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# The importance of cardiac triage for patients with cardiovascular Disease

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ABSTRACT

Coronary heart disease is the leading cause of death (20%) in most industrialized countries. In Iran, also, cardiovascular diseases are among the major causes of death, especially between 55 to 79 years old people with 50% prevalence Triage of cardiac patients is challenging as regardless of intrinsic complications of diagnosing cardiac complaints, triage of patients in emergency departments is generally associate with a degree of undertriage. In other words, when a triage nurse assigns a patient a lower acuity triage level, she/he will fail to properly diagnose the criticality of the patient's condition. Considering the factors associated with delays in this study, it is recommended to offer necessary training to patients with heart ischemic symptoms, enhance patient's information about the role of time in improving disease prognosis, and the time limit of prescribing the said drug. This study demonstrates the importance of time in starting treatment in myocardial infarction patients.



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## INTRODUCTION

Coronary heart disease is the leading cause of death (20%) in most industrialized countries. In Iran, also, cardiovascular diseases are among the major causes of death, especially between 55 to 79 years old people with 50% prevalence (Iserson, K.V., J.C. Moskop, 2007; Chipman, M., *et al*., 1980; Idoguchi, K., Y. Mizobata, *et al*., 2006). Chest pain is the second most common cause for emergency department visits. Yet, its diagnosis is a complicated issue and a most difficult challenge for emergency physicians. Despite the availability of modern diagnostic tools, 5% of acute myocardial infarction and 6.4% of unstable angina cases are diagnosed incorrectly; on the other hand, 60% of the hospitalizations are unnecessary, due to the incorrect diagnoses (Idoguchi, K., Y. Mizobata, *et al*., 2006; Nocera, A., 2000; Beidel, Eric., 2010; Lakha, Raj; T. Moore, 2006). About 8% of the patients with chest pain, hospitalized in the emergency department, are discharged mistakenly, which not only increases the chance of death in them by 4 times but also makes them revisit the hospital after a few hours or days. Another study reported 10-15% wrong diagnosis in the patients with chest pain visiting emergency department, making them to revisit the hospital within 30 days for acute coronary syndrome, which is associated with several legal and economic consequences (Beidel, Eric., 2010; Lakha, Raj; T. Moore, 2006; Medical Surge Capacity and Capability, 2008). These studies show how much the identification and diagnosis of heart disease can be difficult. It can result in non-detection of the disease and delay in the administration of an effective treatment (Husted, E., 2011).

*The Importance of Proper Triage:*

Proper triage is the key of success in an emergency department. In case of selecting an improper triage level, due to misunderstanding or ignoring patient's variables or triage measures, a triage nurse may commit an error. Error in triage decisions may be made by assigning a patient a lower acuity triage level (i.e. undertriage), wasting his/her time or worsening his/her condition (National Disaster, 2008). Neglecting a risky situation and lack of proper interpretation of vital signs are the main reasons of undertriage (Gabor, D., *et al*., 2009). It prolongs diagnosis and treatment which may lead to different consequences such as death. Undertriage in the emergency department can have side effects for the patients during hospitalization; thus, reducing the

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**Advances in Natural and Applied Sciences, 8(15) December 2014, Pages: 42-46**

undertriage rate is among the fundamental objectives in the emergency ward. (Turegano-Fuentes, F., D. Perez-Diaz *et al.*, 2008)

*The Importance of Triage for Patients with Heart Disease:*

Triage of cardiac patients is challenging as regardless of intrinsic complications of diagnosing cardiac complaints, triage of patients in emergency departments is generally associate with a degree of undertriage. In other words, when a triage nurse assigns a patient a lower acuity triage level, she/he will fail to properly diagnose the criticality of the patient's condition. Mirhaghi *et al*. showed that the rate of undertriage report in nurses' decisions was 8.5% (National Disaster, 2008). Kamrani *et al*. (2013) demonstrated that this rate could rise to 23.7% (Turegano-Fuentes, F., D. Perez-Diaz *et al.*, 2008). This rate of undertriage diagnosis, which adds the problems caused by delay in detecting the patient's problem to the complications in diagnosis a cardiac patient, accentuates the high possibility of ignoring intensity of cardiac patient by triage nurses (Ebadi, Ahmad, *et al*. 2014; Firoozabadi, Mehdi Dehghani, *et al*. 2014; firoozabadi, mehdi dehghani, and A. ebadi, 2014).

*The Importance of Evidence Based Measures in Heart Patients:*

On the other hand, studied have shown that triage nurses rely on their beliefs, knowledge, and experience in making triage decisions for cardiac patients. This reveals the necessity of evidence based measures that help triage nurses in their decisions. On the other hand, high rate of young nurses working in emergency departments doubles that importance. Arsalanian (2009) emphasizes the risk of bias and stereotyping decisions in triage of cardiac patients, which delay the administration of proper treatment (Gabor, D., *et al*., 2009). He showed that triage nurses are barely capable of making proper decision for hospitalization or discharge of patients visiting for triage (Firoozabadi, Mehdi Dehghani, *et al*. 2014). Arsalanian *et al*. also showed that the triage nurses' decisions could be improved with the application of evidence based interventions (Ebadi, Ahmad, *et al*. 2014; firoozabadi, mehdi dehghani, and A. ebadi, 2014; Code Orange Plan, 2008; "Chapter 2008). These studies suggest how much triage of cardiac patients can be challenging and increase the probability of undertriage diagnosis. Therefore, rapid and accurate detection can considerably contribute to therapeutic goals including thrombolytic therapy, reperfusion, transmission of less risky patients to other appropriate parts of the hospital, and avoiding improper discharge of patients with myocardial infarction. Administration of thrombolytic therapy 90 minutes after the onset of symptoms can minimize the rate of mortality; while, the chance of preventing its complications rapidly reduces one hour after the onset of the symptoms. In addition, the majority portion of myocardial cells dies six hours after the onset of symptoms, which per se greatly decrease the effect of thrombolytic drugs and acute emergency measures (Idoguchi, K., Y. Mizobata, *et al*., 2006). Therefore, delay in the administration of thrombolytic therapy is taken as an important matter, which indeed may cause such complications as cardiogenic shock, right ventricular infarction, Premature Ventricular Contractions, fibrillation, ventricular tachycardia, arrhythmias, pericarditis and thromboembolism. ("Medical Surge Capacity and Capability" 2008). It is worth noting that during busy periods in the emergency department, delay in the administration of treatment is highly probable; thus, American Heart Association has recommended an initial electrocardiogram (ECG) within 10 minutes of arrival in the emergency department (ED) for the patients with suspected acute coronary syndrome. A study by Jabbari *et al*. (2011) showed that the average waiting time for final examination for triage screen by physician was 8'39". The waiting time from making physician's order to reading ECG by a physician to taking ECG in ED was 53'11". In another study, the time interval between the triage and examination by a physician has been reported as 22 minutes ("The Field Triage, 2008). Such delay, relative to the recommended standard time, in seeing cardiac patients has also been reported in foreign research. The majority of cardiac patients experience undesirable waiting time (57' instead of 30'); therefore, it seems that the identification and correction of factors involved in triage and hospital emergency can contribute to the reduction of this delay (Slater, R.R., 1970).

*The Nature of Triage Measures:*

For this purpose, triage measures were designed with initial aiming of reducing delay in caring high risk and seriously ill patients visiting ED (2, 3, 7, 8, and 9). The real essence of those measures is to distinguish between patients who are in need of urgent care from those who can wait with no consequences (Lakha, Raj; T. Moore, 2006). Triage is a hierarchical decision making process in which the patient is classified based on the severity and acuity of the disease relative to other patients in the same ward. It is an important concept in ED, which is used as a strong managerial measure in the provision of medical services to emergency patients (Burstein, Jonathan L., D. Hogan, 2007). In this regard, some standardized triage measures have been designed in such countries as Australia, New Zealand, Canada, England, and USA in the past two decades, which operate based on the severity and intensity of the patient's condition (Aacharya, R.P., *et al*., 2011).

**Advances in Natural and Applied Sciences, 8(15) December 2014, Pages: 42-46**

*Emergency Severity Index (ESI) Triage System:*

Currently, for the triage of patients in the emergency department, the ESI triage system is used which has 5 levels based on the severity of disease and required facilities. The role of nurse in this system is to identify the patient's condition based on the ESI algorithm. The emergency severity index triage considers the overall condition of the patient and has no guidelines for considering risk factors for heart diseases. This decision is assigned to the nurse, so it can increase the likelihood of bias in the triage of cardiac patients, leading to a light triage (20). In fact, as mentioned, the current triage system (ESI) is general and acts uniformly in dealing with all patients. It has limited the identification of high risk heart patients to the personal information of the nurse and has defined no guidelines specifically for rapid identification and timely onset of specific therapy for heart patients.

*A review on studies by other researchers:*

Graf *et al*. (2000) carried out a study entitled "Setting treatment priorities for patients for rapid ECG (5 minute)." It aimed to determine a rule to identify patients who need a rapid ECG and to avoid delays in the treatment of myocardial infarction patients. The study was performed on 193 patients who referred to the emergency department of the Britain General Hospital with a diagnosis of myocardial infarction within 4 years. Patients referring to the emergency department were initially evaluated by the nurse who determined the treatment priority so that patients with critical and emergency problems were identified and examined by a doctor. Information about the patients during or immediately after the delivery of services to patients was recorded in the electronic system of the department. The research results identified three main causes of delay: 1. delays in obtaining information, 2. delay in decision-making, and 3. delays in receiving medication. Delays in decision-making were resolved by creating a list of criteria for doing the thrombolytic therapy. Delays in receiving medication were resolved by using a trolley in which medicines and equipment associated with thrombolytic therapy were held. Finally, the ECG acceleration rule was developed and became operational in the emergency department of the hospital. Information necessary for the preparation of this rule was obtained from electronic databases of the emergency department. Information was analyzed by SPSS. The results showed that after application of this rule, average delay in taking ECG for myocardial infarction patients for whom rapid thrombolytic therapy was initiated decreased from 10 to 6.3 minutes and the average delay in the rapid injection of thrombolytic decreased from 36.9 to 26.1 minutes. Thus the application of rapid ECG rule can reduce the delay in the ECG and thrombolytic therapy in myocardial infarction patients. Sanchez *et al*. (2006) conducted a study entitled "Flowchart of determining treatment priority for the prevention of acute coronary syndrome." It aimed to create a flowchart for determining treatment priority for the prevention of acute coronary syndrome in patients who suffered from chest pain at entry to the emergency department. The study was performed on 1000 patients with chest pain. All patients who were older than 18 years and complained of chest pain were studied(22). After initial clinical evaluation and making the first ECG, patients were divided into 4 groups by a physician:

1. Myocardial infarction patients with increased ST segment for whom thrombolytic therapy or rapid PCA is done.
2. Acute coronary syndrome patients without increased ST segment. These patients stay in the emergency cardiac care unit and treated.
3. Patients with suspected acute coronary syndrome
4. Patients complaining of chest pain, without cardiac cause

After a month of protocol implementation, patients were divided into 2 groups: patients with real and unreal acute coronary syndrome. To determine these groups, one month after the examination, patients were called and carefully asked about chest pain. If they re-experienced chest pain, they were placed in the real acute coronary syndrome group, otherwise, in the possible coronary syndrome group. The results showed that variables that were significantly correlated with patients without acute coronary syndrome had been included in the treatment priority flowchart. These variables included the age of 40 years (likelihood ratio of 3.61, CI %95, 1.63-7.99), absence of diabetes (2.74, 1.53 - 4.88), with no prior coronary artery disease (5.42, 3.42 - 8.71), unbearable pain (1.63, 1.53 - 4.88) and with no sternum pain (5.16, 2.82 - 9.42). The accuracy and positive predictive value of the treatment priority flowchart was 100% in the prevention of acute coronary syndrome. Thus the treatment priority flowchart can accurately identify patients complaining of chest pain who did not have acute coronary syndrome.

This study is very important because it explains the need to the cardiac complaints algorithm triage and uses its inclusion and exclusion criteria. Hosseinian *et al*. (2012) conducted a study entitled "The time between the onset of clinical symptoms and receiving streptokinase in patients with acute myocardial infarction in the Imam Khomeini Hospital of Ardabil." This sectional study was performed on all patients who referred to the Imam Khomeini hospital of Ardebil with chest pain symptoms. The clinical history, ECG, interview and questionnaire were used for data collection(23). The ECG was taken for all patients suspected of myocardial infarction based on clinical history and physical examination. Patients with STEMI were treated with streptokinase in case of the

absence of relative and absolute contra indications. The information about age, gender, education, age of onset of symptoms, referring to the hospital, time of receiving streptokinase, previous history of heart disease, contraindications and the effects of streptokinase was obtained and entered into SPSS and analyzed using T-TEST. Of 150 studied patients, 111 people (74%) were men and 39 people (26%) were female. The mean interval between the onset of symptoms and receiving streptokinase was 8 hours and 27 minutes and the standard deviation was 8 hours and 18 minutes(24). Only 45 patients (41%) eligible for treatment with streptokinase received the drug in the ideal time (less than 3 hours after symptoms). The main cause of delay in starting treatment was delays in decision-making and pain tolerance by the patient 56 (61%). Distance with 20 patients (22%), delays in the transfer to the CCU with 12 patients (13%) and rapid diagnosis of the physician with 4 patients (4.3%) ranked next. The male sex and living in the city were associated with a more rapid onset of treatment. However, education level, age, and history of previous MI had no correlation with the onset of treatment(25).

*Conclusion:*

The results of reviewing previous research showed the majority of myocardial infarction patients received streptokinase at an interval longer than three hours of onset of symptoms. Considering the factors associated with delays in this study, it is recommended to offer necessary training to patients with heart ischemic symptoms, enhance patient's information about the role of time in improving disease prognosis, and the time limit of prescribing the said drug. This study demonstrates the importance of time in starting treatment in myocardial infarction patients.

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**Advances in Natural and Applied Sciences, 8(15) December 2014, Pages: 42-46**

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