

Decreasing Door-to-Electrocardiogram Times in Frontier Nevada: A Quality Improvement Project

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Background

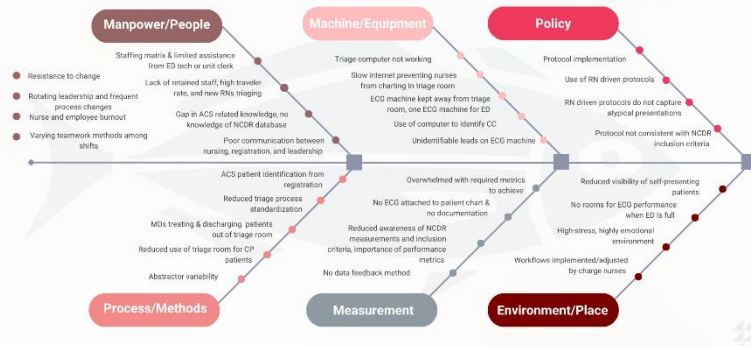
An essential piece to providing quality acute coronary syndrome (ACS) care is ensuring that patients who present to an emergency department (ED) with symptoms suggestive of ACS have an electrocardiogram (ECG) performed and interpreted in ≤ 10 minutes from arrival. This standard has been established based on evidence that demonstrates increased patient survivability when timely ECGs are performed. This is especially true for patients diagnosed with an ST-elevation myocardial infarction (STEMI), as complete occlusion of blood flow can result in irreversible myocardial cell death. Furthermore, patients who experience a door-to-ECG (DTE) time of ≤ 10 minutes are more likely to experience timely revascularization, which is associated with improved percentages of myocardial salvage, thereby reducing complications post-myocardial infarction (MI) and improving clinical outcomes. The organization where this project was implemented has a long-standing history of prolonged DTE times, delaying treatment for patients presenting with a STEMI diagnosis and patients who require treatment under the ACS care pathway but do not require urgent percutaneous coronary intervention. This quality improvement (QI) project has focused on implementing education and process-based interventions to improve DTE time averages in patients self-presenting to this ED with symptoms suggestive of ACS. The bundled intervention involves six different evidence-based components that optimize ED workflows and increase baseline knowledge surrounding ACS patient care.

Goals

The primary goal of this QI project is to optimize ED processes and increase baseline knowledge concerning ACS symptom recognition, timely ACS care, and clinical care pathways. By achieving these two objectives, the QI project will aim to observe the following effects:

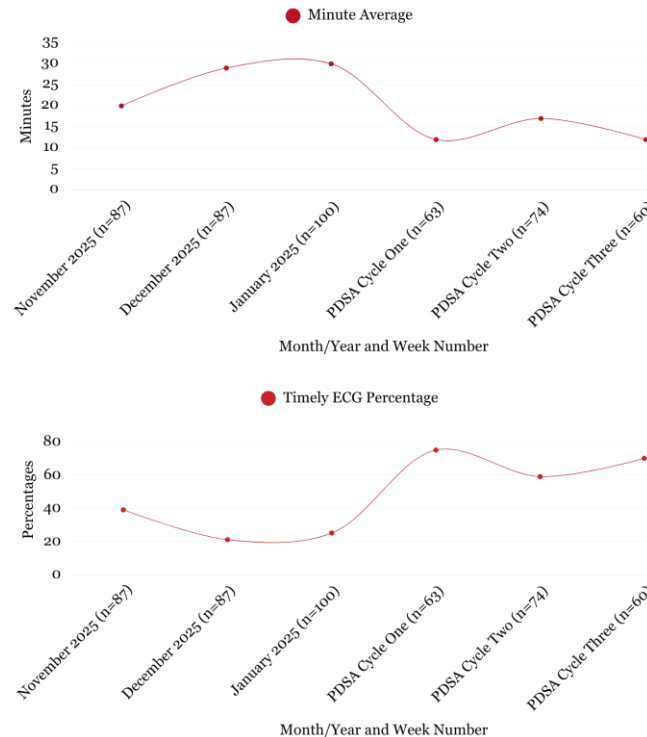
- Reduce the average DTE time in self-presenting patients with reported symptoms suggestive of ACS from 26 minutes to 13 minutes by May 8, 2026
- Increase the percentage of patients who have an ECG performed in ≤ 10 minutes from 28% to 53% by May 8, 2026
- Increase the percentage of patients self-presenting with STEMI who meet the door-to-balloon time goal of ≤ 90 minutes from 0% to 80% by May 8, 2026
- Increase baseline knowledge regarding ACS patient care and treatment pathways in consented ED nurses by 10% in post-education tests

PROLONGED DOOR-TO-ECG TIMES



Results

- Door-to-ECG Time Averages
 - Observed a 14-minute reduction in patients presenting with symptoms suggestive of ACS
 - 26-minute pre-interventional average to 12-minute post-interventional average by May 8, 2026
 - Weighted interrupted time series regression statistical analysis ($p = .02$)
- Timely ECG Acquisition
 - Increased the percentage of timely ECG completion by 42%
 - Percentage of timely ECG completion increased from 28% to 70% in the targeted patient population by May 8, 2026
 - Pearson's Chi-Square test: $\chi^2 = (1, N = 471) = 70.58, p < .001$
- Door-to-Balloon Time Averages
 - Increased the percentage of timely revascularization by 100%
 - Percentage of patients meeting door-to-balloon time goal of ≤ 90 minutes increased from 0% to 100% by May 8, 2026
 - Small post-intervention sample size ($n=1$); no statistical testing performed
- ACS Pre-Test & Post-Test Averages
 - Observed a 5% increase in post-test averages
 - 77% pre-test average score to 82% post-test average score
 - Paired samples t-test ($p = .07$)



Methods

- QI Project
 - Plan-Do-Study-Act (PDSA) Cycle Framework
 - Lewin's Theory of Planned Change
- Bundled intervention established based on current evidence based practices (EBP) and a pre-existing root cause analysis
 - ACS Education Presentation
 - Pre-test and post-test for baseline knowledge measurement
 - Triage Process Optimization
 - Role Reprioritization
 - ECG Machine in Triage Room
 - Visual Cueing
 - Data Feedback Methods
- Setting
 - 16-bed frontier Nevada ED that faces challenges related to poor workforce retention and revolving leadership practices, leading to an environment rooted in poor process consistency, unclear direction, and clinical knowledge gaps
- Sample Description
 - *Primary Inclusion Criteria:* ED nurses, ED registration staff, ED technicians
 - *Primary Exclusion Criteria:* All other hospital department employees
 - *Secondary Inclusion Criteria:* Patients ≥ 18 years of age, self-presenting with any atypical or typical symptom identified by ACS symptom checklist and those whose medical records have an attached ICD-10 (International Classification of Diseases, 10th Revision) code involving low-risk chest pain, unstable angina, non-ST-elevation myocardial infarction (NSTEMI), or STEMI diagnosis
 - *Secondary Exclusion Criteria:* Patients presenting with potential ACS symptoms resulting from a trauma injury, patients presenting via Emergency Medical Services (EMS), patients with a confirmed pre-hospital ECG, or patients who did not have an ECG ordered during their ED visit

Clinical Implications

- ECG acquisition in ≤ 10 minutes will encourage timely revascularization of the culprit lesion for patients presenting with STEMI, resulting in:
 - Reduced morbidity & mortality rates
 - Reduced post-myocardial infarction complications
 - Reduced patient-associated hospital costs
 - Enhanced clinician well-being
- Direct community/organizational benefits from QI project integration:
 - Improved cardiovascular population health
 - Improved health literacy & health equity
 - Regular integration of EBP and QI methodology
 - Maintain organization's chest pain accreditation status with the American College of Cardiology (ACC)

References

