Factors Influencing Pre-Hospital Delay In Patients with Acute Myocardial Infarction

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Abstract:
Acute coronary syndrome is a lethal condition. Treatment modality and success mostly depend on time yielded since onset of symptoms. It is known for more than 30 years that delay between symptom onset and treatment of less than 60 min are desirable, but pre hospital delays remain unacceptably long worldwide including Bangladesh. A greater understanding of the contributing factors may help to reduce delays. A number of sociodemographic, clinical, social and proximal factors have been associated with pre hospital delay. The total pre hospital delay period consists of two component: time taken by patients to recognize that their symptoms are serious and to contact medical help (decision time) and the time taken from requesting help to admission where emergency coronary care is available (time to hospital delay). Different factors may affect these two components. In hospital delay also known as door-to-treatment, is defined as time from arriving to hospital to initiation of reperfusion therapy. Regardless of how to shorten in hospital delay, if the pre hospital delay is not reduced, then reperfusion therapy cannot achieve the best results. We set out to discover what factors are specifically associated with three components: decision time, home to hospital delay and First Medical Contact (FMC) to revascularization delay. This review may help the National health management system to identify the factors associated with treatment delay in ACS and thus reduces ACS related morbidity and mortality.

Key words: Acute Myocardial Infarction; Pre hospital delay; Factors

Introduction:
Acute myocardial infarction is a dangerous disease with a high mortality rate. For AMI patients, the fate of the heart and the patient’s life depends on time to beginning of effective treatment in addition to other factors such as severity of disease and involved vessels etc.1 The key factor is whether reperfusion therapy is started timely after the onset of symptoms, and the benefit of reperfusion therapy depends on the time.2 Guidelines emphasize the need to minimize reperfusion delay time for patients with acute myocardial infarction.3 Delay before the initiation of reperfusion therapy for AMI can be divided into two distinct time periods: pre-hospital delay and in-hospital delay. Pre-hospital delay is the time from onset of symptoms to arrival to the hospital. In-hospital delay, also known as door-to-treatment, is defined as the time from arriving to the hospital to the initiation of reperfusion therapy.1 Pre-hospital delay can be divided into two time periods: patient delay (PD) time and transportation delay (TD) time. Patient delay is time from the onset of symptoms to making the initial decision to seek for professional healthcare facility, and transportation delay is the time from making the initial decision to seek professional healthcare facility to arrival at the hospital.4 Pre-hospital delay is mainly caused by the patient’s own decisions and is much longer than in-hospital delay and the time needed to decide on initiating reperfusion therapy.5 Regardless of how to shorten in-hospital delay, if the pre hospital delay is not reduced, then reperfusion therapy cannot achieve the best results.6 However, patient delay time, which accounts for 75% of the total pre-hospital delay time,3 has not changed in the past 10 years.8,9 Thus, reducing patient delay time is very important for AMI patients.10 The median interval between reported onset of symptoms and hospital admission is 5 hours.

Objectives:
This review study evaluated the cause of pre hospital delay either as decision time delay, home to hospital delay and first medical contact (FMC) to revascularization delay and also evaluated the factors associated with this delay.
Rationality of the review

Data related to ischemic heart disease (IHD) and prehospital delay in Bangladesh are insufficient, suffer from statistical flaws and are not readily available. Few articles were published in national, non-indexed journals, which are not available online and difficult to procure. Recognizing these limitations, the present review has been planned to compile the available data on this important public health issue. This review will hopefully encourage future research and act as an important source of information.

Methods:
Cross sectional analytical study.

Factors Influencing Pre Hospital Delay

1. Age
Increased age has been associated with a longer prehospital delay in many studies. This may be explained by the following several reasons: (1) The elderly have reduced physiological function and a lower ability to perceive pain. (2) Older patients are more likely to have atypical symptoms compared with younger patients and have more comorbidities, which may result in a delay for seeking medical care and limit their correct recognition of warning symptoms. (3) The elderly have insufficient perceptions of AMI and do not want to trouble the family with their symptoms, and thus, the actual rescue time will be longer. However, other researchers could not find a statistically significant result for the effect of age on delay.

2. Gender
Female gender was a significant variable in predicting delay. Female patients with AMI had a prolonged decision-making process compared with males. There are several potential explanations for this finding: (1) The incidence of AMI for males correspond to that of older females. Older female patients often have other chronic diseases, which is a disadvantage for them in terms of their medical care and treatment. (2) Females are more likely to have atypical symptoms compared with males, making females less apt to interpret their symptoms, such as being related to a heart attack. (3) Females appear to have a belief that AMI is a “male” disease and that they are associated with a lower risk of AMI. In contrast, other studies have not found significant gender differences.

Age and gender can affect each other. The elderly have a large gender difference for pre-hospital delay, and older females delay significantly longer than males; however, the reason may be because the incidence of heart disease of women corresponds to that of men who are 10 years younger.

3. Marital status
Single, widowed or divorced patients have a longer delay time for seeking care compared to patients who are married. The reason may be that there is no one to consult immediately. Among males, married or common law status was strongly associated with earlier health-seeking behaviour in the setting of acute myocardial infarction. Among females, married or common law status was not associated with a similar reduction in delay before seeking medical attention. However, a study reported that marital status is not associated with pre hospital delay.

4. Previous history
Patients with a history of diabetes, hypertension or angina pectoris have been found to delay longer than those without these conditions. However, several studies have reported that patients with prior AMI delay less, but many others did not find any association between delay and history of AMI.

5. Health insurance
Patients with health insurance have a shorter delay than those without insurance.

6. Economic level
Several studies have reported that the economic level is associated with pre-hospital delay, e.g., patients with a higher income have an earlier presentation for care.

7. Education level
Low-education levels were a significant determinant of longer pre-hospital delay.

8. Living condition
Living alone was an independent predictor of longer delay time.

9. Race
Minorities who were more likely to have specific cultural health beliefs and perceptions related to medical behaviour were associated with a significantly longer delay.

3. Symptoms
3.1. Types
The classic symptoms of an AMI include chest pain, but some investigators found that 20%-33.3% of patients with AMI did not experience central chest pain at all.
3.2. Intensity
Increased symptom intensity and having fast onset symptoms (symptoms that develop rapidly) were associated with a shorter pre-hospital delay.6,21,22,40

3.3. Duration
Having continuous symptoms predicted a short pre-hospital delay6 and having intermittent symptoms predicted a longer delay.29

4. Contextual factors
4.1. Time when the symptoms occur
Having symptom onset at night was associated with a longer pre-hospital delay.41 There may be no other person available to help at night, and thus, the patients did not want to trouble others and planned to seek healthcare during the daytime. Another reason may be that it is difficult to find a way of transportation and a person to help at night.53

4.2. Location where symptoms occur
Being home21 or in a public place21 when symptoms began resulted in a longer delay to treatment. However, one study found no significant differences between early and late responders with regard to location of where the symptoms began.42

4.3. Whether there is a bystander when the symptoms occur
Patients who experienced symptoms alone had longer delays compared to patients who had company.22 Having someone present when the symptoms occur can not only reduce fear but also lead to a responsible decision regarding treatment and thus a shorter pre-hospital delay.43

5. Cognitive and affective factors
5.1. Symptom factors
5.1.1. Symptom identification
The patient’s correct identification of symptoms was an important predictor for delay time.44 Patients who experienced symptoms that are different from those expected to be associated with AMI delayed care, and patients who correctly recognised the symptoms of AMI experienced less delay.29

5.1.2. Symptom attribution
Patients who thought that their symptoms were heart related sought treatment faster than individuals who did not relate their symptoms to a heart problem.21,22,45

5.1.3. The perception of severity and susceptibility
Lack of perceived seriousness of symptoms6,46 and lack of perceived susceptibility to heart disease47 were associated with a longer delay.

5.1.4. Perceived control symptoms
Patients who perceived being able to cope with or control symptoms were associated with an increased delay.21,46

5.1.5. Knowledge related to AMI
Being able to recognize the importance of a short delay when experiencing an AMI was associated with a significant delay when deciding to seek treatment.22

5.2. Affective factors
5.2.1. Fear
Fear of the consequences can significantly shorten the patients’ decision time.22

5.2.2. Denial of AMI
Denial is a self-defence mechanism toward illness because people tend to reject ideas that are associated with potentially unpleasant experiences or feelings.48 Thus, denial is a common reaction among patients with signs of AMI43,49 and can cause considerable pre-hospital delay.50

5.2.3. Fear of troubling others.
Longer pre-hospital delay was perpetuated by the fear of troubling other family members.51

6. Behavioural factors
6.1. (Calling) consulting others
There are two scenarios. First, calling or visiting the primary care provider (PCP), usually in foreign countries, was associated with a substantially long pre-hospital delay.6 The potential reason is that the consultation process itself is very time-consuming. However, telling members, friends or colleagues may play a crucial role in helping the victims to overcome their fear of the disease or denial about their symptoms, which occurs more commonly in China, and the patients experienced a shorter delay.6,10,52

6.2. Self-treatment
Self-treatment with drugs or rest can lead to a long pre-hospital delay.53

6.3. Transportation
This factor is mainly divided into calling for ambulance transport and self-transport. Patients choosing ambulance transportation reduced their pre-hospital delay
time. However, patients choosing self-transport delayed treatment due to the lack of timely treatment. The most frequent reason for not choosing an ambulance was that the patient did not perceive the symptoms to be sufficiently serious to merit a dramatic action, such as calling the EMS. The second most common reason for not choosing ambulance transport was that the patients believed that self-transport would be faster. The last reason was that the patient became aware of the fact that the ambulances are only a mode of transport and did not understand the capability of paramedics.

7. Clinical parameters and risk factors
7.1. Severity – Patients in cardiogenic shock after cardiac arrest arrive at the hospital sooner than others. For these patients, the acute medical situation is so dramatic as to leave no room for subjective ambivalence. On the other hand, severity parameters such as the size of the infarct, enzyme values, ejection fraction, the number of occluded arteries, and the vital signs do not seem to affect the PHT significantly.

7.2. Hypertension is associated with a longer PHT, with a median of 2.2 hours as compared to 2.0 hours in normotensive patients. Three studies with smaller case numbers revealed no significant difference. One reason for this may be a less sensitive perception of pain in patients with hypertension as a risk factor for myocardial infarction.

7.3. Diabetes – With few exceptions most studies have indicated that diabetes significantly predicts a longer PHT. This may be due to the suppression of pain by diabetic neuropathy.

7.4. Smoking – In three larger studies involving more than 2000 patients each, smokers had significantly shorter prehospital times than non-smokers. The reason for this is perhaps that the risk of myocardial infarction among smokers has been well publicized by the media.

The potential influence of body-mass index, hypercholesterolemia and physical activity on prehospital times has only been investigated in the GREC study, no significant effect was found for any of these factors.

8. Pre-existing heart disease
8.1. Angina pectoris – Patients with a prior history of angina pectoris tend to have a longer prehospital time. Apparently, these patients have more difficulty identifying and attaching the proper significance to the chest pain of myocardial infarction. The ARIC study, however, found no effect of angina pectoris on the PHT, and the NRMI-2 study and that of Kentsch et al even found that patients with prior angina pectoris arrived at the hospital earlier than others.

8.2. Previous myocardial infarction – Though one might imagine that patients who have previously sustained a myocardial infarction would arrive at the hospital more quickly in the event of reinfarction, this is by no means necessarily the case. The MITRAplus study and a Swedish study with more than 2000 patients showed no difference in PHT between patients with a first infarction and patients with a reinfarction. In the first study period of the Worcester Heart Attack Study (1986–1990), patients with reinfarctions actually took longer to get to a hospital (odds ratio 1.6 for a more than six-hour delay, as compared to patients with a first infarction). A Danish study came to the conclusion that patients with a reinfarction have a markedly shorter PHT, while patients with a previous mechanical revascularization procedure interpreted their symptoms correctly but nevertheless had significantly longer decision times.

8.3. Previous revascularization or bypass operation – In most studies, these patients were found to arrive at the hospital sooner than others perhaps because of the sensitization of their families and treating physicians by the previous events.

Discussion:
On both the national and the international level, the prehospital time (PHT) is the most important factor leading to a temporal delay in the initiation of treatment for acute myocardial infarction. The studies that have been performed to date show that the most important factors influencing the PHT are the sex and age of the patient and the patient’s misinterpretation of the symptoms. Empirical data on the effect of psychological mechanisms and coping strategies remain scarce at present.

One cannot yet draw a clear risk profile for “latecomers” that would be of use in everyday clinical practice and in patient education. There is still no theoretically well-founded and empirically confirmed basis for understanding patients’ decisional behavior thus predicting their actions. There is a consensus, however, that general knowledge about the typical symptoms of heart attack is a necessary foundation of prevention but still does not suffice to prepare patients adequately for an acute crisis.

In the future, the psychosocial and economic conditions of the population will have to be considered more closely, patients at high risk will have to receive greater individual
attention, and more sex-specific patient education will have to be provided. Preventive action will have to be tailored more specifically to the groups that are most at risk. It would be desirable to develop predictive algorithms for decisional behavior in groups with well-defined identifying features (e.g., age <60; female sex; anxious avoidant behavior style), so that individualized prevention strategies could be offered. A further opportunity to avoidant behavior style), so that individualized prevention strategies could be offered. A further opportunity to

identification of the prodromalphase of acute myocardial infarction. In the days preceding the acute event, many patients suffer increased irritability, depressive mood, unexplained fatigue, or anxiety. Physicians consulted because of such symptoms should think of the possibility of an impending myocardial infarction and take the corresponding steps to inform the patient about what to do in case this happens.

Conclusion:
Factors influencing pre-hospital patient delay for patients with acute myocardial infarction vary, and many research results are also contradictory regarding factors such as age, gender, and previous myocardial infarction. In addition, there are some interplay factors, such as between age and gender, gender and marital status, and cognitive and affective factors on the behavioural reaction. Nevertheless, predicting factors that could lead to delay using investigations of different populations could provide a reference to help professional medical care providers to developsome strategies to reduce the delay time. Well-designed future studies are needed to better understand the influencing factors related to patient delay and to resolve the controversy surrounding these associations. In addition, targeted intervention measures have been undertaken according to these factors with the goal of reducing the extent of pre-hospital delay in patients with signs and symptoms of AMI.

Conflicts of interest
All the contributing authors declare no conflicts of interest.

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