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Review Article

TIME IT TAKES FOR AN ECG IN CHEST PAIN RELATED EMERGENCIES IN EMERGENCY DEPARTMENT: CLINICAL AUDIT AND REVIEW OF CURRENT GUIDELINES

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ABSTRACT

Background/ Aim: Chest pain is the second cause of Emergency Department (ED) visit in the United States with almost six million ED visits annually. According to the guidelines, first ECG for a patient presenting with chest pain should be done within a 10-minute period of the patient arrival. This clinical audit aims to evaluate the time needed for a patient with chest pain to have an ECG performed.

Methods: This clinical audit was done at Al-Qasmi Hospital in Sharjah, United Arab Emirates. All ECGs records, from 1st July 2016 to 2nd November 2016, were collected from the reception desk at the ED. The time of triage room and the first ECG's time were recorded.

Results: Twelve thousand ECGs had no personal information, nor medical record number and, thus were excluded. 28 patients (20%) had chest pain. Other complaints included dizziness, shortness of breath, palpitations, and others. 18 patients (72.0%) had their first ECGs performed within 10 minutes of triage room entry. The mean of patient presentation-to-ECG time was 14:45 minutes (+/- 4:29 minutes).

Conclusion/ Recommendation: The mean of patient presentation-to-ECG time for patients with chest pain was beyond the recommended timeframe. Therefore, some interventions might be needed. First of all, the exact time of patient's arrival to ED should be recorded. Also, ECGs records should have patient identification, and later documented and archived properly. Also, staff education about the guidelines and indications of ECG at triage room might be helpful.

INTRODUCTION

Chest pain is the second cause of ED visit in the United States with almost six million ED visits annually Mensah, G. & Brown, D. (2016). Patient present with a range of symptoms reflecting many etiologies such as heart, aorta, lung, and upper GI pathologies Evaluation of the adult with chest pain in the emergency department. (2016).

The primary focus of ED clinicians is to rule out life threatening conditions such as ST elevation myocardial infarction (STEMI), which could be excluded by doing an Electrocardiogram (ECG). Glickman *et al*. proposed the following criteria for high-risk STEMI patients to be evaluated with ECG Glickman, S *et al* (2012):

1. Patients over 30 years old with chest pain.
2. Patients over 50 years old with dyspnea, altered level of conciseness, upper extremity pain, syncope, or weakness.
3. Patients over 80 years old with abdominal pain, nausea or vomiting.

Up to our knowledge, the time of high-risk patient arrival to the ED till the time of the first ECG done can significantly affect the ED team adherence to the recommended guidelines and improve the patients' outcomes which were shown by Hutchison *et al*. In this clinical audit, we aim to investigate the ED team efficiency in regards to the time of the first ECG in high-risk patients and the subsequent response accordingly.

The American Heart Association (AHA) guidelines recommend performing a 12-lead Electrocardiogram (ECG) within 10 minutes of arrival for patients with chest pain (or other symptoms suggestive of Acute Coronary Syndrome) at the ED 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes. The capacity of ED and crowding may delay performing an initial ECG and result in delayed care and management Schull, M. J *et al* (2004).

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METHODOLOGY

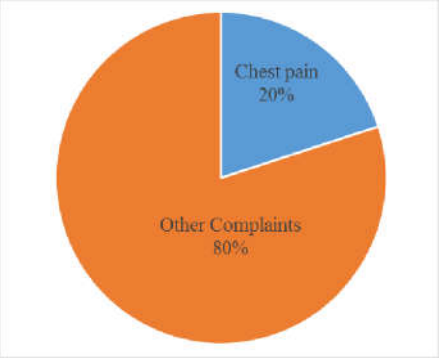
This clinical audit was done at Al-Qasmi Hospital in Sharjah, United Arab Emirates. All ECGs records were collected from the reception desk at the ED. These records were for patients from 1st July 2016 to 2nd November 2016. ECGs that lacked personal details and Medical Record Number (MRN) were discarded. The audit included all adult patients who presented to the ED with chest pain. We recorded the time at which patients entered the triage room and the time at which first ECGs were done. The time difference was analyzed.

RESULTS

Study population

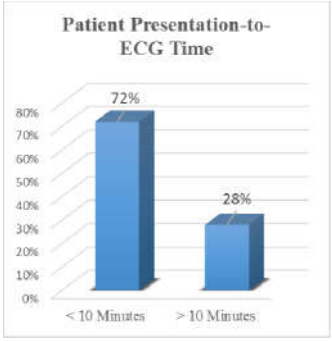
Twelve thousand one hundred and forty ECGs were done from 1st July, 2016 to 2nd November 2016 were reviewed, of which twelve thousand were excluded due to lack of MRN on the ECG. Among those excluded, ECGs performed in July, August, and early September were found to be performed earlier than the triage time.

Out of the one hundred and forty left, 28 were done to patients who presented with chest pain (20%), while the rest of the ECGs were done for patients presenting with other complains including dizziness, shortness of breath, and palpitations. 20 patients were males (71.4 %) and 8 were females (28.6 %).



Patient Presentation-to-ECG Time

Out of the 28 patients presenting with chest pain, one ECG was excluded because the patient refused initially, and two other ECGs were also excluded because the first ECG was not found. Therefore, a total of 25 ECGs were studied. 18 patients had their initial ECGs performed within 10 minutes (72.0 %), whereas seven patients had it completed after 10 minutes (28.0 %). The mean time for performing an initial ECG for a patient presenting with chest pain was 14:45 minutes (+/- 4:29 minutes).



DISCUSSION

The purpose of a triage unit in any ED is to successfully determine the amount of risk a patient is under when he or she arrive in the ED. In the case of chest pain, no one can predict whether a particular individual might be suffering from a myocardial infarction or not without the usage of investigations such as the ECG. In fact, until an ECG is done, a patient cannot even be categorized as high risk, intermediate risk, or low risk for a cardiac etiology for their chest pain by American Heart Association guidelines, because those guidelines require acquisition and interpretation of an ECG Braunwald E *et al*(2000).

According to a study performed by Hutchington *et al*. **Error! Bookmark not defined.** The performance of prehospital 12-lead ECG triage and ED activation of the infarct team significantly improves door to balloon time and results in a greater proportion of patients achieving guideline recommendations. Sagarin *et al*. have also reported that a delay in ECG acquisition was responsible for 25% of fibrinolytic treatment delays. It is, therefore, crucial for any patient undergoing a myocardial infarction to be recognized promptly for a better outcome.

According to a study performed by Ballard *et al*, the treatment of female patients was consistently delayed versus male patients in terms of receiving an ECG in 10 minutes of arrival. This study does not add to any gender differences in treatment due to the small sample size obtained.

In this study, we focused on patients presenting to the ED with signs of chest pain as opposed to those with angina equivalents such as shortness of breath or diaphoresis. Our study focuses on the sole symptom of chest pain, which is a highly suggestive symptom of myocardial infarction, to help us analyze the ED staff prompt response to obtain an ECG following the AHA guidelines without knowing any anginal equivalents. In a study performed by Zegrey-Hemsey *et al*, it was determined that chest pain itself helped to expedite initial ECG acquisition

AHA recommends that all patients presenting to the ED with complaints of chest pain/angina equivalent symptoms receive an initial ECG within 10 minutes of presentation Braunwald E *et al* (2000). In our study, we found that most patients who presented to the ED had their ECG performed within the 10-minute timeframe. However, not all patients we reviewed had their ECG performed on the expected timeframe. On further inspection, we found out that one of the patients refused to have the ECG performed, but no other explanation was provided for the rest of the patients. This finding suggests that ED staff need further education to act in a more rapid manner. It would also be speculative to suggest that the time of ECG performed is consistent with the time on the ECG machine and the difference of time to be accounted for by the ED staff.

Our data demonstrate no evidence of sex or racial disparities in door-to-ECG time for patients with a chief complaint of chest pain.

Emergency Departments have an opportunity to analyze time to ECG for patients with low-risk chest pain and determine whether quality improvement efforts are necessary. Future

quality assurance to decrease the factors of prolonged time to ECG may help inform local quality improvement efforts.

Although the triage time was recorded, it was unknown how much the patients waited before they got registered and entered the triage room. This is because that the hospital doesn't adapt a system that specifies the exact arrival time. Being mentioned that, the guidelines clearly state that the first ECG should be performed in 10 minutes of arrival. Therefore, triage time is not a good estimate to judge the time delay in performing an ECG for a patient presenting with a chest pain.

In addition, the ECGs records weren't archived properly. All ECGs, whether they were performed in the triage room or in the ED, were collected in a recycling tray rather than being packed in the patient's files. Reviewing unorganized records was difficult, especially those lacked personal information which were discarded in this audit. This also contributed to uncertainty of the total ECGs reviewed in the specified period.
Moreover, while reviewing the ECGs, we discovered a huge time difference between the triage time and the time on the ECGs' records for the period between 1st July and 1st September. A delay of 1-hour was noticed and attributed to wrong time settings on the ECGs machines.

CONCLUSION/ RECOMMENDATIONS

While doing this audit, we found the following to help with better abidance with the international guidelines and improve patients care.

Firstly, prior notice to the ED team of suspected high-risk patient can reduce the time needed to do the first ECG, thus proper patient care. Also, the exact time of patient arrival time to ED should be known.

Secondly, all ECG's done should have patient identification, and all sequential ECG's should be archived together for follow up on patient condition. Also, the time and result of ECG should be appropriately documented in the patient file.

Finally, ECG machines should be checked and reviewed on a regular basis. Also, the ED team should take a continuous medical education session in regards to the indications, identification, and report of ECG.

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