. The majority of patients at St. Paul Hospital with high mortality were in Killip classes II and III. In a study from NRMI-2, 19% of the 190,518 patients with acute myocardial infarction also had heart failure in Killip classes II and III.[26]

About 90.4% of patients received a loading dose of aspirin as part of treatment that started while they were hospitalized, which is consistent with earlier research from a global registry of acute coronary events, at 92%.[16] In our study, 82.8% of patients were taking beta-blockers at the time of admission, which is higher than the global registry of acute coronary events 76% and Italy's 65%.[27] About 86.0% of patients have access to statins while in the hospital, which is higher than studies conducted in Kenya 73%,[28] the global registry of acute coronary events (58%),[29] and a study conducted in Canada (43%).[30] This could be a result of the drug's supply being interrupted. However, a percutaneous coronary intervention was present in St. Paul's hospital, patient had not ever received the primary percutaneous coronary intervention. This could be due to the long delay between the onset of symptoms and treatment and cost affordability. Increasing the supply of drugs, giving education to patients regarding risk factors and symptoms, performing percutaneous coronary intervention (PCI) as soon as possible, and administering antithrombotic medications could be possible measures to improve the management of ACS patients at St. Paul hospital.

Conclusions

St. Paul Hospital treated ACS patients in accordance with international guidelines. The time it takes for ACS patients to present to the hospital in St. Paul after the onset of ACS symptoms is very long, and no patient in St. Paul's hospital has ever received the primary percutaneous coronary intervention or thrombolytic. In St. Paul, in-hospital mortality was rising due to the lack of these early revascularization techniques, pre-existing co-morbidities, and patient delays in seeking medical attention. Patients with ACS spent a lot of time (an average of 14.5 days) in the hospital. In St. Paul, STEMI was the primary diagnosis for ACS patients. The two main hospital events for these patients were congestive heart failure and cardiogenic shock.

Abbreviations

ACS, Acute Coronary Syndrome; ACEI, Angiotensin-Converting Enzyme Inhibitor; AHA, American Heart Association; ACSH, Ayder Comprehensive Specialized Hospital; ARB, Angiotensin Receptor Blocker; CVD, Cardiovascular Disease; CAD, Coronary Artery Disease; CCB, Calcium Channel Blocker; CI, Confidential Interval; CHD, Coronary Heart Disease; CHF, Congestive Heart Failure; ECG, Electrocardiography; GRACE, Global Registry of Acute Coronary Event; HMIS, Health Management Information System; MI, Myocardial Infarction; ICU, Intensive Care Unit; IHD, Ischemic Heart Disease; LMICs, Low and middle income countries; NSTEMI, Non-ST-Elevation Myocardial Infarction; PCI, Percutaneous Coronary Intervention; SPHMMC, Saint Paul Hospital Millennium Medical Colleges; SPSS, Statistical Package for Social Science; STEMI, ST-Elevation Myocardial Infarction; UA, Unstable Angina; WHO, World Health Organization.

Data Sharing Statement

All data generated or analysed during this study are included in this published article.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the ethical review committee of ALKAN Health Science Business and Technology College and ethical committee of St. Paul Hospital Millennium Medical College approved it. Before data collection, permission was obtained from the out-patient directorate of SPHMMC. Data is collected anonymously based on patients card numbers. The study complies with the declaration of Helsinki.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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