

Challenges in Managing Acute ST Myocardial Infarction in Community Heart HospitalSachin Dhungel,^{1*} Samir Gautam,¹ Bishal KC,¹ Mazhar Khan,¹ Umesh Yadav,¹ Asmita Gyawali,¹ Mandip Dhungel,¹ Ramesh Bhusal¹¹Gautam Buddha Community Heart Hospital, Butwal, Nepal.**Received:** 27th September, 2022**Accepted:** 17th February, 2023**Published:** 30th June, 2023**DOI:**10.3126/jnhls.v2i1.56162**Correspondence:**

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Citation: Dhungel S, Gautam S, KC B, Khan M, Yadav U, Gyawali A, Dhungel M, Bhusal R. Challenges in Managing Acute ST Myocardial Infarction in Community Heart Hospital. JNHLS. 2023; 2(1):9-13.**ABSTRACT****Background:**The financial issue can cause pre-hospital delay, choosing reperfusion therapy and delay in door to balloon or door to needle time during early management of STMI. The objective of this research is to study the in-hospital cost for STMI patients in community hospital.**Methods:** This cross sectional observational study was done for two years from September 2019 to August 2021. Total in hospital cost (in Nepalese rupees) during managing STMI was calculated.**Results:** The mean in-hospital cost of managing STMI (intervention or medical management) was 78,585±71167. For Intervention the total mean cost was 1,73,884±137551 of which PPCI with one stent 1,80,972±25547 and Percutaneous old balloon angioplasty (POBA) 1,37,551 ±34824. For medical management, the total mean cost was 32,001 ±19442 of which thrombolysis 36069±24188 while conservative management was 31488±18765.**Conclusion:** The in hospital cost was more for intervention management compared to medical therapy. The mortality was more for the medical therapy compared to intervention. Cost of life saving procedures like reperfusion therapy in STMI need to be make more affordable. Patient education for early use of nearby available cardiac facilities including Cath lab need to be promoted.**Keywords:** STMI; patients; butwal; heart hospital.**INTRODUCTION**

The financial issue can be one of cause for delay in pre-hospital time, door to balloon and door to needle time and choice of reperfusion therapy during management of ST-myocardial infarction in the developing countries. The government based scheme and the national insurance plans for heart disease can although partially support the patient with cost of therapy, the gap in accessibility and availability of facilities is huge.¹ For patients with STMI, the recommended treatment is Primary angioplasty if available and timely or thrombolysis followed by referral to nearest available center with 24 hour cath services. The maximum benefit time recommended is 12 hours and no extra benefit of angioplasty after 3 days.^{2,3} At present cardiologists, coronary care unit and cath lab services are sparsely available in periphery centers. In periphery STMI can be easily diagnosed with symptoms of chest pain, ST changes in ECG and blood examination including troponins and CPKMB. Thrombolysis can be started early and timely referral to nearby cardiac center with cath lab services can save many lives. There are many challenges doing coronary angioplasty in community hospital setting in periphery centers. We aim to study the in hospital cost for the patients with STMI.

METHODS

This cross-sectional observational study was done for two years from September 1, 2019 August 30 2021 in Gautam Buddha Community Heart Hospital, Butwal. The study was approved by the ethical board committee. Four hundred thirty one patients with STMI were enrolled. Sample was calculated on 95% confidence interval with Cochran formula $n=(Z^2 p q)/e^2$ where e is the margin of error (5%), p is the proportion of the population (p=0.5) which has the attribute in question, q is 1-p and Z is the Z-score value, its value at 95% CI is 1.96.⁴ Study was done on the in hospital cost of interventional management compared to medical management in acute ST Myocardial infarction. Inclusion patients were from Emergency with chest pain with ST elevation in ECG. Interventional management included Primary PCI, Rescue PCI or Facilitated Angioplasty for chest pain less than 72 hours. Angioplasty after 72 hours was excluded. Risk of Angioplasty including risk of mortality and stent thrombosis were explained after coronary angiography to all patients. Medical management included thrombolysis and conservative. Thrombolysis for chest pain less than 12 hours was second choice if patient or family were indecisive or refusal for angioplasty. Loading dose of Aspirin (300mg), Clopidogrel (300mg) and Rosuvastatin (40mg) were given to all patients. Conservative management was for patients refus-

ing both intervention or thrombolysis and chest pain duration more than 72 hours. LMWH were used in medical managed patients. In hospital direct costs were divided into emergency room cost, pharmacy cost and intervention costs. Inpatient Emergency cost included ticket cost, blood examination (complete blood count, renal function test, blood sugar, lipid profile, cardiac enzymes and serology), ECG, screening ECHO and X ray chest PA view. Pharmacy cost included cost of medicine, contrast and other ancillary supplies. Inpatient cost included bed charges, intensive care charges and other regular blood investigation. Intervention cost included cost of angiography, angioplasty, stenting and other interventions in patients. Mortality was analyzed for intervention and conservative arm. Data were tabulated in excel and analysed in SPSS software. Mean cost was calculated for each in Nepalese Rupees (NPR) and the determining factors were calculated and tabulated (Table 1).

Table 1. Cost of investigations, hospital charges and Cath lab investigations in hospital.

Items	Cost (in NPR)
Emergency ticket	100
CCU	2500
Investigations	
ECG	300
ECHO	1500
X-ray chest	
Cath lab charges	
Coronary angiography	12000
Angioplasty	70000
Temporary pacemaker	5000
Coronary stents	70000
Contrast	2000
Streptokinase	2300

RESULTS

Total patient enrolled were 431 of which were 321 (74.5 %) male and 110 (25.5%) female. Mean age was 61.1 ± 12.8 years ranging from 25 years to 95 years. Mean age for female 60.1 ±11.1 years and male 61.4±13.4 years. Commonest risk factors studied were tobacco use (smoker or tobacco user) 41(9.5%), hypertension 110 (25.5%), diabetes 130 (30.2%) and dyslipidemia 63 (14.6%). All patients have ST elevation ECG changes. Anterior wall MI was in 245 (56.8%) Inferior wall MI was in 186 (43.2%). The mean values were Haemoglobin 12.9 ± 4.4 mg/dl, total count 11788 ±4067 mg/dl, routine blood sugar 173.1 mg/dl, serum creatinine 1.0 ± 0.3 mg/dl, total cholestrol185 ± 50, LDL 108 ± 43, Triglyceride 176 ±137, HDL 44.8 ±14.9 and CPKMB 96.6± 111.39 mg/dl. Mean hospital stay was 3.1±1.1 days and coronary care unit admission was 2.5 ±1.4 days. 280 (65%) patients were discharged normally. 51 (11.8%) were discharged on request.

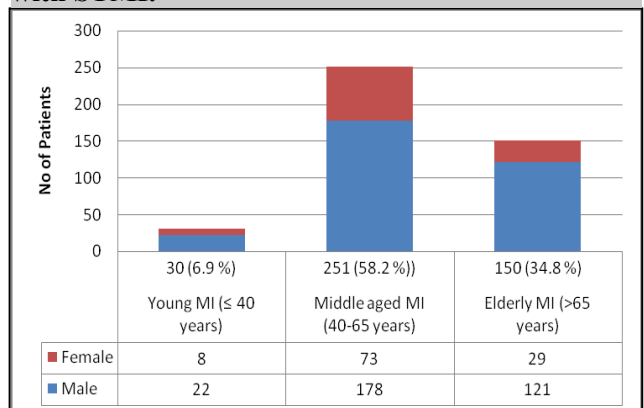
63 (14.6%) were expired. 18 (4.4%) were leave against medical advice (LAMA) and 19 (4.4%) were refer on request (Table 1).

Table 2. Distribution of study population, coronary lesions and management Rupee.

Variables	No. (%)
Mean ± SD of age(years)	61.1±12.8
Gender	
Male	321(74.5)
Female	110(25.5)
Length of hospital stay	3.1 days
Types of MI	
Anterior dominant	245(56.8)
Inferior	186(43.2)
Intervention (Angiography)	166(38.5)
Types of coronary lesions(n=166)	
SVD	86(51.8)
DVD	43(25.9)
TVD	37(22.3)
Infarct related artery(n=166)	
RCA	71(42.7)
LCx	8(4.8)
LAD	87(52.4)
Angioplasty	128(29.7)
Primary angioplasty with Stenting	106(24.59)
Facilitated	1(0.23)
Rescue	1(0.23)
POBA	20(4.64)
Temporary pacemaker	25(5.80)
Thrombosuction	11(2.55)
Non intervention	
Medical management	303(70.3)
Thrombolysis	38(8.9)
Conservative treatment	267(61.9)
Crossover (Medical to intervention)	2(0.46)
Intervention to medical	38(8.81)

Young MI (≤ 40 years) were 30 (6.9 %) patients (Figure 1).

Figure 1. Age and gender distribution of patients with STMI.



The mean±SD of overall cost of STMI was 78585±71167, mean±SD of Medical management was 32001±19442, the mean±SD of Thrombolysis was 36069±24188 and mean±SD of Conservative was 31488±18765 (Table 3).

Table 3. Medical cost of managing STMI according to types (in Nepalese Rupee).

Mean Cost of Managing STMI	Mean	SD
Overall	78585	71167
Medical management	32001	19442
Thrombolysis	36069	24188
Conservative	31488	18765
Intervention	173884	31537
POBA	149551	34824
Stenting	192972	25547

Figure 2. Cost distribution in the Emergency, hospitalization and pharmacy in intervention and medical management.

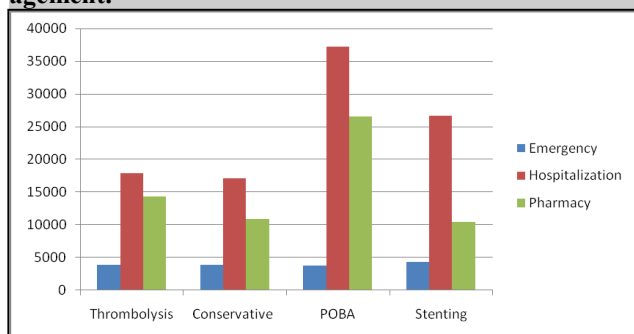
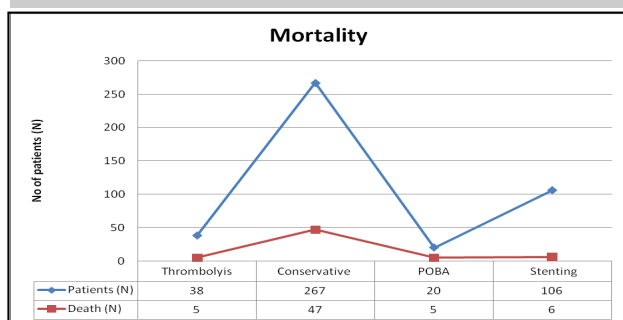


Figure 3. Mortality in medical and interventional management.



DISCUSSION

The distribution of the patients in terms of age, gender risk factors and types of myocardial infarction (anterior or inferior) were similar to other study.^{5,6} Middle aged males (age 41 to 65 years) were the most common and chewing tobacco and smoking cigarettes were the major preventable risk factors. Young MI <40% occurred in 6.9 % of total patients which is similar to study done in earlier decade showing young MI in 3 to 6 %. High percentage of young MI have been described in other literature.^{6,7,8} Avoiding tobacco, promoting regular exercises, attending training on coping and releasing stress and living healthy life style can help reduce burden of STMI in young. In comparisons to Adhikari et al. the patient undergoing CAG in our study was 38.6% vs 26.8% , thrombolysis 8.8% vs 5.6%, Primary angioplasty with stenting 77% vs 87% and POBA 12% vs 3.3%.⁶ In 9569 STMI patients in Kerala multicenter CAD registry thrombo-

lysis was done in 18.8% and CAG was done in 19.6% of which 65.9% did primary PCI.⁹ In Europe , any reperfusion treatment was used in 37-93% of STEMI patients of which Primary PCI was the dominant reperfusion strategy in 16 countries and thrombolysis was in 8 countries. Of all STMI, primary PCI strategy varied between 5 and 92% and the use of thrombolysis between 0 and 55%.¹⁰ The mean in-hospital cost for managing STMI by primary angioplasty in Netherland € 5021 (\$5824) , USA \$18931, China \$7790, Singapore \$6978, Korea (\$4300), Thailand (\$4427) , India (around 3000\$) and Hong Kong (around 2000 \$).^{11,12,13,14} The cost for Emergency room charges was similar. For the management of STMI by intervention with stenting is 5 times more than by medical management while managing by thrombolysis can have slight increase in charge than the medical management. Catheterization laboratory expense (including implanted devices) accounting for 45% of hospital cost, room and board (22%), supplies (14%) and pharmacy (9%) had been described. The in hospital mortality in this study were PCI with stenting 5.6% and POBA 25% with overall mortality for patient undergoing therapeutic intervention was 8.7 % thrombolysis 13.1% and conservative management without reperfusion 17.6%. In-hospital mortality among primary PCI at SGNHC was 6.1% compared to 10.4% with thrombolysis .⁶ In Europe, in-hospital mortality varied between 4.2 and 13.5%, for patients treated by primary PCI between 2.7 and 8% and for patients treated by thrombolysis between 3.5 and 14%.¹⁰ Higher mortality in POBA was due to the procedure done in critical and unstable, high thrombus burden and with multisystem diseases. Similar challenges encountered in managing STMI in community hospital settings as described in other literature. After explaining risk of medicine or procedure, patients or the visitors delay or refused giving consent for administering reperfusion therapy. Financially and mentally they are unprepared to making instant decision. It is difficult for them to understand every minute of delay in treatment of patients with STEMI can affect 1-year mortality, both in thrombolytic therapy and primary angioplasty and the risk of 1-year mortality can be increased by 7.5% for each 30-minute delay.^{15,16,17} Once the patient in the periphery became stable and chest pain free, many refused to complete doses of medicine and request for early discharge. Mean hospital stay was for 3.1±1.1 days. 280 (65%) patients were discharged normally, 51 (11.8%) discharged on request, 63 (14.6%) expired, 18 (4.4%) leave against medical advice (LAMA) and 19 (4.4%) refer on request. Patient in the periphery community hospital tend not to complete

doses of heparin and may be inadequate treated for infarction by medical management. Patient party refused to agree once the complication or mortality occurred and creates unnecessary harassment to the treating hospital staff and physicians. Owing to these, may happen high unnecessary referral from the periphery. In developed countries, cardiologists are sued more than other physicians. Doctors in Emergency department and working in rural place tend to be physically abused also.^{18,19} Gaining trust of the patient may be slow process which can be developed if the community heart hospital can deliver complete and quality cardiac services to the patients.

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CONCLUSION

The in hospital cost was more for intervention management compared to medical therapy. The mortality was more for the medical therapy compared to intervention. Cost of life saving procedures like reperfusion therapy in STMI need to be make more affordable. Patient education for early use of nearby available cardiac facilities including cath lab services in timely manner need to be promoted.

Conflict of Interest: None.

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