



Process Improvement Initiative

Prospectively measure the accuracy of EMS 12 Lead ECG Interpretation for STEMI Alert Patients

Hypothesis/Concern

Anecdotal information suggests that the EMS ECG interpretation accuracy for patients identified as STEMI Alert is low. If this concern is confirmed, the incidence of incorrect cardiac catheterization lab activations may be unnecessarily increased

Objective

Prospectively measure the EMS ECG STEMI interpretation accuracy to determine whether improvements may be identified. If the concern is confirmed, a secondary objective is to determine potential reasons for the low accuracy in order to identify and implement educational improvements. It is anticipated that this initiative will continue for a minimum of 6 months. Hospital and EMS System participation is voluntary. However, increased Hospital and EMS System participation will improve the reliability of the results.

Process

1. The Office of the Medical Director for the Austin/Travis County EMS System in concert with the Clinical Leadership for Williamson County EMS and San Marcos/Hays Co EMS will define the minimum required data fields, data definitions and data choices and formatting. These will be incorporated into a standardized Excel spreadsheet. (See below for defined data fields)
2. Each EMS System through its defined Clinical or Performance Management group will send each defined hospital representative the standardized Excel spreadsheet on a regular basis (monthly is recommended).
3. The spreadsheet will contain the EMS incident numbers for all patients deemed as STEMI Alerts (Code STEMI) and transported to the specific hospital.
4. In addition to the spreadsheet, each STEMI Alert case will also have the EMS 12 lead ECG used to activate the STEMI Alert.
5. The participating STEMI Receiving Hospital will complete the Blank fields using the provided Excel Spreadsheet.

6. In order to completing the data fields, the STEMI Receiving Hospital will identify a cardiologist who will review the EMS ECG. The cardiologist will reach two decisions. First, the cardiologist will determine whether the ECG meets the regional Mission Lifeline diagnostic criteria for ST segment elevation indicating a STEMI (Yes/No). Second, the cardiologist will determine whether other ECG findings may have contributed to an incorrect STEMI interpretation (choices from a standardized drop down menu). (Ideally, the cardiologist will not be one involved with the cardiac catheterization decisions for the STEMI Alert patient. It is also preferred that the number of cardiologists involved in this process be limited to 1 or 2 in order to minimize inter-rater reliability concerns.)
7. The participating STEMI Receiving Hospital will then send the completed spreadsheet to the designated person within the EMS System. Designated persons for each EMS System are:
 - a. Austin/Travis County EMS: Send to Jeff Brockman AND Louis Gonzales
 - b. Williamson County EMS: Send to Terri King
 - c. San Marcos/Hays County EMS: Send to John Moseley
8. Completed spreadsheet data will then be aggregated into a single spreadsheet. This task will be overseen by Jeff Brockman and Louis Gonzales.
9. Louis Gonzales will prepare reports of the data for the purpose of reporting key measures (see below for key measures and definitions). Reports will be distributed to the Mission Lifeline QI group and each participating Hospital and EMS System
10. Additionally, each participating EMS System and Hospital will receive (if requested) the raw data exported into an Excel Spreadsheet.
11. At the end of the 6-month initiative, this process will be discussed with the Mission Lifeline QI group and the participating Hospitals and EMS Systems to determine whether it should continue.

Data Points & Definitions

STEMI Alert – An response in which the paramedic crew acquires a 12 lead ECG and interprets the ECG as meeting the diagnostic criteria for an ST segment elevation myocardial infarction. STEMI Alerts are only activated when the patient also has a clinical presentation consistent with a possible AMI.

EMS Incident Number – The EMS System’s unique incident number for each case defined as a STEMI Alert (Code STEMI).

Receiving Hospital – The Hospital who initially received the STEMI Alert patient from the EMS System.

Alert Declared Time – The clock time and date at which the paramedic crew notifies EMS Communications of a STEMI Alert (MM:DD:YYYY HH:MM:SS). This is an optional field for the EMS System.

ECG Confirmed – The decision made by the STEMI Receiving Hospital’s overreading cardiologist regarding whether the ECG met the diagnostic criteria for an ST segment elevation myocardial infarction. (Yes, No)

Potential ECG Confounders – a listing of ECG findings commonly associated with erroneous identification of ECGs as STEMI. This field would allow the overreading cardiologist to list up to two reasons why the ECG may have been difficult to interpret and which may have contributed to an incorrect ECG interpretation. (LBBB, RBBB, LVH, Early Repolarization, Pericarditis, Ventricular paced, Non-specific ST changes, Other)

Comments – a limited text field for entry of feedback information for the treating EMS providers. This field may contain information related to the location and extent of coronary artery lesions identified as well as any available patient outcome information. (Free Text; Field Size Limit to be determined)

STEMI – For the purposes of this project, STEMI refers only to the evaluation of the 12 lead ECG to determine if it meets the agreed upon definition. The CATRAC Regional Mission Lifeline group has agreed upon the following definition for STEMI:

- Signs / Symptoms of Acute Coronary Syndrome AND ST segment elevation of 1 mm or more in two continuous leads
- Excluded are inconclusive ST elevation, elevation isolated to V1 – V2 only, and LBBB

Measures

The key measure for this initiative is the EMS ECG Accuracy Rate calculated as follows:

n = number of STEMI Alerts with an affirmative ECG Confirmed data field

N = number of STEMI Alerts for the reporting time period

EMS ECG Accuracy Rate (reported as a percentage)

$$= (n / N) \times 100\%$$

The EMS ECG Accuracy Rate indicates the frequency of correct ECG STEMI identification (Sensitivity). This measure may be reported using aggregate data and/or sorted by EMS System or destination hospital.

Initiative Endpoints

After approximately 6 months of data collection, the initiative will be reevaluated. The reevaluation will include both the Mission Lifeline QI group and the participating Hospitals and EMS Systems

Additionally, any identified improvement opportunities related to increasing the frequency of EMS ECG STEMI Interpretation accuracy will be addressed by the Clinical Leadership of the participating EMS Systems.