



# IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH

An official Publication of Human Journals

ISSN 2349-7203



Human Journals

## Research Article

August 2016 Vol.:7, Issue:1

© All rights are reserved by Adhin Antony Xavier et al.

# An Analysis of Management of Acute STEMI in CCU with Special Reference to Drug Prescription



**IJPPR**  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



**HUMAN**

**Adhin Antony Xavier<sup>1\*</sup>, K Ragachandana<sup>1</sup>, Aleem Sarwar<sup>1</sup>, Dr.C.K.Dhanpal<sup>1</sup>, Dr.S.Sudharsan<sup>2</sup>**

*1.Department of Pharmacy, Annamalai University, Chidambaram-, TN, India*

*2.Department of Medicine, Rajah Muthiah Medical College, Annamalai University, Chidambaram, TN, India.*

**Submission:** 1 August 2016

**Accepted:** 7 August 2016

**Published:** 25 August 2016



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

**Keywords:** ST-elevated myocardial infarction, Door to needle time, Thrombolytics, Side effects

## ABSTRACT

**Objectives:** To document briefly the clinical profile of the patients admitted with Acute STEMI. To study the timing, dose, side-effects, Killip-classification, and outcome of therapy.

**Material & method:** This is a six-month prospective observational study carried out in department of Medicine, RMMCH, Annamalai University. 100 cases of Acute STEMI were collected from CCU during November 2014 to April 2015. The data required from case sheets was entered into data collection form, analyzed and reported.

**Results:** Study showed that Acute STEMI was more predominant in male (72%) than females (28%). The average door to needle time was 49 minutes. 61 patients belong to Killip-class II. 81 patients are thrombolysed, thrombolytic agents used are Streptokinase (69 patients), Reteplase (8 patients) and Tenecteplase (4 patients). All of them were prescribed with appropriate dose of aspirin, Clopidogrel, and atorvastatin according to ACC/AHA guidelines. The most predominant side effect was headache (25%). The outcome of therapy shows, at the time of discharge serum CKMB levels, reached normal in 38 patients out of 77; ECG shows resolution of ST segment elevation in 18 patients, 76 patients got resolved, 15 patients got a reduction of symptoms and 9 death cases were reported.

**Conclusion:** study shows males were commonly affected than females. 81 patients are thrombolysed, and higher number of population was found to be thrombolysed with streptokinase followed by Reteplase and Tenecteplase. The mean door to needle time was 49 minutes. The average duration of hospital stay was 4.5 days and most predominant side effects were found to be headache occurred with Isosorbide dinitrate.

## INTRODUCTION

Acute coronary syndrome (ACS) refers to a group of conditions due to decreased blood flow in the coronary arteries and that part of the heart muscle is unable to function properly or dies. The most common symptoms are chest Pain, often radiation to the left arm, pressure-like in character, associated with nausea and sweating. Acute coronary syndrome usually occurs as a result of one of the three problems as STEMI (ST-elevated myocardial infarction), NSTEMI (non-STelevation myocardial infarction) or UA (unstable angina). These types are named according to the appearance of the electrocardiogram as *non-ST segment elevation myocardial infarction* (NSTEMI) and *ST-segment elevation myocardial infarction* (STEMI).<sup>[1]</sup> People with presumed ACS are typically treated with Aspirin, Clopidogrel, and nitroglycerin. If the chest pain persists morphine should be given.<sup>[2]</sup> Angiography is recommended in those who have ST elevation or a new bundle branch block on their ECG.<sup>[3]</sup>

While primary prevention of IHD is considered the ideal, mortality and morbidity in patients presenting with acute myocardial infarction (AMI) can be reduced with early interventions such as fibrinolysis or percutaneous coronary intervention (PCI).<sup>[4]</sup> Many studies have shown that early PCI is more advantageous in reducing mortality from re-infarction and the need for a coronary artery bypass graft (CABG) than fibrinolytic drug therapy.<sup>[5-7]</sup> Clinical guidelines have provided timely and appropriate decisions for each individual patient with STEMI.<sup>[8-9]</sup> Evidence-based practice guidelines specify a maximum delay of 30 min for fibrinolysis and 90 min for primary percutaneous coronary intervention (PCI) for patients with ST-elevation myocardial infarction (STEMI).<sup>[10]</sup> Compliance with this time period is considered a marker of quality of care.<sup>[11]</sup> The aim of this study is to document briefly the clinical profile of the patients admitted with Acute ST Elevated Myocardial Infarction and to study the timing, dose, side-effects, Killip-classification and outcome of the therapy.

## MATERIAL AND METHOD

This is a six-month prospective observational study carried out in department of Medicine, RMMCH, Annamalai University a 1260 bedded multispecialty tertiary care hospital. The study was carried out during the period of November 2014 to April 2015 in 100 patients. The study was approved by the Institution Human Ethics Committee, Rajah Muthiah Medical College,

Annamalai University (M18/RMMC/2015). Data were collected from inpatient case sheets and All the patient were followed up, till discharge/death/otherwise (migration to other hospital). Study populations were selected based on inclusion and end exclusion criteria. Patients admitted with acute STEMI, those with risk factors like smoking, alcohol consumption, DM, HTN, DM+HTN and Hyperlipidemia were included in the study. Patients admitted with diagnosis of NSTEMI and unstable angina, Patients with previous history of MI and CAD were excluded from the study.

## RESULT

The results were obtained from 100 patients with Acute STEMI, who were enrolled into the study after fulfillment of the selection criteria described above on obtaining consent from the same. Among the 100 patients, the majority were male (72%) when compared to female patients (28%).

Overall 10 patients belong to the age group of 31-40 yrs., accounting for 10 % of total. A total of 16 patients belonged to the age group of 41-50 years and 25 patients belonged to 51-60 years each, accounting for 16% and 25% respectively. 27 patients belonged to the age group of 61-70 years, accounting for 27 %. 14 patients belonged to the age group of 71-80 years, accounting for 14%. The remaining 8 patients belonged to the age group of >80 years accounting for 8% of the total patients included in the study.

**Table 1: DEMOGRAPHIC CHARECTERSISTICS OF STUDY POPULATION**

|               |               | N   | %   |
|---------------|---------------|-----|-----|
| <b>Gender</b> | <b>Male</b>   | 72  | 72  |
|               | <b>Female</b> | 28  | 28  |
|               | <b>Total</b>  | 100 | 100 |

Acute STEMI was more predominant in males with 72% compared to females with 28%.

**Table 2: DISTRIBUTION OF STUDY POPULATION**

| AGE ( IN YEARS) | MALE | FEMALE | TOTAL PERCENTAGE (%) |
|-----------------|------|--------|----------------------|
| 31-40           | 8    | 2      | 10                   |
| 41-50           | 11   | 5      | 16                   |
| 51-60           | 14   | 11     | 25                   |
| 61-70           | 21   | 6      | 27                   |
| 71-80           | 12   | 2      | 14                   |
| >80             | 6    | 2      | 8                    |
| Total           | 72   | 28     | 100                  |

It was predominant in the age group of 61-70 years in male and 51-60 years in female

**Table 3: FAMILY HISTORY**

| S.NO | FAMILY HISTORY                 | N   | %   |
|------|--------------------------------|-----|-----|
| 1.   | Significant family history     | 26  | 26  |
| 2.   | Nil Significant family history | 74  | 74  |
|      | <b>Total</b>                   | 100 | 100 |

It was observed that 26(26%) patients had significant family history of CAD.

**Table 4: OCCUPATION**

| OCCUPATION   | NUMBER(n) | PERCENTAGE(%) |
|--------------|-----------|---------------|
| Farmer       | 56        | 56            |
| Labourer     | 27        | 27            |
| Businessman  | 5         | 5             |
| Professional | 4         | 4             |
| Unemployed   | 8         | 8             |

Acute STEMI was more predominant in farmers with 46%.

**Table 5: RISK FACTORS**

| Sr.no | Risk factor         | Number of patients | Percentage |
|-------|---------------------|--------------------|------------|
| 1.    | Smoking             | 16                 | 15.8       |
| 2.    | Alcohol consumption | 19                 | 18.8       |
| 3.    | Smoking + Alcohol   | 30                 | 29.7       |
| 4.    | Betel Nut Chewing   | 21                 | 20.7       |
| 5.    | DM                  | 17                 | 16.8       |
| 6.    | HTN                 | 19                 | 18.8       |
| 7.    | DM+HTN              | 28                 | 27.7       |
| 8.    | Hyperlipidaemia     | 12                 | 11.8       |

Smoking + Alcohol was a predominant risk factor among lifestyle habits in our study.

HTN +DM was predominant risk factor among diseases in our study.

**Table 6: DURATION OF SYMPTOMS**

| Chest pain duration | NUMBER(n) | PERCENTAGE (%) |
|---------------------|-----------|----------------|
| <1day               | 76        | 76             |
| 1-2 days            | 12        | 12             |
| 2-3 days            | 8         | 8              |
| 4-7days             | 4         | 4              |

Average duration of chest pain was observed as 1.09 days.

**Table 7: SYMPTOMS RELATED TO STEMI**

| SR NO | SYMPTOM        | NUMBER OF PATIENTS | PERCENTAGE |
|-------|----------------|--------------------|------------|
| 1     | Palpitations   | 81                 | 81         |
| 2     | Giddiness      | 93                 | 93         |
| 3     | Breathlessness | 73                 | 73         |
| 4     | Sweating       | 66                 | 66         |
| 5     | Chest pain     | 100                | 100        |

Predominant symptoms are giddiness and chest pain.

**Table 8: OTHER SYMPTOMS**

| SR.NO | SYMPTOM         | NUMBER OF PATIENTS | PERCENTAGE |
|-------|-----------------|--------------------|------------|
| 1.    | Vomiting        | 8                  | 8          |
| 2.    | Nausea          | 12                 | 12         |
| 3.    | Cough and cold  | 5                  | 5          |
| 4.    | Epigastric pain | 2                  | 2          |

It was observed that nausea is more predominant.

**Table 9: DURATION OF HOSPITAL STAY**

| SNO | DURATION OF HOSPITAL STAY | NUMBER OF PATIENTS |
|-----|---------------------------|--------------------|
| 1.  | <1day                     | 6                  |
| 2.  | 2 days                    | 4                  |
| 3.  | 3 days                    | 13                 |
| 4.  | 4 days                    | 16                 |
| 5.  | 5 days                    | 34                 |
| 6.  | 6 days                    | 21                 |
| 7.  | 7 days                    | 6                  |

The average duration of hospital stay is observed as 4.5 days.

**Table 10: DOOR TO NEEDLE TIME**

| SNO | DOOR TO NEEDLE TIME(min) | NUMBER OF PATIENTS |
|-----|--------------------------|--------------------|
| 1.  | <60min                   | 87                 |
| 2.  | 60-120min                | 13                 |

Average door to needle time = 49min

**Table 11: KILLIP CLASSIFICATION**

| SNO | Killip class | NUMBER OF PATIENTS |
|-----|--------------|--------------------|
| 1.  | I            | 27                 |
| 2.  | II           | 61                 |
| 3.  | III          | 4                  |
| 4.  | IV           | 8                  |

It was observed that 61 patients belongs to Killip class II which was predominant.

**THERAPY:**

No. of patients thrombolysed: 81

Thrombolytic agents used:

- ✓ Inj. Streptokinase 1.5 lakh units IV- 69 patients.
- ✓ Inj. Reteplase 10 units IV - 8 patients
- ✓ Inj. Tenecteplase 40mg IV - 4 patients.
- Aspirin: 100 patients were prescribed with a loading dose of 325mg PO stat and a follow-up dose of 150mg and 75mg PO.
- Clopidogrel: 100 patients were prescribed with a loading dose of 300 mg PO stat and then a follow-up dose of 75mg PO.
- Atorvastatin: 100 patients were prescribed with a loading dose of 80 mg PO stat and then a follow up dose of 40mg PO.

**Table 12: OTHER DRUGS PRESCRIBED:**

| NAME OF THE DRUGS PRESCRIBED                 | NUMBER OF PATIENTS |
|--|--------------------|
| Liquid Paraffin syrup HS                     | 56                 |
| T.Enalapril 5mg BD                           | 33                 |
| T.Alprazolam 0.5mg OD                        | 26                 |
| T.Clonazepam 0.5mg OD                        | 32                 |
| Dopamine 400mg IV sos                        | 12                 |
| insulin according to BSL SC                  | 21                 |
| T.Glimipiride 1mg+metformin 500mg ½ BD       | 26                 |
| T.Metformin 500mg BD                         | 11                 |
| T.Ramipril 2.5mg BD                          | 21                 |
| T.Furosemide 20mg BD                         | 3                  |
| T.Paracetamol 500mg QID                      | 4                  |
| Ranitidine 50mg IV BD                        | 74                 |
| Pheniramine MaleateIM25mg stat               | 2                  |
| Enoxaparin sodium 40mg SC BD                 | 65                 |
| Heparin 5000 units IV TDS                    | 31                 |
| Isosorbide dinitrate 5 mg SL sos             | 38                 |
| T.Ondansetron 4mg BD                         | 18                 |
| T.Pantoprazole 40 mg BD                      | 16                 |
| Syp.Lactulose 15ml HS                        | 28                 |
| Syp.Ambrolite 30mg/5ml 1tsp tds              | 4                  |
| Morphine 1mg IV stat                         | 6                  |
| Atropine 0.6mg IV stat                       | 8                  |
| Adrenaline 1amp IV stat                      | 6                  |
| T.Nitroglycerine 2.5mg stat                  | 7                  |
| Neurobion forte OD                           | 39                 |
| T.Atorvastatin 10mg+Fenofibrate BP 145 mg OD | 16                 |
| T.Rabeprazole 20mg OD                        | 18                 |
| T.Amlodipine 5mg OD                          | 4                  |
| T.Metoprolol 25mg BD                         | 12                 |



**Table 13: SIDE EFFECTS**

| Side effect              | N  | Suspected drugs  | Remedy given   |
|--------------------------|----|--|--|
| Nausea                   | 18 | T.Atorvastatin 40mg BD and Inj.Morphine 1mg STAT                     | T.Ondansetron 4mg BD   |
| Fever, Chills and rigors | 6  | Inj.Enoxaparin sodium 40mg SC BD, Inj.Streptokinase 1.5lakh units IV | T.Paracetamol 500 mg QID, Inj.Pheneramine Maleate 25 mg stat |
| Headache                 | 25 | T.Isosorbide dinitrate SL 5mg BD                                     | T,Paracetamol 500mg QID                                      |
| Abdominal pain           | 5  | T.Clopidogrel mgOD, T.Aspirin 150mg OD                               | T.Rabeprazole 20mg BD, T.paracetamol 500mg QID               |
| Constipation             | 22 | T.Enalapril 5mg BD, T.Atorvastatin 40mg BD                           | Syp.lactulose 15ml HS  |
| Insomnia                 | 10 | T.GTN 2.5mg SL OD, T.Aspirin 150mg OD                                | T.Clonazepam 0.5mg OD, T. Alprazolam 0.5mg OD                |

Most predominant side effect was a headache (25%) occurred due to Isosorbide dinitrate

**OUTCOME OF THERAPY:**

**Table 14: Serum CKMB levels**

|              | 0-25IU/L | 25-200IU/L | 200-450IU/L |
|--------------|----------|------------|-------------|
| At admission | 48       | 40         | 12          |
| At discharge | 38       | 29         | 10          |

It was observed that Serum CKMB levels reached to normal in 38 patients out of 77 patients when the test was performed at the time of discharge.

**Table 15: TROPONIN-T**

|          | 24 hrs |
|----------|--------|
| Positive | 78     |
| Negative | 0      |

Only 78 patients out of 100 had Troponin-T test and It was found to be positive in all the 78 patients in first 24 hours and the test was performed in next 48-72 hours for 8 members. It was observed as negative in those 8 patients.

**Table 16: ELECTROCARDIOGRAPH**

|  | DOA(N) | DOD(N) | RESOLVED | DEATHS |
|--|--------|--------|----------|--------|
| Inferior wall MI –II , III, avF                                  | 34     | 26     | 2        | 6      |
| Anterior wall MI-V1-V2   | 36     | 28     | 6        | 2      |
| Lateral wall MI – I,avL,V5,V6                                    | 14     | 7      | 7        | 0      |
| Inferior wall with posterior wall extension II,III,avF,V8 and V9 | 4      | 2      | 2        | 0      |
| Antero septal MI-V1 TO V4  | 3      | 2      | 1        | 0      |
| Q wave evolving MI   | 9      | 8      | 0        | 1      |

ECG has shown ST segment elevation was resolved in 18 patients at the time of discharge .  
Number of deaths = 9(9%)

**Table 17: SYMPTOMATIC IMPROVEMENT**

| Symptoms resolved | Reduction of symptoms | Deaths |
|-------------------|-----------------------|--------|
| 76                | 15                    | 9      |

76 patients got resolved from symptoms, 15 patients got a reduction of symptoms and 9 patients were not relieved at the time of discharge.

Number of death cases = 9

**Table 18: BLOOD PRESSURE**

| Class                | SBP                 |     |     | DBP                 |     |     |
|----------------------|---------------------|-----|-----|---------------------|-----|-----|
|                      | Normal range(mm/Hg) | DOA | DOD | Normal range(mm/Hg) | DOA | DOD |
| Hypotension          | 60-100mmHg          | N   | N   | 40-60mmHg           | N   | N   |
|                      |                     |     | 4   |                     |     | 3   |
| Normal               | <120                | 17  | 18  | <80                 | 15  | 16  |
| Pre hypertension     | 120-139             | 32  | 46  | 80-89               | 39  | 46  |
| Stage 1 hypertension | 140-159             | 44  | 31  | 90-99               | 40  | 34  |
| Stage 2 hypertension | >160                | 7   | 1   | >100                | 6   | 1   |

It was observed as SBP was decreased from 7 to 1 patients in stage II HTN, 44 to 31 in stage I HTN and it was increased from 32 to 46 patients in pre-hypertension, 17 to 18 in normal HTN from the DOA to DOD. 4 people have SBP in the range of 60-100mmHg on the DOD.

It was observed as DBP was decreased from 6 to 1 patients in stage II HTN, 40 to 34 in stage I HTN and it was increased from 39 to 46 patients in prehypertension, 15 to 16 in normal HTN, from the DOA to DOD. 3 people have DBP in the range of 40-60mmHg on the DOD.

**DISCUSSION**

Overall 100 patients were enrolled during the study period. Of these 72 (72%) were male and 28(28%) were female which was similar to other international registries, namely, ACCESS (81%).<sup>[12]</sup> It was observed that this disease is more prevalent in 61-70 years in male and 51-60 years in female. While considering risk factor it has a great impact on occurrence of STEMI. We observed that 16 patients smoke, 19 patients consume alcohol, 30 patients smoke and consume alcohol, 21 patients chew betel nut. Smoking + Alcohol was a predominant risk factor among

lifestyle habits in our study, HTN +DM (28) was a predominant risk factor among diseases in our study. A study conducted by Benjamin *et al* found hypertension, diabetes and dyslipidaemia are the most common risk factors<sup>[13]</sup> The prevalence of this disease also depends on family history. 26 patients out of 100 patients i.e.; 26% had a relevant family history. The average duration of chest pain was observed as 1.09 days. Giddiness followed by palpitations is the predominant symptom. Nausea is predominant in other symptoms. The average duration of hospital stay is observed as 4.5 and Average door to needle time was found to be 49 minutes where a study conducted by Zhang *et al* was 83 min<sup>[14]</sup>. 45 min in the BLITZ study<sup>[15]</sup> 32 min in the AMI-QUEBEC Study<sup>[16]</sup> and 17±13 min in the Vienna STEMI Registry.<sup>[17]</sup> It was observed that 61 patients belong to Killip class II which was predominant. A number of death cases reported is 9. Out of 100 patients, 81 were thrombolysed as they had reported to hospital within 12 hours of chest pain, Thrombolytic agents used are Streptokinase(69), Reteplase(8) and Tenecteplase(4). *Aspirin*: 100 patients were prescribed with a loading dose of 325mg PO and a follow-up dose of 75,150mg. *Clopidogrel*: 100 patients were prescribed with a loading dose of 300 mg and then a follow-up dose of 75mg. *Atorvastatin*: 100 were prescribed with a loading dose of 80mg and a follow-up dose of 40 mg out of 96 patients. The most predominant side effect was found to be headache 25(25%).

**Outcome of Therapy:** It was observed that Serum CKMB levels reached to normal in 38 patients at the time of discharge when performed in 77 patients. ECG has shown resolved in 18 patients at the time of discharge. Troponin T was performed in Only 78 patients and It was found to be positive in all the 78 patients in first 24 hours and the test was performed in next 48-72 hrs.' in 8 members and found to be negative. Blood pressure was seen to be decreased from 7 to 1 patients in stage II HTN, 44 to 31 in stage 1 HTN and it was increased from 32 to 46 patients in pre-hypertension, 17 to 18 in normal HTN from the DOA to DOD. 4 people have SBP in the range of 60-100mmHg on the DOD. DBP was found to be decreased from 6 patients to 1 patient in stage II HTN, 40 to 34 in stage 1 HTN and it was increased from 39 to 46 patients in pre-hypertension, 15 to 16 in normal HTN, from the DOA to DOD. 3 people have DBP in the range of 40-60mmHg on the DOD. The blood glucose level was found to be reached to normal in 80 patients RBS in 70 patients, PPBS in 71 patients at the time of discharge. Out of 100 patients 76 patients got resolved from symptoms, 15 patients got a reduction of symptoms and 9 patients were not relieved at the time of discharge.

## CONCLUSION

In Acute STEMI, the benefits of ST segment elevation resolved with thrombolytics and anti-platelets have become increasingly evident. The present study has shown that male patients were more commonly affected compared to female patients. HTN + DM was observed as the most predominant risk factor that causes acute STEMI. It was observed as 26(26%) patients got acute STEMI with relevant family history and Mean door to needle time was observed as 49mins. Most predominant side-effects occurred due to therapy was headache. 18 Patients who reached hospital within 2 hrs. of onset of chest pain got resolved from symptoms, their ECG has shown ST segment elevation was resolved and S.CKMB levels reached to normal. Out of 100 patients 58 patients got resolved from symptoms and in 15 patients, symptoms were reduced without significant changes in ECG and Treatment complied with ACC/AHA guidelines.

## ACKNOWLEDGEMENT

We would like to express sincere thanks to Dr. P K Manna professor and Head of the Department for providing necessary facilities to carry out research Also, would like to thanks to faculty members of Department of Medicine, Rajah Muthiah Medical College for their constant support and help.

## REFERENCES

1. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction : a quantitative review of 23 randomised trials. *Lancet* 2003;361:13-20.
2. Andersen HR, Nielsen TT, Vesterlund T, et al. The Danish multicenter randomized study on fibrinolytic therapy versus acute coronary angioplasty in acute myocardial infarction: rationale and design of the DANAMI-2 trial. *Am Heart J* 2003;146:234-41.
3. Antman EM, Anbe DT, Armstrong PW, et al. ACC./AHA guidelines for the management of patients with ST-elevation myocardial infarction : A report of the American College of Cardiology / American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patients with Acute Myocardial Infarction). *J Am CollCardiol* 2004;44:E1-E211.
4. Armstrong PW, Bogaty P, Buller CE, et al. The 2004 ACC/AHA guidelines: a perspective adaptation for Canada by the Canadian Cardiovascular Society Working Group. *Can J Cardiol* 2004;20:1075-1079.
5. de Boer MJ, Hoorntje JC, Ottervanger JP, et al. Immediate coronary angioplasty versus intravenous streptokinase in acute myocardial infarction: left ventricular ejection fraction, hospital mortality and reinfarction. *J Am CollCardiol* 1994;23:1004-1008.
6. Stone GW, Grines CL, Browne KF, et al. Implications of recurrent ischemia after reperfusion therapy in acute myocardial infarction: a comparison of thrombolytic therapy and primary angioplasty. *J Am CollCardiol* 1995;26:66-72.

7. Weaver WD, Simes RJ, Betriu A, et al. Comparison of primary coronary angioplasty and intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review. *JAMA* 1997;278:2093-2098.
8. Ryan TJ, Antman EM, Books NH, et al. 1999 update: ACC/AHA guidelines for the management of patients with acute myocardial infarction. *J Am CollCardiol* 1999; 34: 890-911
9. Antman EM, Anbe DT, Armstrong PW, et al. ACC/ AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patients with Acute Myocardial Infarction). *Circulation* 2004; 110: e82–292.
10. O’Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/ American Heart Association Task Force on Practice Guidelines. *Circulation* 2013;127(4):e362–425.
11. Kuppuswamy VC, Webb D , Gupta S, et al. Meeting the NSF targets for door-to-needle time in acute myocardial infarction – the role of a bolus thrombolytic. *Br J Cardiol* 2006;13:36-41.
12. ACCESS Investigators. Management of acute coronary syndromes in developing countries: acute coronary events-a multinational survey of current management strategies. *Am Heart J* 2011;162(5):852–859.e22.
13. Benjamin W. Wachira, Andrew O. Owuor ,Harun A. Otieno, et al . Acute management of ST-elevation myocardial infarction in a tertiary hospital in Kenya: Are we complying with practice guidelines?. *African Journal of Emergency Medicine* (2014) 4, 104–108
14. Shou -Yan Zhang, MD Da -Yi Hu, MD, FACC Yi -Hong Sun, MD Jin- Gang Yang, MD et al. Current management of patients with ST elevation myocardial infarction in Metropolitan Beijing, China *Clin Invest Med* 2008; 31 (4): E189-E197
15. Chiara AD, Chiarella F, Savonitto S on behalf of the BLITZ Investigators. Epidemiology of acute myocardial infarction in the Italian CCU network. The BLITZ Study. *European Heart J* 2003; 24:1616–29.
16. Huynh T, O’Loughlin J, Joseph L, et al. Delays to reperfusion therapy in acute ST-segment elevation myocardial infarction: results from the AMI-QUEBEC Study. *CMAJ* 2006;175:1527-32.
17. Kalla K, Christ G, Karnik R, et al. Implementation of Guidelines Improves the Standard of Care. The Viennese Registry on Reperfusion Strategies in ST Elevation Myocardial Infarction (Vienna STEMI Registry). *Circulation*. 2006; 113:2398-405.

HUMAN