

# Delayed Presentation of Patients with Acute Myocardial Infarction in Chittagong Medical College Hospital

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### Abstract:

**Key Words :**  
IHD, Myocardial  
Infarction,  
delayed  
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predictors.

**Background:** Delay between onset of symptoms and hospital presentation is a critical factor in determining the management strategy and subsequent outcome. Objective of the study was to identify predictors of late presentation in patients with acute myocardial infarction (AMI) and target interventions for those at high risk of late presentation.

**Methods:** In our cross sectional study we prospectively analyzed a cohort of 1032 AMI patients for 1 year (August, 2014 to July, 2015). Demographic factors, clinical characteristics, perception of health and access to health care were compared between early (within 12 hours of symptom onset) and late presenters (>12 hours of symptom onset). Bivariate comparison and multivariate logistic regression were done to identify independent predictors of late presentation. Odds ratio and 95% confidence intervals were calculated directly from the estimated regression coefficient.

**Results:** Of the total 1032 patients 385 (37.3%) were early presenters and 647 (62.7%) were late presenters. Mean time interval between onset of symptom and presentation to hospital were  $6.85 \pm 8.06$  hrs (range 1.5 to 12 hrs) in early and  $37.88 \pm 25.13$  hrs (range 13 to 120 hrs) in late presenters. Bivariate comparison found that in the late presentation group was higher age group patients and employed citizens, had  $\geq$  one angina episode over past 4 weeks, was unable to use emergency medical transport, had no nearby ECG facilities and misinterpreted chest pain as peptic ulcer disease (PUD). Multivariate analysis showed older age  $\geq 65$  yrs, traveling long distance  $\geq 50$  miles from home residence, reporting one or more angina episode over past 4 weeks, attending PHC/clinic and misinterpreting chest pain as PUD were associated with late presentation.

**Conclusion:** A significant majority of patients with AMI were late presenters. Misinterpreting chest pain as PUD was responsible for the delay in the majority. Reporting  $\geq 1$  angina episodes over past 4 weeks was also independently associated with late presentation. Lack of emergency medical transport and traveling long distance were also significantly associated with the late presenters. Patient education, appropriate utilization of existing resources and use of tele-electrocardiography that allows transmission of ECG signal to a medical control officer may decrease late presentation and improve outcome.

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### Introduction:

Most deaths in AMI occur within the first hour of its onset. With improved cardiac care time from reaching hospital to initiate treatment for AMI patients has been curtailed successfully but delay from symptom onset to hospital presentation has not been decreased.<sup>1-3</sup> With the advent of

thrombolytic therapy delayed hospital presentation has been recognized as both largest contributor to postponed treatment of AMI and a critical determinant of initial management strategy. Several population based studies have confirmed a strong inverse relationship between the use of thrombolytics and the length of delay. The

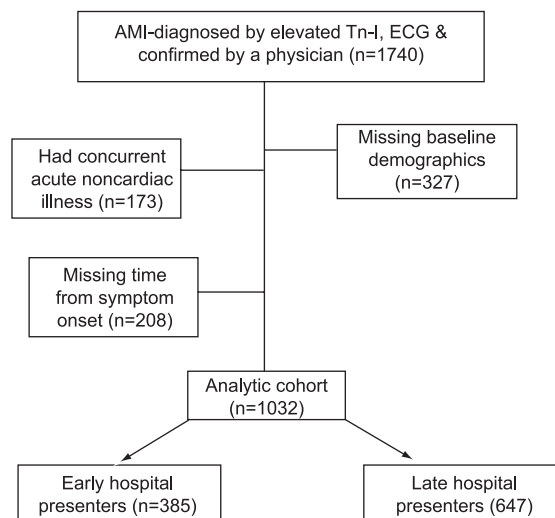
importance of the immediate implementation of definitive resuscitative efforts and of rapidly transporting the patient to a hospital is crucial. Major cause of delay from the onset of symptoms consistent with AMI include, time to recognize the seriousness of the problem to seek medical attention, pre-hospital evaluation and transportation to the coronary care unit (CCU).<sup>4</sup> Patient related factors for delay in seeking medical attention includes older age, female gender, low socioeconomic status, history of angina, DM, consulting a spouse, relative and a physician.<sup>5,6</sup> Also patient's perception of health and access to health care facilities are important factors causing such delay.<sup>7</sup> As most deaths occur during early hours of AMI, prevention and treatment of potentially fatal arrhythmias as well as salvage of jeopardized myocardium by reperfusion is mandatory for which time is crucial.<sup>5</sup> The late presenters of AMI are less likely to receive reperfusion therapy and more likely to have irreversible myocardial damage and more in-hospital and long term mortality.<sup>6,7</sup> Identification of factors contributing to delayed hospital presentation in AMI patients is essential to the development of strategies to reduce delay. No quantitative assessment of late presentation of AMI among Bangladeshi populations has been found to be reported. The purpose of our study is to identify predictors of late presentation and target interventions to reduce it.

### Methods:

This is a prospective, cross sectional study of patients with AMI admitted to CCU of Chittagong Medical College Hospital, a tertiary care cardiac center in the port city of Bangladesh between August, 2014 and July, 2015. AMI was diagnosed when two of the following criteria were fulfilled: (i) typical symptoms of AMI (chest pain, arm or shoulder pain, diaphoresis, dyspnoea, nausea or vomiting and neck or jaw pain) (ii) ECG findings compatible with AMI and (iii) elevated serum troponin -I above upper limit of normal.

Our analytic cohort consisted of 1032 patients with AMI diagnosed by presence of chest pain and evidence of ECG changes and elevated troponin. For analytic purpose we excluded subjects with missing demographic data (n=327) and those with missing time from symptom onset (n=208). We also

excluded study subjects with concurrent acute noncardiac conditions such as stroke, exacerbation of chronic obstructive pulmonary diseases (COPD), acute renal failure, major trauma or fracture, coma, cancer, psychosis (n=173).



**Fig-1:** Study flow diagram.

Patients were classified according to whether the delay between onset of symptoms suggestive of AMI and hospitalization was 12 hours or less or more than 12 hours. The time that elapsed between the onset of symptoms suggestive of AMI and hospital presentation was categorized as follows: <1 hour, 1 to 2 hours, >2 hours to 4 hours, >4 hours to 6 hours, >6 hours to 12 hours, and >12 hours. We compared early and late presenters based on demographics, including age, sex, marital status, location of residence, use of emergency medical transport (EMT), attending nearby primary health center or clinic and employment status. Delay categories were defined a priori clinically making decision about the management of AMI; particularly the use of thrombolytics. Hospital presentation characteristics were compared between the early and late presenters. These included: type of MI (STEMI, NSTEMI), number of anginal episodes in 24 hours prior to admission and frequency of angina over the previous 4 weeks. Other medical history included was: any prior invasive cardiac procedure (PCI, CABG), any prior myocardial infarction (MI), heart failure, prior stroke, diabetes mellitus (DM), hypertension, and history of smoking. Perceptions

of health care by the patients were collected by patient interviews with self administered questionnaires.

Mean and standard deviations were calculated for continuous variables and percentages were calculated for categorical variables. Factors potentially associated with a delay of > 12 hours were examined by using chi-square statistics with p value <0.05 considered as significant. Multivariate logistic regression was used to adjust for covariates and identify independent predictors of late presentation. Logistic regression model used were based on current literature.<sup>8,9</sup> These were: older age  $\geq 65$  years, type of MI, distance traveled from home residence  $\geq 50$  miles, angina episodes  $\geq 2$  in last 24 hours, one or more episodes of angina daily in the prior 4 weeks. A history of prior MI, CHF, DM, hypertension and smoking was also included as a covariate. We included misinterpretation of angina as PUD in the multivariate model based on its high prevalence among the study subjects and potential for delaying presentation. Odds ratio and 95% confidence interval (C.I.) were calculated directly from the estimated regression coefficient and their SEs. Statistical analysis was done with the SPSS software version 18.0.

### Results:

Of the total 1032 study population 365(37.3%) were early presenters and 647(62.7%) were late presenters. Mean age of early presenters was  $48.25 \pm 12.7$  yrs (range 21-70 yrs.) and that of late presenters was  $51.02 \pm 13.76$  yrs (range 26-90 yrs.). There were 265 (68.8%) male and 120 (31.2%) female in the early presenter group and 435 (68.5%) male and 212 (32.7%) female in the late presenter

group. Male: female ratio in the two groups were 2.2:1 and 2.1:1 respectively (p = 0.8). Other demographic parameters are shown in table I.

The time interval from onset of symptoms to presentation to hospital CCU was as follows: 1 to 2 hours 36(3.5%); >2 hours to 4 hours 53 (5.2%); >4 hours to 6 hours 88(8.5%); >6 hours to 12 hours 207(20.1%) and >12 hours 648(62.7%). None of our patients presented within 1 hour. Mean time interval of presentation in early presenters was  $6.8 \pm 3.0$  (range 1.5-12) hours and that in late presenters was  $37.8 \pm 25.1$  (range 13-120) hours. Time interval of presentation is shown in fig.2.

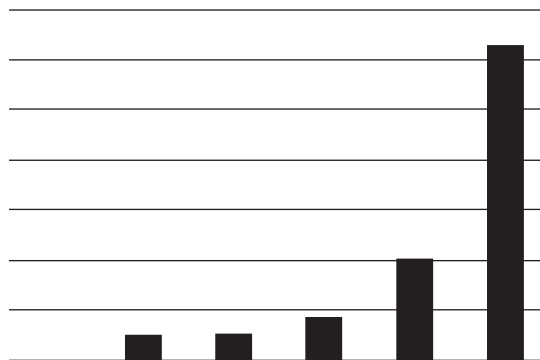
Bivariate comparison of demographic and presentation characteristics between early and late presenters shows that older age, not attending primary health center or clinic prior to CCU admission, distance from home residence  $\geq 50$  miles, unable to use EMT and having one or more angina episode over past 4 weeks of admission are significantly associated with delayed presentation.

Analysis of perception of health care revealed that absence of nearby ECG facility within 10 min, misinterpreting chest pain of AMI as PUD are significantly associated with a late presentation.

Multivariate logistic regression used to adjust for covariates and identify independent predictors of late presentation. When adjusted for other variables, age  $\geq 65$  yrs, distance traveled from home residence  $\geq 50$  miles, not attending PHC/ clinic, angina episode  $\geq 1$  over past 4 weeks and misinterpreting chest pain of AMI as PUD significantly predicted late presentation.

**Table-I**  
*Demographic parameters in early and late presenters (n=1032).*

Parameter	Early	Late	p value
Age	48.25 $\pm$ 12.7	58.02 $\pm$ 13.7	< 0.001
Sex	Male 265 (68.8%) Female 120 (31.2%)	Male 435 (67.3%) Female 212 (32.7%)	0.8
Attendance to PHC/Clinic	328 (85.4%)	292 (45.1%)	< 0.001
Location of residence	Rural 232 (60.4%) Urban 152 (39.6%)	Rural 408 (63.0%) Urban 240 (37.95%)	0.95
Distance traveled from home residence $\geq$ 50 miles	124 (32.3%)	340 (52.5%)	0.16
EMT Used	183 (47.9%)	171 (26.5%)	< 0.001
Employment status(Employed)	176 (71.9%)	384 (59.3%)	0.01



**Fig.-2:** Time interval from symptom onset to presentation at CCU (n=1032).

**Table-II**

*Diagnosis and risk factors of IHD of the study population at presentation (n=1032).*

Presentation	Early Presenter	Late presenter	p value
STEMI	301(78.1%)	415(54.25)	0.27
NSTEMI	84(21.8%)	232(35.8)	
Anginal episode in first 24 hours			0.06
0-1	244(63.5%)	335(51.9%)	
> 2	141(30.5%)	312(48.1%)	
> More than one anginal episode in past 4 weeks	128(33.2%)	334(51.6%)	0.00
Prior MI	92(24%)	140(21.6%)	0.77
Prior stroke	12(3.1%)	32(4.9%)	0.70
DM	96(25.0%)	228(35.2%)	0.11
Hypertension	84(12.9%)	172(26.5%)	0.49
Smoking	284(74.0%)	498(75.4%)	0.50
Prior cardiac procedure (PCI,CABG)	28(7.3%)	48(7.4%)	0.97

**Table-III**

*Perception about health care among the study subjects (n=1032).*

Perception of Health Care	Early	Late	p value
Nearby ECG facility within 10 min available	48(12.5%)	532(82.1%)	0.00
Nearby PHC/clinic available	248(64.6%)	408(63.6%)	0.89
Misinterpreting chest pain as PUD	48(12.5%)	532(82.1%)	0.00
Leveling MI as stroke	228(59.4%)	432(66.7%)	0.29

**Table IV**

*Multivariate logistic regression factors predicting late presentation (n=1032).*

Predicting Late Presentation	Odds ratio (95% C I)	p value
Age $\geq$ 65 years	1.59(1.35-1.86)	0.00
Distance travelled $\geq$ 50 miles	1.35(1.12-1.62)	0.00
Attending PHC/clinic	0.54(0.45-0.65)	0.00
Anginal episode > 2 in last 24 hours	1.19(0.99-1.43)	0.06
Anginal episode > 1 over past 4 wks	1.31(1.09-1.58)	0.00
Misinterpreting MI as PUD	3.57(2.6-4.9)	0.00
Prior MI	0.95(0.75-1.2)	0.66
Prior heart failure	1.06(0.84-1.33)	0.60
Smoking	1.1(0.86-1.39)	0.41
DM	1.18(0.98-1.43)	0.08
Prior cardiac procedure	1.00(0.70-1.4)	0.97

**Discussion:**

The present study was done on Bangladeshi patients to evaluate various factors potentially related to delayed hospital presentation in AMI. Although several investigators have studied on the factors responsible for patient delay in AMI, comparison is difficult because of difference in study design, inclusion criteria, demographic and clinical characteristics.<sup>9</sup> Bivariate comparison of demographic and clinical characteristics showed that older age, having STEMI, distance traveled  $\geq 50$  miles from home, not using EMT and having one or more anginal episode over past 4 weeks of admission were significantly associated with late presentation. These findings are similar to that of other studies.<sup>10,11</sup> A significant number of our early presenters used EMT. Previous studies have suggested that a patient's decision to call physician increases the delay to hospital admission.<sup>15,16</sup> These, along with self treatment with rest or medication and an extended process of decision making in which the patient seeks the help of a physician or family member before obtaining hospital care contributes to prolong delay in seeking hospital care. We did not find any significant difference between early and late presenters regarding presence of co-morbidities, such as stroke, DM, hypertension and smoking. Peterson et al<sup>12</sup> in their study on veterans found a higher prevalence of many co morbidities including diabetes and stroke. Comorbid conditions have been associated with atypical symptoms of AMI leading to increased delay among general populations.<sup>13</sup> We did not find such relationship in our patients. This finding is also consistent with the findings of a study done on veterans where despite higher comorbidities among the veterans, no relationship has been found.<sup>14</sup> Absence of nearby ECG facility within 10 min was found to be significantly associated with late presentation in our patients. Underuse of emergency medical services resulting in delayed hospital presentation of AMI was also found in other studies.<sup>17</sup> ECG is the single most important source of data in AMI; failure to perform and interpret ECG correctly is recognized as the most important factor in clinical practice causing delay and inappropriate management. Vast majority of our late presenters misinterpreted their chest pain as peptic ulcer pain (82.1% vs 12.5%,  $p < 0.0$ ). Thus they received self

medication with antiulcer drugs that led to patient indecision regarding seeking urgent medical help. Patient indecision causing delayed hospital presentation was also found in a study from Washington where the patient did not perceive their symptoms to be severe enough to call 911 and ask for medical help, though none of these patients misinterpreted their chest pain as peptic ulcer pain.<sup>18</sup> Among our general people, perception of chest pain as of peptic origin leading to self medication with antiulcer agents may be related to the commonness of PUD among the people and easy availability of over the counter antiulcer drugs. Lack of public awareness of the increasing incidence of coronary artery disease in Bangladesh is also an important factor that is responsible for the frequent misinterpretation of such chest pain symptoms leading to delay in seeking medical help. Patient education alone, in reducing the delay of presentation of AMI patients to hospital has not been proved to be effective.<sup>19</sup> Meisehke et al<sup>18</sup> have suggested that measures on increasing knowledge on sign and symptoms of AMI are not enough in this regard. Rather interventions for rapid activation of emergency medical system and attention at components leading to increased patient confidence in dealing with AMI symptoms need attention. Our findings have several implications for implementation of actions to reduce the delay in our patients. Thus our suggestions to reduce the delay are: (i) targeting vulnerable populations, such as elderly, that are late presenters (ii) activation of emergency medical services such as, EMT, performing and interpreting ECG at earliest possible time (iii) generate awareness among persons with established cardiac risk factors and need for prompt response to symptoms (iv) factors leading to patient self confidence in dealing with the symptoms (v) cardiotelemetry, that allow transmission of ECG signals to an expert to facilitate triage.

**Limitation of the study:**

This is a single center study. Hence, our study population may not represent the population at large who have had AMI. In addition, exclusion of subjects with concurrent noncardiac conditions may have biased our cohort towards much healthier patients. Outcome measures reported by the patients may be subjected to patient recall bias.



**Conclusion:**

Sixty two percent of our AMI patients are late presenters. Age  $\geq 65$  years, home distance from hospital  $\geq 50$  miles, one or more angina episode over 4 weeks and misinterpreting pain of AMI as PUD were independently associated with delayed presentation.

**Conflict of Interest - None.****References:**

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