

A quality improvement project to reduce door-to-electrocardiogram time: A multicenter study

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Objective: To improve compliance with a target door-to-electrocardiogram (EKG) time of 10 minutes or less in patients presenting with symptoms concerning for acute coronary syndrome.

Methods: A pre-post study was performed between January 2014 and May 2016 at five emergency departments (EDs) in Saudi Arabia. Patients who presented to ED with symptoms concerning for acute coronary syndrome were included in the study. The primary outcome of interest was whether EKG was completed within 10 minutes after the patient arrival to ED. Quality improvement interventions consisted of human resources adjustments, education, technological improvements, and improved interdepartmental collaboration. Multivariate analysis was used to model the percentage of EKGs that were completed within the targeted time.

Results: During the study period, 11,518 patients received EKGs. Prior to the intervention, compliance with a door-to-EKG time of 10 minutes or less was found to be 62.6%. Post intervention, compliance improved to 87.7%. On multivariate analysis, male patients were significantly more likely to receive EKG within 10 minutes than female patients (odds ratio = 1.231, 95% confidence interval = 1.113–1.361; $p < 0.001$).

Conclusion: A quality improvement project can successfully increase the percentage of patients receiving EKG within 10 minutes of presentation to ED. Further research is required to demonstrate the clinical significance of improved door-to-EKG times.

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Introduction

Ischemic heart disease is the leading cause of death worldwide, responsible for 14.86% of deaths in 2013 [1]. Early diagnosis is crucial because delays in the restoration of blood flow lead to a greater loss in the heart muscle [2]. The American Heart Association recommends that patients presenting to an emergency department (ED) with chest discomfort or pain should receive an electrocardiogram (EKG) within 10 minutes [3,4]. However, 33% of patients presenting with an acute myocardial infarction (MI) do not present with chest pain, and these patients have worse outcomes [5]. Primary percutaneous coronary intervention and thrombolytic therapy improve clinical outcomes following MI, although percutaneous coronary intervention has a survival benefit compared to thrombolytic therapy [6].

While the benchmark of 10 minutes for door-to-EKG (DTE) time was generated by expert opinion [7], some studies show that faster DTE times lead to reduced time to aspirin, or reduced door-to-balloon (DTB) time, which are crucial steps in the management pathway of acute MI [8–10]. A meta-analysis has revealed that DTB time of less than 90 minutes is associated with reduced in-

Abbreviations

DTE	Door-to-EKG
DTB	Door-to-balloon
QI	Quality improvement
ED	Emergency Department

hospital mortality [11]. The American Heart Association recommends that DTB time of less than 90 minutes is an acceptable management strategy, although they highly emphasize the importance of further minimizing DTB time [12].

At our institution, we found that many patients did not receive EKGs within 10 minutes of arrival. Therefore, we believed that it was important to study this issue to develop ways for improving DTE time. Furthermore, DTE time was instituted as a key performance indicator at our institution, thereby providing further incentive and institutional buy-in for improving DTE time.

The primary objective of this study was to increase compliance to DTE time of 10 minutes or less for patients presenting with chest pain or other symptoms concerning for acute coronary syndrome (ACS). Quality improvement (QI) interventions were selected and implemented to achieve this goal. Our secondary objective was to

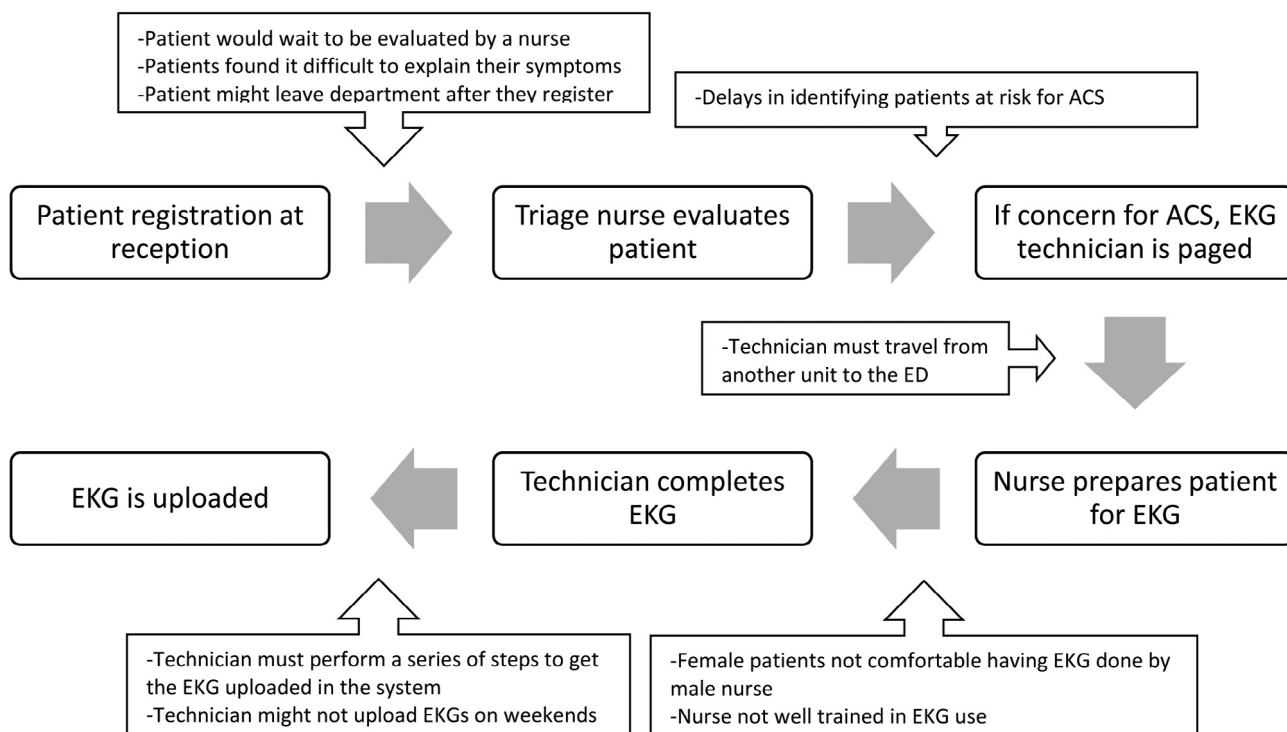


Figure 1. Simplified process map for performing an electrocardiogram with associated barriers prior to intervention. ACS = acute coronary syndrome; ED = emergency department; EKG = electrocardiogram.

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