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

CLINICAL FEATURES AND OUTCOME OF ACUTE CORONARY SYNDROME IN PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT IN ADDIS ABABA, ETHIOPIA

RESEARCH THESIS

Principal Investigator:
Dr. REDIET WAKWAYA

ADVISORS:
PROFESSOR AKLILU AZAZH (INTERNIST AND PROFESSOR OF EMERGENCY AND CRITICAL CARE)
DOCTOR TIGIST WORKU (ASSISTANT PROFESSOR OF EMERGENCY AND CRITICAL CARE)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, DEPARTMENT OF EMERGENCY AND CRITICAL CARE FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT IN SPECIALITY PROGRAM.

August, 2019
Addis Ababa, Ethiopia

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ABSTRACT

AIM: To assess the clinical features, identify risk factors; describe the management and outcome of patients who present with ACS in EDs in Addis, Ababa, Ethiopia

METHODS: A multicentre prospective cross-sectional study was carried out from September 21, 2018 to July 1, 2019 among patients >18 years old presenting to the ED with ACS.

RESULTS: 40 patients were enrolled during the study period. Majority of them were males (72.5%). The average age of patients affected is 58.03 $\pm$ 11.831 years. The commonest presentations were easy fatigability (92.5%) followed by chest pain and diaphoresis 77.5%. Of those who had chest pain, most (45%) expressed it as squeezing and severe in quality (40%). 65% had radiation mostly to the arms(35%) followed by the shoulder(27.5%).The mean duration of illness prior to presentation to the ED of the study area was 4.41$\pm$2.83. The commonest risk factors identified were hypertension (60%) and type 2 DM (57.5%). STEMI was the major type of MI identified (67.5%) with 30% in Killip class I. NSTEMI was seen in 17.5% and Unstable angina in 15%. Heart failure was the commonest complication at presentation. The commonest echocardiography finding was wall hypokinesis (67.5%) followed by decreased Ejection fraction (37.5%). Patients with STEMI had higher increase in the cardiac markers than NSTEMI. None of the patients received thrombolytics/fibrinolytics. PCI was done for 42.5% with only 15% done as primary PCI. Most patients (70%) stayed in the ED for more than 24 hours up to 7days. Death within 7 days of admission to the hospital while in patient occurred in 10%. The live discharge rate was 90%.

CONCLUSION: Patients present very late to the Emergency department; most of them with STEMI with heart failure as the commonest complication upon presentation. They then stay in the emergency department for prolonged period of time in limited technical facilities which pose major difficulties of their management and subsequently poorer quality of life.

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Contents

ACRONYMS

AaBET- Addis Ababa Burn, Emergency and Trauma Centre

ACS – Acute Coronary Syndrome

A.fib- Atrial Fibrillation

AMI- Acute Myocardial Infarction

ART- Antiretroviral Therapy

ACEI- Angiotensin converting enzyme inhibitors

ARBs- Angiotensin Receptor Blockers

BID- "Bis in die" (Latin), twice a day

BP- Blood Pressure

CABG- Coronary Artery Bypass Graft

CAD- Coronary Artery Disease

CI- Confidence Interval

CKMB-Creatinine Kinase Muscle/Brain

CNS- Central Nervous System

COR- Crude Odds Ratio

CRVHD- Chronic Rheumatoid Valvular Heart Disease

DM- Diabetes Mellitus

DKA- Diabetic Ketoacidosis

DCMP- Dilated Cardiomyopathy

ECG-Electrocardiography

ED- Emergency Department

GRACE- Global Registry of Acute Coronary Events

HDL- High Density Lipoprotein

HIV- Human Immunodeficiency Virus

HMIS- Health Management Information Systems

IHD- Ischemic Heart Disease

ICU- Intensive Care Unit

LDL- Low density Lipoprotein

LVH- Left Ventricular Hypertrophy

LBBB- Left Bundle Branch Block

MI- Myocardial Infarction

MVR- Mitral Valve Replacement

NSTEMI- Non- ST Elevation Myocardial Infarction

PO- Per Os (Oral)

PCI- Percutaneous Coronary Intervention

PVCs- Premature Ventricular Complexes

PLWH- People Living With HIV

RVI- Retroviral infection

SSA- Sub-Saharan Africa

STEMI- ST- elevation Myocardial Infarction

TAG – Triacylglycerol

TASH/BLH- Tikur Anbessa Specialized Hospital/Black Lion Hospital

TIA- Transient Ischemic Attack

UFH- Unfractionated Heparin

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CHAPTER ONE: INTRODUCTION

1.1. Background

Acute Coronary syndrome refers to the group of clinical manifestations that result from inadequate perfusion of the heart. It is a spectrum that includes unstable angina, NSTEMI and STEMI. It is seen in those people who have atherosclerosis of the blood vessels resulting in narrowing of the blood pipes supplying the heart. Widely known risk factors include Smoking, Diabetes Mellitus, Dyslipidemia, old age, hypertension, obesity, physical inactivity (sedentary lifestyle) and family history of AMI in early age.

Patients present to the ED mainly with a complaint of chest pain that can be described with as squeezing, crushing, or as chest tightness which is retrosternal with vague localization. It may radiate to the shoulders, jaw, neck and inner part of the left arm. In others, they may not have any complaint of chest pain rather they complain of tiredness, shortness of breath, diaphoresis, nausea, or epigastric discomfort. This is usually termed as atypical presentation and ACS should be highly suspected in obese, diabetic and fatty women with these atypical presentations.

Acute coronary syndrome is diagnosed when patients present with a history of chest pain that is becoming more frequent, staying for longer than before, with above qualities described associated with nausea, vomiting, diaphoresis or syncope plus ECG and cardiac biomarker results.

Unstable angina is chest pain that is worse, more frequent or new onset chest pain with signs of Ischemia on the ECG but no injury to the heart tissue as evidenced by absence of rise in biomarkers.

NSTEMI is chest pain of cardiac origin with signs of ischemia and injury to the heart tissue as evidenced by ST depression, T wave inversion with increase in the markers of cardiac injury (Troponin I, Troponin T and CKMB). This type of ACS has a worse prognosis relating to morbidity as compared to unstable angina.

STEMI, also commonly referred to as heart attack, is the worst of the three; it is diagnosed with ST segment elevations in the ECG indicative of transmural necrosis of the heart because of severe obstruction to the perfusing artery, and elevated cardiac biomarkers.

Acute coronary syndrome is a medical emergency that should be intervened fast because of the eventually significant morbidity and mortality.

1.2. Statement of the problem

Coronary Artery Disease has raised greatly in low income and middle income countries accounting for 80% of the burden occurring in these countries.[22,23] A decade ago, Myocardial Infarction (MI) was the 8th leading cause of death in Sub-Saharan Africa (SSA) , the leading cause of death in men above 60years and the 2nd leading cause of death in women >60years.[16, 29] Ischemic Heart Disease (IHD) accounted for 7.7% of 1006 patients with new onset heart failure recruited from 12 cardiology centres in 9 countries over a 4 year study period.[20] Coronary Artery Disease was attributed to 6% of cardiac symptoms in The Heart

of Soweto study which included 1593 patients with cardiac symptoms.[9] The onset occurs in those under 65 years old.[21]

In Ethiopia, Myocardial infarction was the 3rd commonest cause of admission after severe malaria and Diabetic Ketoacidosis (DKA) accounting for 8.8% of admissions to Medical ICU in Black Lion Hospital.[29] Not only that but, according to a 2001 report from Menelik II Memorial Hospital Autopsy results of people after sudden deaths, coronary artery disease accounted for 70% of those who died of cardiac causes.[28]

For a resource limited country like ours, prevention should take quite a role rather than treat once the event occurs, given the cost of standard of care and treatment of ACS. The emergency department plays a prominent role concerning ACS, since it is the place where it will be first suspected and the site where rate limiting measures to be started once diagnosed, which determine both the morbidity and mortality of the patient. Despite this, an elaborate study concerning acute coronary syndrome is lacking with most studies done nearly 10 years back and are retrospective than prospective.
For these reasons, this multicentre prospective research to assess the pattern of ACS in patients presenting to the emergency department, their commonest risk factor and commonest presentation will help the physician and the public health at large on which areas to focus. It will also give an insight on how to tackle these issues.

1.3. Literature Review

The prevalence of coronary artery disease has been increasing in the Sub-Saharan Africa in the past decades. Although there are no country wide prospective studies done in different parts of Africa, institutional studies and many small studies have shown growth throughout the decades. According to a WHO report on cardiovascular diseases in 2011, coronary artery disease has raised greatly in low income and middle income countries and these countries will contribute to 80% of the burden in the world. [27, 28]

In a prospective study done in Dakar, Senegal on Acute coronary syndrome in young sub-Saharan Africans of age under or equal to 40 years, the hospital prevalence was found to be 0.45%.[4] Another prospective study that was done in Abidjan heart Institute which got published in 2016, the prevalence was 13.5% out of 425 patients.[6] In Nigeria, out of 1347 people, Ischemic Heart Disease accounted for 0.9%[40] where as in a private Hospital in Kenya, 5.1% of admissions to ICU from 2008-2010 were due to Acute Coronary Syndrome[11]. The Hospital prevalence in Addis Cardiac clinic, Ethiopia on a study on acute coronary syndrome using diagnostic Angiography, Coronary Artery Disease was confirmed in 58.5% in those under 45 years and 79.6% in those above and equal to 45 years old out of 300 patients included in the study. [12]

Like in the Western setup, Acute Coronary Syndrome in Africa also has a male predilection. In the study in Addis cardiac clinic in Ethiopia, 83% with confirmed coronary artery disease were males, with the commonest age range affected being 50-59 years. [12] Another study done in Black lion Hospital, Ethiopia published on 2013 also confirms the male predominance, accounting for 65.2% with a mean age of 57.1+/-13.7 years.[3] In Djibouti,

the male to female ratio was found to be 7.7:1 with a relatively similar age group affected being 52+/-11 years. This age group was found to be 10-15 years younger than the Western Countries'. [7]

The INTERHEART and INTERSTROKE studies were landmark case control studies which confirmed 9 modifiable risk factors that account for approximately 90% of the population attributable risk for Myocardial Infarction and Stroke in all regions of the world including Sub-Saharan Africa. This included high blood pressure (19.8-26% in rural Nigeria and Kenya, 23.7-40.1% in Urban Tanzania and Namibia), Diabetes Mellitus, Current/former use of tobacco, high lipoprotein (Apo B/Apo A ratio), abdominal obesity, unhealthy diet, increased psychosocial stress and physical inactivity.[32,31] These risk factors have been increasing over the last 5-8 years throughout most of the continent.[9,37,33-36,38] The level of risk imparted by a pro-atherogenic risk factor profile for MI is independent of race, ethnicity and Geography.[31,39] In addition to that, there is also compelling evidence that the risk factors for atherosclerosis driven by urbanization, industrialization and its consequences on lifestyle, diet and physical activity are on the rise, according to cardiology in Africa review Series.

The risk factors for Coronary Artery Disease pre-angiography determined in Addis cardiac centre in Ethiopia has also found that Hypertension(61.2%), dyslipidemia (63%) and DM (41.4%) were the main risk factors for CAD with 91% of the 300 study participants having at least 1 risk factor.[12] In Dakar, smoking was the commonest risk factor identified accounting for 52.4%[4] whereas in Djibouti, hypercholesterolemia (83%), tobacco use (60%), Khat chewing (57%), DM (49%), Hypertension (46%) and heredity (20%) were the risks identified[7]. Although Khat chewing was found to be a risk factor in Djibouti, it had no effect on the prognosis of the ACS.

According to a systematic review on the Association between HIV and atherosclerotic disease in SSA, extensive thrombus and hypercoagulability were found to be contributing factors for ACS; yet, potential confounders that should be kept in mind included CNS infections and immunosuppressed ART naïve PLWH.[5]

The commonest presenting symptom that was found in a study done in Dakar, Senegal was chest pain, 95.2%. The average time delay before medical care from the time of symptom onset was 14.5 hours. [4] In Abidjan Heart Institute as well, the average time of admission after symptom onset was relatively similar, 12 hours. [6] This time was found to be significantly increased as compared to a study done in Djibouti with the average presentation time of 5 hours after symptom onset but relatively similar time of admission of 12 hours as seen in 43 of the patients included in the study. [7]

The predominant type of Acute Coronary Syndrome was STEMI in studies done in Black lion Hospital (Ethiopia), Dakar (Senegal) and Abidjan accounting for 62%, 85.7% and 71.5% respectively.[3,4,6] Coronary Artery Disease was confirmed by angiography in 75.7% of 300 patients diagnosed with ACS in a study done in Addis Cardiac centre, in Ethiopia.[12] Of these, 85% had significant disease (defined as >50% stenosis of the left main coronary artery

or >70% stenosis at other coronary beds). Single vessel disease accounted for 43.2%, multi-vessel disease for 40.5% and left main coronary disease in 1.3%. Echocardiography findings included decreased left ventricular systolic function in 37.5%, left ventricular thrombus in 20% in the study done in Dakar. [4]

The limitation of resources available in SSA, have a great impact on the standard management of ACS. This results in more dependence on the pharmacological management rather than interventional (PCI and CABG) management. In TASH, Ethiopia, patients with a diagnosis of ACS, all were given anti-platelets and statins but no thrombolytic.[3] According to ACS in young SSA done in Dakar Senegal, out of 21 patients, thrombolysis was done in 44.4% of patients with STEMI.[4] PCI was done in 22.5% (6.6% of STEMI) and fibrinolytics were given in 8.2% in Abidjan Heart Institute on a study published in 2016.[6] Thrombolysis was also successfully done in 73% of 35 patients on a study done in Djibouti.[7]

The in-hospital mortality of patients admitted with ACS depends on many factors. In a retrospective study performed at a single tertiary heart centre in Northeast Thailand, factors associated with in-hospital mortality included age >60 years and left ventricular ejection fraction <40% [41]. In GRACE eight risk factors accounted for 89.9% of the prognostic information which includes older ages, higher Killip class, systolic blood pressure, ST-segment deviations, cardiac arrest during presentation, serum Creatinine level, positive initial cardiac enzyme finding and heart rate [42]. Use of aspirin, Clopidogrel, ACEI, statin, and PCI were significantly associated with in-hospital mortality in a study done in China [43]. In a study done in TASH, factors found to have significant association with the in-hospital mortality were old age, delayed time of presentation, patients who have previous history of hypertension, higher Killip class and patients who were diagnosed to have STEMI. [1]

CHAPTER TWO: OBJECTIVE

2.1. General Objective

- To assess the features of patients presenting with Acute Coronary Syndrome to the Emergency departments in Addis Ababa, Ethiopia

2.2. Specific objectives

- To identify clinical features of ACS patients presenting to the ED in Addis Ababa, Ethiopia
- To identify risk factors related with ACS in patients presenting to the EDs in Addis Ababa, Ethiopia
- To describe the management of ACS in the EDs in Addis Ababa, Ethiopia
- To determine the outcome of ACS patients presenting to the ED in Addis Ababa, Ethiopia

CHAPTER THREE: METHODOLOGY

3.1. Study Area and Study period

It is conducted in the two emergency centres of Ethiopia, TASH ED and AaBET hospital on patients with an admission diagnosis of ACS during the study period. These two sites are chosen because they are the two largest emergency centres in Ethiopia run by Emergency Physicians.

TASH (Black Lion Hospital) is a tertiary referral hospital that sees around 370,000-400,000 patients per year, although the exact number is not known. The hospital has a total of 800 beds. It is also the teaching hospital affiliated with Addis Ababa University, School of Medicine. The Emergency department was established and run by emergency Physicians for the past 7 years. It sees around 80,000 critical patients referred from the different hospitals per year. It has a red zone which has 7 beds, 2 mechanical ventilators and monitors for each bed. TASH also has a well-equipped ICU with a total of 20 beds, 6 beds for surgical ICU, 6 beds for adult medical ICU, 4 beds for Pediatric ICU and 4 beds for Cardiac ICU.

Addis Ababa Burn, Emergency and Trauma (AaBET) Hospital is a part of St. Paul referral hospital and is the first Emergency, Burn and trauma centre founded in Ethiopia since 3years back. The emergency department has Red zone with 7 beds, Orange zone with 7 beds and Yellow Green zone with 40 beds. It also has ICU with a total of 15 beds. Both the Emergency and ICU are run by the Emergency and Critical care specialists.

3.2. Study Design

A prospective descriptive cross-sectional study was employed

3.3. Study Period

From September 21, 2018- July 1, 2019

3.4. Study population

Source population

All patients with acute coronary syndrome who visited TASH ED and AaBET hospital

Sample population

All patients who have a diagnosis of ACS and are kept in TASH ED and AaBET hospital during the study period

3.5. Sampling method and sample size calculation

Convenience sampling is used. All patients who are admitted during the study period are included.

3.6. Inclusion and Exclusion Criteria

Inclusion Criteria

- Age >= 18yrs old with a presumed diagnosis of ACS at admission who have ECG, cardiac marker results
- All patients in whom ACS is an incidental finding

Exclusion Criteria

- Patients who do not have ECG and cardiac biomarkers
- Patients who present within the study period for re-infarction after a previous admission during the study period(Patients coming for the second time during the study period)

3.7. Variables

Independent variables

- Age
- Sex
- Previous illness(DM, Hypertension, Dyslipidemia, obesity)
- Type of symptom at presentation
- Type of ECG features the patient presents with
- Type of ACS the patient has
- Level of cardiac marker increase at presentation
- Time of presentation from symptom onset to arrival to the ED

Dependent Variables

- Complications at presentation (Killip classification)
- Length of stay in the ED before admission to the ICU
- Treatment started after the diagnosis of ACS in the ED
- In hospital mortality rate

3.8. Data collection

Data collection is done using structured questionnaire that is made by modifying a questionnaire used in a published research. It is filled by the principal investigator in the TASH ED and an Emergency and critical care resident who is informed on how to fill the questionnaire in AaBET hospital. Missed data is handled by revising the chart and filling the gaps. Significantly large missed data on objective measurement of body mass index and abdominal girth was omitted from the analysis.

3.9. Statistical Analysis

Statistical analysis is done by SPSS version 16.0. The relationship between independent and dependent variables are done by using bivariate logistic regression. The odds ratio was calculated with 95% confidence interval (95% CI) for previously known independent predictor variables. They were considered statistically significant if their p-value is < 0.05.

3.10. Ethical considerations

Before data collection, a letter was written by the Emergency and Critical Care Medicine department for grant of permission for the research. Another letter of permission was also sent to AaBET hospital. The names of patients are replaced with codes to avoid individual identifiers.

3.11. Operational Definitions

Treatment outcome: treatment outcome of patients with ACS is explained mainly by in-hospital mortality. It will be calculated by dividing the total number of patients who died during their hospital stay by the total number of patients who participated in the study.
In-hospital mortality is defined as the percentage of patients who died during their hospital stay.
Previous myocardial infarction (MI): The patient has had at least 1 documented previous MI before admission

Dyslipidemia: patient has had previously documented dyslipidemia
Current tobacco use: Smoking cigarettes within 1 month of this admission
Previous Tobacco use: Has stopped smoking for at least the past 1 month before admission
Killip class: Killip class of the patient at the time of hospital admission:

- **Class 1:** No evidence of heart failure
- **Class 2:** Findings consistent with mild to moderate heart failure (S3, lung rales <1/2 way up the posterior lung fields, jugular venous distension)
- **Class 3:** Overt pulmonary edema
- **Class 4:** Cardiogenic shock

Elective PCI: PCI done for STEMI if patients have persistent symptoms or have a significant occlusion which is not the culprit artery for the current presentation on angiography. It is done on an elective basis

Rescue PCI: is mechanical reperfusion for failed fibrinolysis for acute MI

Primary PCI: mechanical intervention for acute MI done immediately upon diagnosis of MI

Intermediate ward: It is a ward where patients can be transferred from the emergency department until bed for the respective ward is available. It is intended to relieve the ED over-crowding in TASH

CHAPTER FOUR: RESULTS

4.1. Socio-demographic status of the patients

There were a total of 40 ACS patients seen during the study period from both study sites (AaBET and Black Lion Hospital). They were in the age range between 29 and 84, with an average age of 58.03 $\pm$ 11.831 years. Majority of them were males accounting for 29 (72.5%) with a M: F ratio of 2.6:1.

4.2. Characteristics of the patient on arrival

Majority of patients with ACS presented with easy fatigability 37(92.5%) followed by chest pain and diaphoresis each accounting for 31(77.5%). Of those patients who had chest pain, 26(65%) had radiating chest pain commonly to the arms, 14(35%), followed by the shoulder 11(27.5%). They mostly describe their chest pain as Squeezing, 18(45%) and severe in quality, 16(40%).

Pulmonary edema was present in 16 (40%) of patients who presented to the emergency with ACS. The vital signs and GCS at presentation to the ED are summarized in Table 1 below

The average time of presentation after symptom onset was 4.41 $\pm$ 2.83 days with a range from 1 hour to 14 days.

The commonest risk factors identified were Hypertension and Diabetes Mellitus each accounting for 24(60%) and 23(57.5%) respectively. Only one patient had history of previous stroke/TIA. Other possible risk factors that were found in 12(30%) of patients with ACS include underlying IHD in 4(10%) and breast cancer on medications in 2(5%). Alcoholism with fatty liver, Cholelithiasis, DCMP, known Asthma, Polycythemia and post mitral valve replacement Chronic rheumatoid valvular heart disease with Atrial fibrillation were also the rare underlying illnesses which could have some contribution to the development of ACS in this patients. See Table 2 below

Table 1 Characteristics symptoms of patients presenting to the ED, Addis Ababa, Ethiopia, September- July, 2019

Symptoms at presentation	**Percentage**	**Frequency**	
Easy fatigability	92.5%	37	
Chest pain	77.5%	31	
Diaphoresis	77.5%	31	
Epigastric discomfort	70%	28	
Nausea/vomiting	50%	20	
Shortness of breath	30%	12	
Incidental finding	10%	4	
Characteristics of chest pain	**Yes Freq. (%)**	**Total Freq. (%)**	
Radiation	26(65%)	31(77.5%)	
Neck	5(12.5%)	31(77.5%)	
Jaw	3(7.5%)	31(77.5%)	
Arm	14(35%)	31(77.5%)	
Left arm	10(25%)	14(35%)	
Both arms	4(10%)	14(35%)	
Shoulder	11(27.5%)	31(77.5%)	
Left shoulder	6(15%)	11(27.5%)	
Right Shoulder	1(2.5%)	11(27.5%)	
Both shoulders	4(10%)	11(27.5%)	
Back	9(22.5%)	31(77.5%)	
Characteristics of chest pain	**Yes**	**No**	**Total**
Squeezing	18(45%)	13(32.5%)	31(77.5%)
Stabbing	8(20%)	23(57.5%)	31(77.5%)
Heaviness	4(10%)	27(67.5%)	31(77.5%)
Dull aching	4(10%)	27(67.5%)	31(77.5%)
Quality of Chest pain	Yes	No	Total
Mild	1(2.5%)	30(75%)	31(77.5%)
Moderate	14(35%)	17(42.5%)	31(77.5%)
Severe	16(40%)	15(37.5%)	31(77.5%)
Findings upon presentation	**Mean**	**Standard deviation**	**Range**
Systolic BP(mm Hg)	124.75	28.447	80-195
Diastolic BP(mm Hg)	75.05	19.158	42-111
Heart rate (beats/minute)	93.05	17.859	50-126
Respiratory Rate(breaths/minute)	23.4	5.930	12-40
GCS(Scored out of 15)	14.65	1.747	4-15

Table 2 Risk factors identified in patients with ACS presenting to the ED, Addis Ababa, Ethiopia, September- July, 2019

Risk factors Identified	Yes	No	Unknown
Type 2 DM	23(57.5%)	17(42.5%)	-
Hypertension	24(60%)	16(40%)	
Dyslipidemia	9(22.5%)	20(50%)	11(27.5%)
Obesity	11(27.5%)	29(72.5%)	-
RVI	3(7.5%)	37(92.5%)	
Cigarette Smoking	12(30%)	28(70%)	
Currently smoking	4(10%)		
Previous history of use	8(20%)		
Chat Chewing	10(25%)	30(75%)	
Previous MI	4(10%)	36(90%)	
Premature CAD	2(5%)	34(85%)	4(10%)

Out of the 30% who said yes to tobacco smoking, 12(25%) had previous history of tobacco use with a mean of 22.22 $\pm$ 21.77 pack years. Patients classified as current users of cigarettes (defined as cigarette use in the past 1 month) accounted for 4(10%). The mean number of cigarettes smoked by these people was 15.75 $\pm$ 8.5 cigarettes per day with a median of 20 cigarettes (1 pack per day).

Counting comorbidities as one risk factor, 38(95%) of the patients who presented with ACS to the ED had at least 1 risk factor. Most, 12(30%) of the patients had 3 identified risk factors. Only 2(5%) of the patients did not have any identifiable risk factors.

4.3. Diagnosis and Investigations done to confirm diagnosis

All patients who were diagnosed with ACS in the study period had ECG and cardiac markers done for them. The majority, 27 (67.5%) of these patients had STEMI, in Killip class I, 12 (30%). Only 3 patients came in with cardiogenic shock among the STEMI patients. See Table 3 below

The commonest ECG finding was ST elevation accounting for 28(70%) and it was unremarkable in only 2 patients despite increment in cardiac markers.

All patients had at least one of the cardiac markers done for them. The most widely used cardiac marker was Troponin I, it was done for 37(92.5%) of the cases. The level of troponin I rise from the upper limit in STEMI patients had a mean of 473.05$\pm$774.97 with a median of 300. As compared to NSTEMI patients, whose mean rise in the troponin level is 256.58$\pm$429.78 and had a median of 52, this value was found to be very high.

Echocardiography was done for 33 (82.5%) patients. The commonest finding was wall hypokinesis. It was seen in 27(67.5%) of those who had echocardiography done for them, followed by decreased ejection fraction in 15(37.5%). Only 1 patient had decreased ejection fraction, wall hypokinesis and new regurgitation on echocardiography. None of the patients who had echocardiography done had ruptured free wall or septal wall upon presentation.

Random blood sugar was done for 23 patients (57.5%). The serum Creatinine was determined for 32 patients out of the 40 (80%) and lipid profile was done for 9(22.5 %) of the patients, the values are listed in the table below.

Table 3 Diagnosis and Diagnostic investigations done for ACS patients presenting to the ED, Addis Ababa, Ethiopia, September- July, 2019

ECG findings	**Frequency**	**%**
ST elevation	28	70%
ST depression/T wave inversion	6	15%
Previous LBBB fulfilled Sgarbossa criteria	2	5%
PVCs	1	2.5%
2nd degree AV block	1	2.5%
Unremarkable ECG	2	5%
Type of cardiac markers done	**Frequency**	**%**
CKMB	7	17.5%
Troponin I	37	92.5%
Troponin T	4	10%
CK MB and Troponin I	6	15%
CK MB and Troponin T	1	2.5%
Echocardiography	**Frequency**	**%**
Yes	33	82.5%
No	7	17.5%
Echocardiography findings	**Frequency**	**%**
Decreased Ejection Fraction	15	37.5%
Wall hypokinesis	27	67.5%
New regurgitation	2	5%
Decreased EF &Wall hypokinesis	12	30%
LV thrombus & wall hypokinesis	2	5%
Diagnosis of MI	**Frequency**	**%**
STEMI	27	67.5%
Killip class I	12	30%
Killip class II	7	17.5%
Killip class III	5	12.5%
Killip class IV	3	7.5%
NSTEMI	7	17.5%
Unstable angina	6	15%

Lab.Ix	**Minimum**	**Maximum**	**Mean**	**Standard deviation**
LDL (mg/dl)	52	142	96.09	33.14
HDL (mg/dl)	16	56	33.88	13.14
Total cholesterol (mg/dl)	52	207	135.33	51.89
Triacylglycerol (mg/dl)	56	153	98.22	29.86
RBS	69	450	185.48	94.64
Creatinine	0.6	2.16	1.19	0.41

4.4 Complications at presentation

Heart failure was present in 17(42.5%) was the commonest complication identified upon presentation to the ED followed by dysrhythmia in only 5(12.5 %) of the patients with ACS upon presentation. The types which were seen were 2nd degree AV block, 3rd degree AV block, bradycardia, premature ventricular contractions and ventricular tachycardia, each accounting for 2.5% of the cases with dysrhythmia. Right ventricular infarction was seen in 2(5%), apical left ventricular thrombus in 1(2.5%), ischemic stroke in 2(5%) and cardiogenic shock in 4(10%) patients upon presentation to the emergency department. None of the patients had mechanical complications and pericarditis up on presentation. See Figure 1 below.

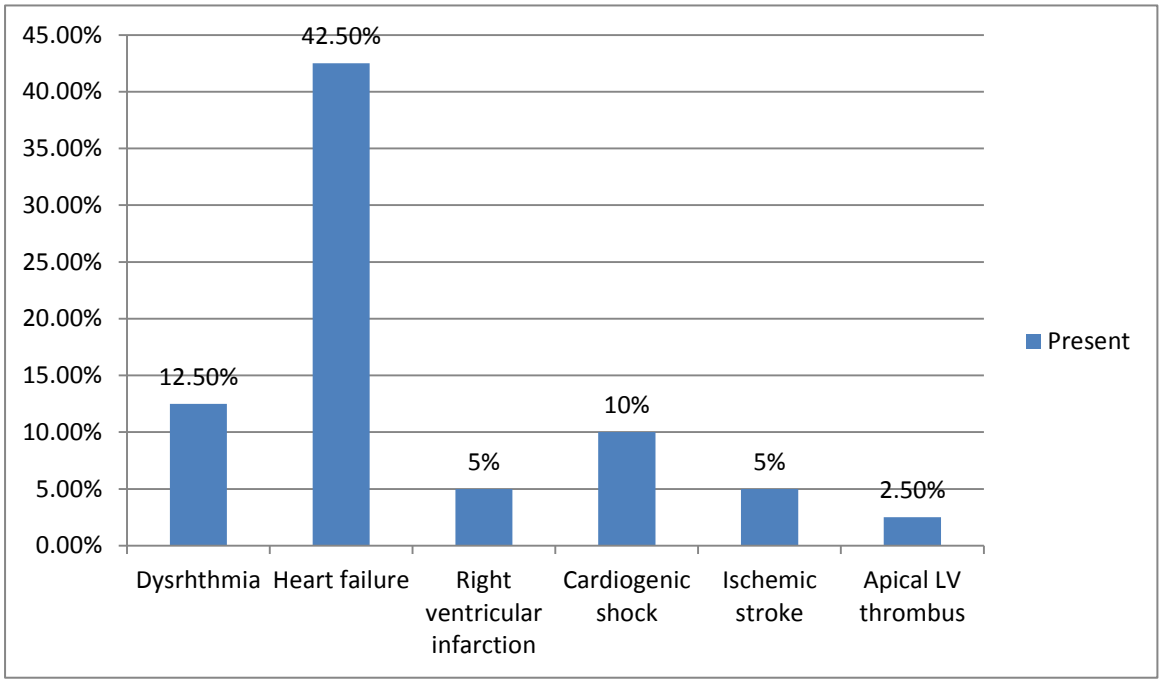

Figure 1 Complications upon presentation of patients with ACS presenting to the ED, Addis Ababa, Ethiopia, September- July, 2019

4.5. Pharmacologic treatment started upon hospitalization

The pharmacologic management of ACS patients in the study area is mostly in line with standard management protocols used worldwide. Most of the patients have received antiplatelet agents, anticoagulants, beta blockers and statins. See the Table 4 below

4.6 Reperfusion (Revascularization) Therapy

Percutaneous coronary intervention was done for 17(42.5%) of the patients who presented with ACS. It was done as a primary procedure in only 6(15%) of the patients. In the rest 11(27.5%), it was done as elective PCI. There was one patient who had angiography done without subsequent PCI because there was no visible occlusion.

None of the patients received thrombolytic therapy nor Coronary artery bypass graft (CABG).

Table 4 Treatment given to patients presenting with ACS to the ED, Addis Ababa, Ethiopia, September- July, 2019

Treatment given	Yes	Started in the ED
Aspirin	39(97.5%)	23(57.5%)
Loading(300-375mg)	37(92.5%)	
Maintenance(81mg)	39(97.5%)	
Clopidogrel	37(92.5%)	25(62.5%)
Loading(300-375mg)	36(90%)	
Maintenance(75mg)	36(90%)	
Statins	37(92.5%)	23(57.5%)
Atrovastatin	36(90%)	
Simvastatin	1(2.5%)	
Anticoagulants	33(82.5%)	25(62.5%)
UFH	28(70%)	
Enoxaparin(8000 SC BID)	2(5%)	
Warfarin	2(5%)	
Beta blockers(Metoprolol)	25(62.5%)	18(45%)
Max daily dose(200mg)	3(7.5%)	
Morphine	32(80%)	31(77.5%)
Nitrates	12(30%)	10(25%)
Sublingual	11(27.5%)	
Isosorbide Dinitrate PO	1(2.5%)	
ACE inhibitors/ARBs(Enalapril)	14(35%)	5(12.5%)
Calcium channel blockers	3(7.5%)	-
PCI	17(42.5%)	
Primary	6(15%)	
Elective	11(27.5%)	

4.7 Disposition

Length of stay in the emergency department for most of the patients, 28(70%), was from 24 hrs to 7 days, 5(12.5%) stayed in the emergency department for more than a week and actually were discharged from the emergency department except for 1 patient who stayed for more than one week and was admitted to the ICU. Only 6(15%) had a length of stay of less than 24 hours in the emergency department.

Most of the patients, 22(55%) were discharged home directly from the ED. Only 14(35%) of the patients were admitted to the ICU. The rest 2, 1 and 1 were admitted to intermediate ward, cardiac ward and transferred to another hospital, respectively.

Majority of the patients who presented with ACS, 36 (90%) were discharged alive. The rest 4(10%) had died within 7 days of admission to the hospital while inpatient.

4.8 Predictors of in-hospital mortality within 7 days

Bivariate logistic regression was done to assess the relationship between the different variables on the patient outcome, which is the in-hospital mortality within 7 days of admission to the hospital of the study areas. Chest pain, age, length of illness, Hypertension,

vital signs at presentation, random blood sugar, the serum Creatinine and dysrhythmia did not have any significant relationship with death within 7 days of admission to the hospital. Chat use, however had an odds ratio of 0.8(CI 0.007-0.895) and p-value of 0.045 with a 95% confidence interval, indicating that its use is associated with lower odds of death within 7 days of admission to the hospital.

Table 5 Significance of the different variables in predicting patient outcome in patients with ACS presenting to the ED, Addis Ababa, Ethiopia, September- July, 2019

Predictor variables	COR(CI)	p-value
Chest Pain	1.167(0.106-12.805)	0.9
Age	1.000(0.915-1.092)	0.996
LOI	0.901(0.596-1.362)	0.621
Hypertension	1.571(0.198-12.470)	0.669
Chat	0.80(0.007-0.895)	0.045
Systolic BP	1.014(0.977-1.052)	0.458
Diastolic BP	1.048(0.982-1.118)	0.158
Heart rate	1.007(0.949-1.069)	0.816
Respiratory rate	1.103(0.945-1.287)	0.214
GCS	0.118(0.007-1.919)	0.133
RBS	1.006(0.993-1.020)	0.363
Pulmonary Edema	0.188(0.018-2.002)	0.166
Creatinine	2.759(0.266-28.568)	0.395
Dysrhythmia	0.375(0.031-4.525)	0.440

CHAPTER FIVE: DISCUSSION

Majority of the patients who presented to the emergency department with ACS, are males, 72.5%. This is comparable to the Western population, a study done in Addis Cardiac clinic (83%) and previous retrospective research done in BLH (65.2%) and Djibouti (7.7:1).[12, 3, 7]

The mean age of ACS patients coming to the ED was 58.03±11.831 years which is slightly higher than that of Djibouti (52±11 years) and Addis Cardiac centre (50-59 years) and comparable to a retrospective study done in BLH in 2013.[7,12, 3] This value is, however, lower as compared to the GRACE Global Registry of Acute Coronary Events 66.3 ±10 years.[42]

Chest pain is the commonest symptom patients present with in a study done in Dakar, Senegal [4] accounting for 95.2% of the patients which is higher than that seen in this study (77.5%). Rather easy fatigability was found to be the commonest presentation (92.5%).

The time to presentation to the ED (of the study area) after symptom onset in this study was found to be very delayed (4.41±2.83 days) ranging from1 hour to 14 days than those seen in other places which is in hours than in days. In Dakar, it is 14.5hours, in Abidjan 12 hours and Djibouti 5 hours.[4,6,7]

The commonest risk factor identified, from the already established risk factors for ACS, was Hypertension (60%). This value was comparable to the study done in Addis cardiac centre (61.2%) but higher than in studies done in rural Nigeria and Kenya (19.8-26%), Urban Tanzania and Namibia (23.7-40.1%) and in Djibouti (46%).[12, 32, 31, 7] Diabetes Mellitus was found to be a risk factor in 57.5% which is slightly higher than that seen in the study in Addis cardiac centre in Ethiopia (41.4%) and in Djibouti (49%). Dyslipidemia accounted for 22.5% which is lower than those seen in Djibouti (83%) and Addis Cardiac clinic (63%). This could be due to less routine screening for dyslipidemia in the out-patient follow up clinics. Chat chewing was also seen in lesser percentage in this study (25%) as compared to 57% seen in Djibouti. Tobacco use either former or current use was the commonest risk factor identified in a study done in Dakar, Senegal (52.4%) and 60% of ACS patients had it identified as a risk factor in Djibouti but is less common in this study, seen in only 30% of the patients who presented with ACS. Most (95%) patients had at least one risk factor identified which is comparable to a previous retrospective study done in TASH in 2017[1].

STEMI is the predominant type of ACS that present to the ED in studies done in Dakar (83%), Abidjan heart institute (71.5%) and BLH in Ethiopia in 2013(62%) and 72.6% in another study published in 2017 in TASH[4, 6,3,1] as is seen in this study as well (62%). This value is higher than those seen in the GRACE study which only accounted for 34% [42]. The percentage of patients who presented with Killip class I in this study are comparable to those in the study published in BLH in 2017 30% and 33.3% respectively. However, the rate of Killip class II and class III has decreased from 30.3 to 17.5% and 24.3% to 12.5% respectively in comparison to a study done in TASH in 2017. Cardiogenic shock was seen in 10% in this study which is comparable to 12.1% in the previous study. This could be

attributed to early diagnosis and treatment with high rate of suspicion despite late presentation of these patients.

The diagnosis of acute coronary syndrome is by asking history of chest pain or discomfort in a patient who has the risk factor supported by the 12 lead ECG and Cardiac biomarkers' result. All patients in this study had ECG and cardiac biomarkers at presentation. As compared to a study published in TASH in 2017, 4.8% of ACS patients did not have their cardiac biomarkers measured.

Echocardiography is also another supportive diagnostic modality that can assess and tells us about the severity of the ischemia as well as complications associated with the ischemia/infarction. It was done in 82.5% of the patients in this study which is higher than that done in a previous study published in TASH (69.4%). The commonest echo finding was wall hypokinesis (67.5%) followed by decreased ejection fraction (37.5%). LV thrombus was seen in 5%. As compared to a study done in Dakar, Senegal the rate of left ventricular thrombus seen is smaller (20%) whereas the rate of decreased Ejection fraction was similar (37.5%). This shows the presence of improvement in cardiac diagnostics equipment accessibility and trained personnel in cardiology.

The mean systolic and diastolic blood pressure upon presentation in this study was 124.75 $\pm$ 28.447 and 75.05 $\pm$ 19.185 with a range from 80 to 15 mm Hg and 42 to 111, respectively. This value is lower as compared to the retrospective study done and published in 2017 in TASH [1] which was 135.5 $\pm$ 30.33 and 84.6 $\pm$ 21.11 respectively. The heart rate, however, was found to be comparable with a mean of 93.05 $\pm$ 17.859 in this study and 93.2(SD ± 16.6) in the study published in TASH in 2017. The average Random blood sugar was also similar between this study and the study published in 2017 in TASH, Ethiopia [1] which is 185.48 $\pm$ 94.64 mg/dl and 183.2 ± 90.33 mg/dl, respectively.

Lipid profile was determined for 22.5% in this study as compared to 64.5 % (80) patients during their hospital stay in a study done in TASH in 2017. The mean total cholesterol, LDL, HDL and triglyceride values were lower in this study as compared to the same study. It was 135.33$\pm$51.89 in this study as compared to 182.5 ± 47.7, 96.09$\pm$33.14 to 118.5 ± 47.3, 33.88$\pm$13.14 to 40.5 ± 14.0 and 98.22+29.86 to 158.8 ± 84.7 respectively in this study and the retrospective study published in TASH in 2017[1], respectively. High level of total cholesterol (>200 mg/dl) was documented in 26(33.3%) which is higher than in this study 2.5% (1). LDL level was more than 100 mg/dl in 10% (4) which is lower than 44 (62.9%) patients in a previous study. Low amount of high density lipoprotein was measured in 47.1% of patients which is also higher than that in this study (20%). About 39.5% of patients were admitted with high amount of triglyceride level which was higher than 150 mg/dl which is also very high as compared to this study (2.5%). These differences could be due to the small number of patients that were included in this study plus the low number of people who had lipid profile done during their hospital stay.

The standard medical management of acute coronary syndrome comprises of antiplatelet agents (Aspirin and Clopidogrel), anticoagulants, beta blockers, anti-pain, ACEI/ARBs and

statins. In this study, patients received Aspirin in 97.5% which is slightly lower than the study published in 2017(100%). Clopidogrel was started in 92.5% which is slightly higher than previous study (90.3%), anticoagulant in 82.5% also higher than previous study (77.4%). Beta blocker was started in 62.5 % as compared to 88.1% in previous study in TASH. This value is lower than that of GRACE (76%), South Africa (69%) and Italy (65%). [45, 46, 47] ACE inhibitors use in this study has decreased to 35% as compared to 71% and Statin use has increased to 92.5% as compared to 85.5% in the previous study in TASH. This is also higher than studies done in Kenya (73%), GRACE (58%) and Canada (43%). [44, 45, 29] Morphine was started upon arrival in 80% which is higher than 12.9% in the previous study in TASH whereas Nitrate use is comparable 32.5% and 35.5% respectively in this study and the previous study done in TASH [1].

Reperfusion therapy is a treatment modality used to treat obstructive lesions in the epicardial coronary arteries and their major branches. It can be done via medical reperfusion or percutaneous coronary intervention. This technique is used widely in the western setup as compared to that in the developing world. According to a study done in TASH [1] in the years 2015 and 2016, none of the patients received thrombolysis as is the case in this study as well. However, thrombolysis was done in 44.4% of STEMI patients in a study in Dakar and 73% in the study done in Djibouti.[4, 7] None of the patients in this study got fibrinolysis either which is still low as compared to 8.2% seen in a study done in Abidjan Heart Institute. PCI was done in 42.5% of the patients which is higher than that seen in Abidjan (22.5%).[6]

The length of stay of ACS patients in a multicentre study done Tunisia had a median of 1 hour for regional hospitals and 8 hours for university EDs and patients with STEMI had short median length of stay of 2 hours (range 0-5 hours) compared to UA/NSTEMI 8 hours.[48] This time is very short as compared to this study where patients length of stay is measured in days than in hours. 57% of NSTEMI patients were discharged from the ED in this study which is higher than that seen in the study done in Tunisia (43%).

Predictors of in hospital mortality which were identified in the Global Registry of Acute Coronary Events (GRACE) includes age, Killip class, systolic blood pressure, ST segment deviation, cardiac arrest during presentation, serum Creatinine level, positive initial cardiac enzyme finding and heart rate. However, none of this were found to have significant association. Chat use did not increase the in hospital mortality rate within 7 days and may even be protective, COR 0.8(CI 0.007-0.895) and p-value of 0.045 with a 95% confidence interval in this study. This could be because of the small number of patients included in this study or the presence of less number of deaths to assess for adequate association. In addition to that, since the presentation to the emergency is delayed, those who have died may not have made it to the hospital, thus decreasing the in hospital mortality rate.

CHAPTER SIX: LIMITATIONS OF THE STUDY

The total number of patients included in this study is very small; hence generalizability is very difficult despite it being multicentre. This was due to decrease in ACS patient flow to our ED in most of the data collection period in TASH and new referral systems to St.Peter hospital from the AaBET hospital which decreased the number of patients referred for ACS to AaBET Hospital.

The small number of patients involved in the study and the less number of death after admission may also be the reason why previously incriminated in hospital mortality predictors were not found to have significant relation on the patient outcome in this study.

The relatively delayed presentation to the ED, could also be a contributing factor as to why there were small number of deaths in the hospital as the critical ones may have died before even reaching the hospital.

CHAPTER SEVEN: CONCLUSION

The clinical features ACS patients in Ethiopia who present to the Emergency department was relatively the same. Males were predominantly affected. The average age of patients affected is 58.03 $\pm$ 11.831 years which is relatively younger than the western population. The commonest presentations were easy fatigability and chest pain during the acute attack. Patients' presentation is very late, in days as compared to in hours in other parts of the world. The commonest risk factors identified are hypertension and type 2 DM. STEMI is the major type of MI identified. Heart failure was the commonest complication at presentation.

The medical management is in line with international recommendations except for the use of thrombolytic which is still lagging from the other parts of the world. The use of PCI has improved and is even better than its use in other parts of Africa but still not enough as compared to the developed countries. The ED length of stay is unacceptably longer than the recommendations by standard guidelines. The discharge rate without death is very good despite the patients' late presentations and inadequate reperfusion strategies.

CHAPTER EIGHT: RECOMMENDATIONS

Given the clinical features of ACS patients presenting to the ED and the presence of significant delay from the time of onset of illness to medical contact

- Awareness creation and public teaching of the non-communicable diseases and their clinical features and teaching on recognition of angina symptoms could prevent the patients from having a bad quality of life. Not only patients but it would also help decrease the health costs from caring for such people at large.
- The nationwide registries on non-communicable diseases should be available and closely monitored as in the case of RVI registries, malnutrition follow up sheets and other HMIS registry books which are given great attention. This will help in a uniform management and close follow up of cardiovascular associated problems and ACS patients as well.
- PCI service as well as the necessary medications for treatment should be made available in all parts of Ethiopia and all hospitals so that precious time will not be lost by referral from hospitals with first medical contact to tertiary hospitals
- There should be a continuous supply of pharmacologic medications like thrombolytic, fibrinolytics, Clopidogrel and Nitroglycerin for the management of ACS
- The establishment specific centres for the management of ACS patients in conjunction to all the hospitals could help decrease the duration of stay in the emergency department. Time is muscle in this disease and every minute delay can significantly affect the morbidity, mortality and later on, the quality of life
- Large prospective and multi-centred studies should be carried out to have a better picture of such patient and help in their identification and better management.

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ANNEX

QUESTIONNAIRE

1. SOCIODEMOGRAPHIC STATUS OF THE PATIENT

1. Patient card number_____ Patient's name initials _____

2. Age

3. Sex A. Male B. Female

2. PATIENT CHARACTERISTICS AT ARRIVAL

1. Presenting complaint

A. Chest Pain 1. Yes 2. No

If Yes, Radiation_____

Quality of pain_____

Characteristics of the pain_____

B. Epigastric discomfort 1.Yes 2.No

C. Nausea/Vomiting 1.Yes 2.No

D. Diaphoresis 1.Yes 2. No

E. Easy fatigability 1. Yes 2.No

F. Incidental finding on screening 1.Yes 2.No

G. Others_____

2. Duration of illness (time of presentation after symptom onset)_____

3. Risk factor identified

A. Diabetic A. YES If yes, 1. Type 1 2.Type 2

B. NO

B. Hypertension A.Yes B.No C.Unknown

C. Dyslipidemia A. Yes B. No C.Unknown

D. Obesity – A.Yes If Yes, Abdominal girth (cm)_____, BMI (Kg/m^2) _____

B.No

E. RVI A.Yes If yes, 1. On HAART 2. Not on HAART

B. No

F. Tobacco Use (Smoking) 1. Never used

2. Previous Tobacco use, In pack years _____

3. Current Tobacco use, Number of cigarettes used per day _____

G. Chat Chewing A.Yes B. No

H. Previous MI A.Yes B.No

I. Previous Stroke/TIA A. Yes B. No C.Unknown

J. Family history of premature CAD A. Yes B. No C. Unknown

K. Illicit drug use (Cocaine/methamphetamines) A.Yes B.No

3. DIAGNOSIS

A. STEMI 1. Killip class 1 2. Killip class 2 3. Killip class 3 4.Killip class 4

B. NSTEMI

C. Unstable angina

4. INVESTIGATIONS DONE TO CONFIRM DIAGNOSIS

A. ECG finding

1. New LBBB

2. Previous LBBB with fulfilled Sgarbossa criteria

3. ST elevation

4. ST depression/T wave inversion

B. Cardiac markers done

1. CK-MB, A.Yes If Yes, the level of rise from the upper limit(?x)_____

B. No

2. Troponin I, A. Yes, If Yes, the level of rise from the upper limit(?x)_____

B. No

3. Troponin T, A. Yes, If Yes, the level of rise from the upper limit (?x)_____

B.No

C. Echocardiography, A. Yes, B. No

If Yes, Finding suggestive of MI

(1) Decreased Ejection fraction
(2) Wall hypokinesis
(3) New regurgitation
(4) Ruptured free wall

(5) Ruptured septal wall
(6) Others_____

5. FINDINGS UPON PRESENTATION

A. Blood Pressure (mm Hg)_____

B. Heart Rate (Breaths/min)_____

C. Respiratory Rate (RR)_____

D. Mental status GCS=_____

E. Random Blood Sugar _____

F. Pulmonary edema 1. Present 2.Absent

G. Serum Lipid profile

A. Done, If done, B. Not done

LDL_____

HDL_____

Total Cholesterol_____

Triacylglycerol_____

H. Serum Creatinine value

6. COMPLICATIONS AT PRESENTATION

A. Dysrhythmia, A. Present, If yes, State the type of dysrhythmia_____

B. Absent

B. Heart Failure A. Present B. Absent

C. Mechanical complication

A. Present , If present

1. Free wall rupture

2. Septal rupture

3. Papillary muscle rupture

D. Right ventricular infarction A. Present B. Absent

E. Pericarditis A. Present B. Absent

F. others, specify_____

7. PHARMACOLOGIC TREATMENT STARTED UPON HOSPITALIZATION

1. Aspirin A.YES B. NO

If YES, Loading Dose_____mg/d

Maintenance Dose_____mg/day
Started in ED A. YES B. NO

2. Clopidogrel A.YES B.NO
If YES Loading Dose_____mg/d
M.Dose_____mg/day
Started in ED A.YES B. NO

3. Glycoprotein IIb/ IIIa receptor antagonist A.YES B.NO
If YES drug name_____
Loading Dose_____mg/d
Maintenance Dose_____mg/day
Started in ED A.YES B. NO

4. Anti-coagulant A.YES B. NO
If YES drug name_____
Loading Dose_____mg/d
Maintenance Dose_____mg/day
Started in ED A.YES B. NO

5. Beta Blocker (PO/IV) A.YES B.NO
If YES drug name_____
Initial Dose_____mg/d
Max.Dose_____mg/day
Started in ED A.YES B.NO
6. Morphine A.YES B. NO
If YES Initial Dose_____mg/d
Max.Dose_____mg/day
Started in ED A.YES B.NO

7. Nitrates (SL/IV/PO) A.YES B.NO
If YES drug name_____
Initial Dose_____mg/d
Max.Dose_____mg/day
Started in ED A.YES B.NO

8. ACEIs/ARBs A.YES B.NO
If YES drug name_____
Initial Dose_____mg/d
Max.Dose_____mg/day
Started in ED A.YES B. NO

9. Ca-channel blocker A.YES B. NO
If YES drug name_____
Initial Dose_____mg/d
Max.Dose_____mg/day
Started in ED A.YES B. NO

10. Statins A.YES B.NO
If YES drug name_____

Initial Dose_____mg/d
Max.Dose_____mg/day

Started in ED A.YES B. NO

11.Reperfusion therapy/ revascularization

I. Thrombolytic therapy given A.YES B.NO

if yes which drug and dose □ Alteplase (tPA) □ Reteplase □ Streptokinase □ Tenecteplase □ Other_____

□ Tot. Dose_____mg

Door to Needle Time _____

If NO the reason why

□ Given before arrival
□ Primary PCI
□ Contraindication
□ Not indicated
□ Patient refused
□ Unknown

II. PCI performed A.YES B. NO

If yes the first procedure is

□ Primary (Emergency)
□ Rescue
□ Elective

If NO the reason why

□ Thrombolysed before arrival □ Primary thrombolysis
□ Contraindication □ Not indicated
□ Patient refused □ Unknown

III. CABG performed A.YES B. NO

8. DISPOSITION

1. Length of Stay in the Emergency Department

A. <24 hours

B. 24hrs-7days

C. >1week

D. Discharged from the ED(>1 week)

2. Disposition

A. ICU B. Discharged home C. Cardiac Ward D. Transferred to other hospital

E. Intermediate Ward

3. Patient outcome

A. Discharged Alive B. Death within 7 days of admission