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IMPROVING DOOR TO BALLOON TIME IN PATIENTS WITH STEMI IN THE EMERGENCY DEPARTMENT BY IMPLEMENTING CLINICAL CODE "CARDIAC ALERT"

Cardiology

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ABSTRACT

INTRODUCTION: Over the past 25 years, the survival of patients with ST-segment elevation myocardial infarction (STEMI) has improved substantially, with the development of thrombolytic therapy, primary percutaneous coronary intervention (PCI), and improvements in adjunctive medical therapy. During the past decade, primary PCI has become the preferred treatment strategy when experienced operators and hospitals are available within an appropriate time frame.For both primary PCI and thrombolytic therapy, analyses have consistently shown that timeliness of reperfusion is a major prognostic factor in improving patient survival. For PCI, the American College of Cardiology has recommended a delay of no more than 90 minutes from initial hospital contact to first balloon inflation.

METHODS: CARDIAC ALERT code was implemented and included activation of cardiac catheterization laboratory by emergency medicine physician. We retrospectively reviewed 190 patients with a diagnosis of STEMI, a period of time before and after implementation of a clinical code aimed at reducing door to balloon time.

RESULTS: Door to balloon time was compared between groups before (n=95),and after (n=95)clinical code implementation. Median door to balloon time for the former group was 129.73 minutes and for the latter group 70 minutes. Prior to implementation of protocol a door to balloon time of <90 minutes was achieved in 15.6% of cases.By the end of study, this goal was being met in 90.5%.

CONCLUSION: This observational study provides support for the use of Clinical Code CARDIAC ALERT as a key for reduction in door to balloon time. Our experience demonstrates extensive interdisciplinary collaboration and explicit strategies for overcoming the barriers to organizational change.

KEYWORDS

Stemi, Code Cardiac Alert, Emergency Medicine, Door To Balloon Time

INTRODUCTION

Worldwide cardiovascular disease (CVD) is the largest cause of death which account for 17.5 million deaths and 46.2% deaths due to Non Communicable Diseases in 2012. The most deaths occur in low income countries such as India. [1] 29.8 million coronary artery disease patients are present in India, and South Indians have a higher incidence of mortality.[2] The Indian patients with acute coronary syndrome are often younger and having higher mortality and due to this fact it is the main focus of cardiovascular research.[3]

The Global Burden of Diseases study highlighted the fact that, in India mortality from Acute Coronary Syndrome [ACS] is projected to increase from 16 lacs in 2000 to approximately 64 million by 2015.[4]
Many scientific bodies like the American College of Cardiology (ACC), American Heart Association (AHA), and the European Society of Cardiology (ESC) recommend that all ST-segment elevation myocardial infarction (STEMI) patients should undergo rapid evaluation for reperfusion therapy and have reperfusion strategy implemented promptly after contact with the medical system[5-6].

Primary percutaneous coronary intervention (PCI) has to be performed in a timely fashion and door-to-balloon (D2B) time benchmark is ≤ 90 min in PCI capable hospital. This strategy is supported by a meta-analysis of 23 trials showing an absolute 2% reduction in mortality with primary PCI compared with fibrinolytic therapy[7]. Many trials have demonstrated that D2B time ≤ 90 min is associated with smaller infarct sizes, fewer major adverse cardiovascular events, and better long-term survival[8-11]. International guidelines in the management of patients with STEMI recommended several performance measures to monitor the quality of delivered patient care[12]. Of particular interest are the D2B time (arrival at hospital to primary PCI) and overall health care system delay (first medical contact to reperfusion); both of these are acknowledged as valuable performance indicators [13].

For PCI, the American College of Cardiology has recommended a delay of no more than 90 minutes from initial hospital contact to first balloon inflation.

AIM

To decrease door to balloon time for patients with STEMI who come through Emergency Department, to meet the standards of less than 90 minutes, from current door to balloon time 129.73 minutes.

OBJECTIVES

To determine how Emergency Department could improve door to balloon time for STEMI patients undergoing primary PCI at our institute, by implementing clinical code "CADIAC ALERT".

MATERIALS AND METHODS

Study design: Prospective and comparative study

Study area: This study was conducted in the Department of Emergency Medicine,Jehangir Hospital,Pune, which is tertiary care teaching hospital.

Study Population: In the present study, all patients with new ST-elevation MI or left bundle branch block(LBBB),of both sexes and age above 18 years were studied. All the patients fulfilling the inclusion criteria were included in the study.

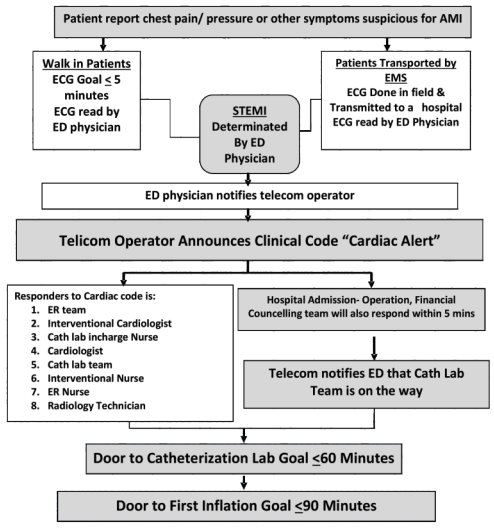
INCLUSION CRITERIA:

STEMI Patients- those who presented with onset of symptoms for 12 hours and who were found to have new ST-elevation or left bundle branch block(LBBB),of both sexes and age above 18 years.

EXCLUSION CRITERIA:

Patients with:
1. Unstable angina
2. Non STEMI
3. Non cardiac chest pain

Code "Cardiac Alert" Protocol at Jehangir Hospital, Pune.



OBSERVATIONS AND RESULTS

Figure 1) The age distribution of the patients studied between two study groups (n = 190). P- value 0.321[NS]

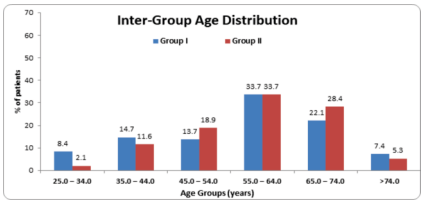


Figure 2) The sex distribution of the cases studied between two study groups (n=190). P-value 0.217[NS]

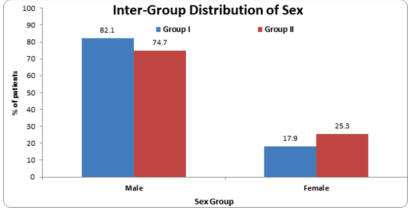


Table 1) The distribution of average door to ECG time of the cases studied between two study groups (n=190).

Door to ECG Time (Mins)	Group I (n=95)		Group II (n=95)		P-value (Group I v Group II)
	Mean	SD	Mean	SD	
Door to ECG Time (Mins)	1.95	1.07	2.54	1.00	0.001***

Table 2) The distribution of average door to Cathlab time of the cases studied between two study groups (n=190).

Door to Cathlab Time (Mins)	Group I (n=95)		Group II (n=95)		P-value (Group I v Group II)
	Mean	SD	Mean	SD	
Door to Cathlab Time (Mins)	25.34	9.45	37.88	15.89	0.001***

Figure 3) The distribution of average door to Balloon time of the cases studied between two study groups (n=190). (P-value<0.001 for all).

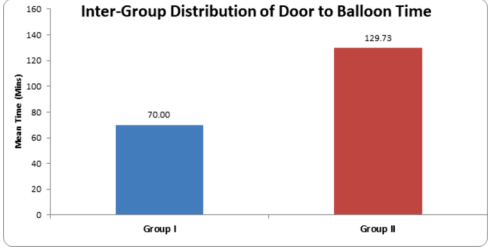
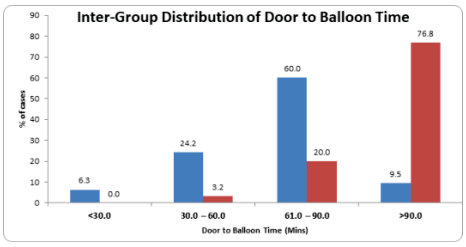


Figure 4) The distribution of door to Balloon time of the cases studied between two study groups (n=190). (P-value<0.001 for all).



CONCLUSION

1. In our study, the majority of patients were in the age group 55.0 to 64.0 years and male to female sex ratio is 3.63 : 1.00.
2. There is significantly underuse of ambulance service, only 25.3% patients use ambulance service. majority of patients had arrival in the public transport facility.
3. It is found that, there is singnificantly rise in STEMI in premorbidly healthy patients. 44.2% in group I and 28.4% in group II patients were premorbidly healthy.
4. In our study, Diabetes Mellitus and Hypertention are major risk factors.
5. By implementing clinical code cardiac alert, we decresed door to ECG time from 2.54 min to 1.95 min.and door to cathlab time was decreased from 37.88min to 25.34min.
6. In our study,clinical code cardiac alert helps to decrease Door to balloon time by 59.73min., from 129.73 min to 70 min. we achieve door to balloon time <90 min in 90.5% patients.
7. Clinical code cardiac alert at our tertiary care teaching hospital significantly decreased door to balloon time for STEMI and exceeded what is recommended in concurrent guidelines.
8. Interdepartmental relationships are crucial to the success and sustainability of a protocol such as this. We developed a multidisciplinary team approach and prioritized timely reperfusion therapy and optimal patient care, rather than any parochial interests of a single group or person. In addition, we maintain a collegial environment where the ED and cardiology staff are able to work together to improve processes in an organizational fashion.

RECOMMENDATIONS

1. Emergency medicine physician should directly activate catheterization lab without review or preapproval from a cardiologist.
2. Catheterization laboratory should be activated with a single-call system.
3. Time goals for "critical steps" in the ED to expedite patient-flow:

a). Door to ERP attending time- 0 min to 1 min
b. Door-to-ECG time _10 min.
c. Door to STEMI confirmation time- 10 mins to 15 mins.
d. Door to CODE CARDIAC ALERT SYSTEM- 15 MINS
e. Door-to-departure from ED _45 min

4. Catheterization team should be ready to begin the procedure within 30 min
5. There should be prompt data feedback to emergency department and catheterization laboratory staff
6. Senior management support of efforts to reduce door-to-balloon time
7. Team-based approach to door-to-balloon improvement efforts
8. Use of prehospital electrocardiogram to activate the catheterization laboratory

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