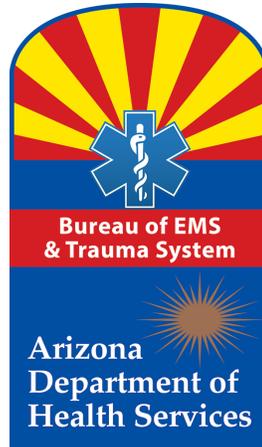


**ARIZONA DEPARTMENT OF HEALTH SERVICES  
BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM**



**PERFORMANCE IMPROVEMENT TOOLKIT:  
STEMI  
AZ-PIERS 2013**

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**Report No. 14-2-EMS-STEMI**

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## Purpose:

The purpose of this report is to provide agencies with a level of comparison on their performance in 2013 on confirmed ST-Elevation Myocardial Infarctions (STEMIs). This report can be used to support Quality Assurance initiatives in their communities.

This report analyzes four STEMI related performance measures:

1. Reduce the length of time from arrival on scene until a 12-lead ECG is acquired,
2. Increase the frequency of hospital pre-notification for STEMI patients,
3. Increase the frequency that STEMI patients are transported to a cardiac receiving/referral center,
4. Increase the frequency that STEMI patients receive pre-hospital aspirin and oxygen therapy.

## Methodology:

The [Arizona Pre-hospital Information & EMS Registry System \(AZ-PIERS\)](#) was analyzed to find records where a STEMI occurred. The records in this analysis were pulled on May 10, 2014, and had:

1. A unit notified date range of January 1, 2013, to December 31, 2013, AND
2. *Patient Disposition* (E20.10) equal to “Dead on scene,” “Treated and transferred,” or “Treated and transported.”

Two Arizona databases were used to confirm STEMI cases: Hospital Discharge Database (HDD) and the Save Hearts in Arizona Registry and Education (SHARE) STEMI registry. The hospital admission date matched the range of the unit notified date.

In the HDD, a STEMI was identified by an ICD-9 code between 410.0 to 410.6 and 410.8. A total of 2,927 STEMI records were identified in 2013.

In the SHARE STEMI registry, a total of 1,926 records were identified in 2013.

Link Plus was used to match AZ-PIERS records with the HDD and the SHARE STEMI registry. This report presents the EMS performance measures for the 562 matched STEMI cases.

## Limitations

Limitations: If a patient received care for a STEMI involving more than one submitting EMS agency, that patient would be counted multiple times (once for each EMS agency encounter).

Additionally, state benchmarks are restricted to only include those agencies participating in the registry. If your agency is not currently participating, please visit us on our [AZ-PIERS homepage](#) for information on how to sign up.

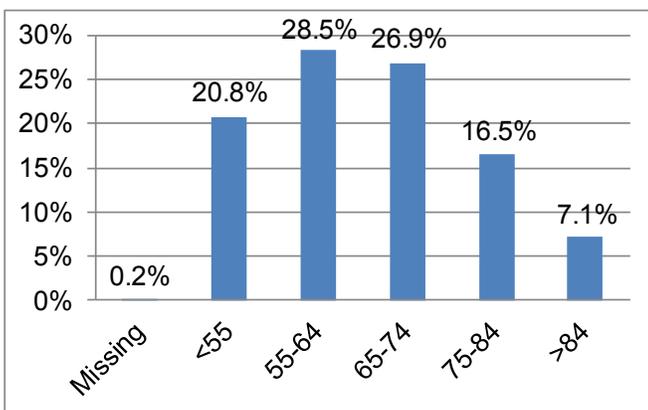
**Table 1: STEMI patient demographics**

	<b>N</b>	<b>%</b>
<b>Confirmed/matched STEMI cases</b>	<b>562</b>	<b>100%</b>
<b>Age (years)</b>		
<b>Missing</b>	<b>1</b>	<b>0.17%</b>
<b>&lt; 55</b>	<b>117</b>	<b>20.8%</b>
<b>55-64</b>	<b>160</b>	<b>28.4%</b>
<b>65-74</b>	<b>151</b>	<b>26.8%</b>
<b>75-84</b>	<b>93</b>	<b>16.5%</b>
<b>&gt; 84</b>	<b>40</b>	<b>7.1%</b>
<b>Gender</b>		
<b>Missing</b>	<b>4</b>	<b>0.71%</b>
<b>Female</b>	<b>174</b>	<b>30.9%</b>
<b>Male</b>	<b>384</b>	<b>68.3%</b>
<b>Race/ethnicity</b>		
<b>Missing</b>	<b>285</b>	<b>50.7%</b>
<b>American Indian or Alaska Native</b>	<b>9</b>	<b>1.6%</b>
<b>Asian</b>	<b>2</b>	<b>0.35%</b>
<b>Black or African American</b>	<b>7</b>	<b>1.24%</b>
<b>Other Race</b>	<b>26</b>	<b>4.62%</b>
<b>White</b>	<b>233</b>	<b>41.4%</b>
<b>EMS Discharge Status</b>		
<b>Treated and transferred</b>	<b>28</b>	<b>4.9%</b>
<b>Treated and transported</b>	<b>534</b>	<b>95%</b>

A total of 562 STEMI patients were matched in at least two of the three databases. In half of the cases, the patient *Race* (E06\_12) variable was missing. Of those cases in which race was documented, the majority of STEMI patients were white.

Over two-thirds of all STEMI patients were male. The median age of STEMI patients was 65 years. Additionally, 25% were older than 74 and 25% were younger than 55.

**Graph 1: Distribution of ages for STEMI patients (n=562)**



The highest volume of STEMI patients occurred in 55-64 year olds, followed by 65-74, under 55, and 75-84.

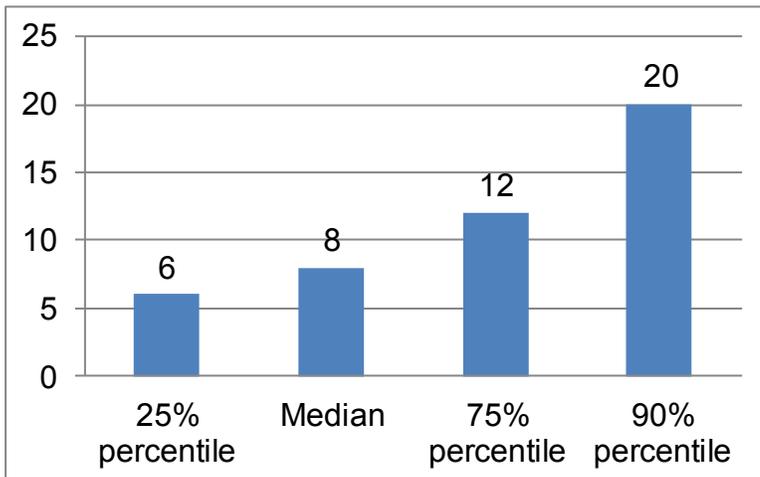
## Performance Measure 1: Reduce the length of time from arrival on scene to a 12-lead ECG acquisition

**Table 2: Performance of 12-lead ECG on STEMI patients (n=562)**

	N	%
<i>Not documented</i>	236	42%
<b>Yes</b>	183	32.5%
<i>Performed and not documented *</i>	143	25.4%

\*Documentation of a 12-lead ECG was MISSING from AZ-PIERS but documented in the SHARE STEMI registry

**Graph 2: Time to 12-lead ECG time after arrival on scene (minutes)**



Of the 562 confirmed STEMI cases in AZ-PIERS, a large portion of cases (42%) failed to document an ECG acquisition. Documentation of an ECG occurs through the *Procedure* variable (E19\_03).

**An ECG was documented in only 32.5% of STEMI patients pre-hospital medical records.**

Through verification with the SHARE STEMI registry and AZ-PIERS, there were 58% confirmed STEMI cases in which an ECG was performed.

\*Time calculations were available in 161 out of 562 cases. In 401 records this time was unable to be calculated.

**Table 3: Scene arrival to 12-lead ECG time (n=562)**

	Min	Max	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile	90 <sup>th</sup> percentile
<b>Scene arrival to 12-lead ECG time (minutes)</b>	0	183	6	8	12	20

The median time from arrival on scene to 12-lead ECG acquisition was 8 minutes. In 90% of cases, a 12-lead ECG was performed within 20 minutes after arriving on scene. The scene arrival to 12-lead ECG time was missing in 401 records.

**Table 4: Primary impression of STEMI patients who did not receive a 12-lead ECG**

	<i>N</i>	<i>%</i>
<b>Total STEMI cases without a 12 lead</b>	<b>236</b>	<b>100%</b>
<b>Primary impression</b>		
<b>Missing</b>	<b>74</b>	<b>31.3%</b>
<b>Abdominal pain/problems</b>	<b>1</b>	<b>0.42%</b>
<b>Altered level of consciousness</b>	<b>6</b>	<b>2.5%</b>
<b>Asthma</b>	<b>1</b>	<b>0.42%</b>
<b>Cancer</b>	<b>1</b>	<b>0.42%</b>
<b>Cardiac arrest</b>	<b>22</b>	<b>9.3%</b>
<b>Cardiac rhythm disturbance</b>	<b>16</b>	<b>6.7%</b>
<b>Chest pain/discomfort</b>	<b>86</b>	<b>36.4%</b>
<b>Fever</b>	<b>1</b>	<b>0.42%</b>
<b>Gastrointestinal bleed</b>	<b>2</b>	<b>0.84%</b>
<b>Other</b>	<b>13</b>	<b>5.5%</b>
<b>Pain</b>	<b>2</b>	<b>0.84%</b>
<b>Respiratory arrest</b>	<b>3</b>	<b>1.27%</b>
<b>Respiratory distress</b>	<b>4</b>	<b>1.69%</b>
<b>Seizure</b>	<b>1</b>	<b>0.42%</b>
<b>Stroke/CVA</b>	<b>1</b>	<b>0.42%</b>
<b>Weakness</b>	<b>2</b>	<b>0.84%</b>

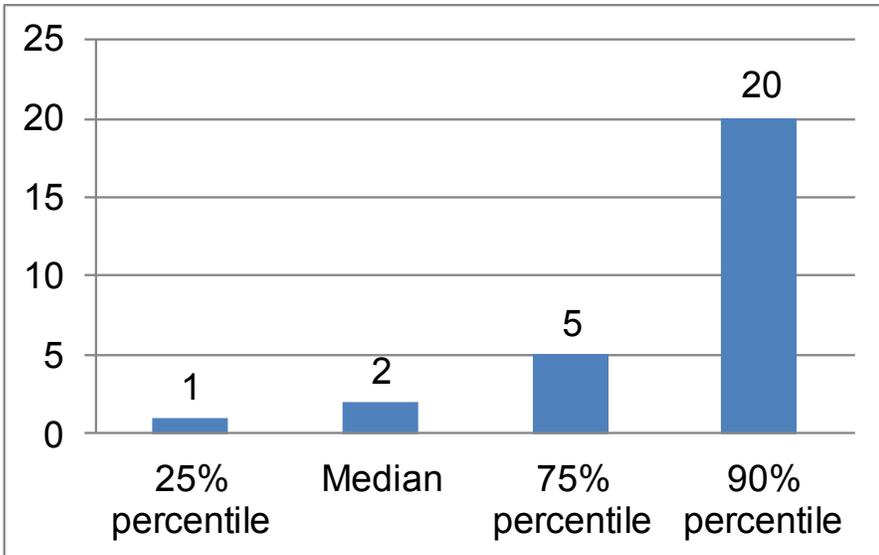
The STEMI cases in which a 12-lead ECG was not performed underwent further analysis to understand the presentation of symptoms. For most STEMI patients, providers were under the impression that cases were cardiac related (cardiac arrest, cardiac rhythm disturbance, chest pain/discomfort).

There are three possible reasons for reporting a “No/Not Documented” on a 12-lead ECG:

- The ePCR vendor failed to properly map the procedure code of a 12-lead,
- The provider failed to document they performed a 12-lead,
- The provider failed to perform a 12-lead on a STEMI.

## Performance Measure 2: Increase the frequency of hospital pre-notification for a STEMI patient

**Graph 3: Time to transmit 12-lead ECG (minutes) (n=6)**



\*Of the 562 STEMI's only 6 records calculated transmission time to hospital

**Table 5: Time to transmit 12-lead ECG (minutes)**

	Min	Max	25% percentile	Median	75% percentile	90% percentile
<b>12-lead ECG performed to transmit time</b>	1	20	1	2	5	20

The 12-lead ECG transmission time was missing in 98.6% of records. AZ-PIERS collects this variable through the data elements *Receiving Hospital Contacted Date/Time* (IT5\_71). In the 6 prehospital records the 12-lead ECG had a median transmission time of 2 minutes.

The 12-lead transmission variable is an optional variable in the current version of AZ-PIERS. This will move to a mandatory field for the next version.

**Performance Measure 3: Increase the frequency that STEMI patients are transported to a cardiac receiving/referral center**

**Table 6: Hospital destination for STEMI patients as reported by AZ-PIERS (n=562)**

	<b>N</b>	<b>%</b>
<i>Missing</i>	<b>54</b>	<b>9.6%</b>
<i>Non-cardiac center</i>	<b>99</b>	<b>17.6%</b>
<i>Cardiac receiving/referral center</i>	<b>304</b>	<b>54%</b>
<i>Not Applicable</i>	<b>105</b>	<b>18.6%</b>

**Table 7: Hospital destination for STEMI patients as reported by HDD and SHARE STEMI (n=562)**

	<b>N</b>	<b>%</b>
<i>Non-cardiac center</i>	<b>28</b>	<b>4.9%</b>
<i>Cardiac receiving/referral center</i>	<b>534</b>	<b>95%</b>

Agencies failed to report the *Hospital Destination* (E20\_01) in 28% of the records in AZ-PIERS. However, the SHARE STEMI registry and the HDD were used to fill in the shortcoming of the destination reporting.

The vast majority of STEMI patients went to a cardiac center (95%) and were discharged home (80%). A little over 10% of STEMI patients died as a result of their conditions (includes expired/hospice).

It is important to transport patients to the most appropriate level of care in a timely manner. Arizona’s cardiac centers have the resources and specialized staff to treat STEMI patients.

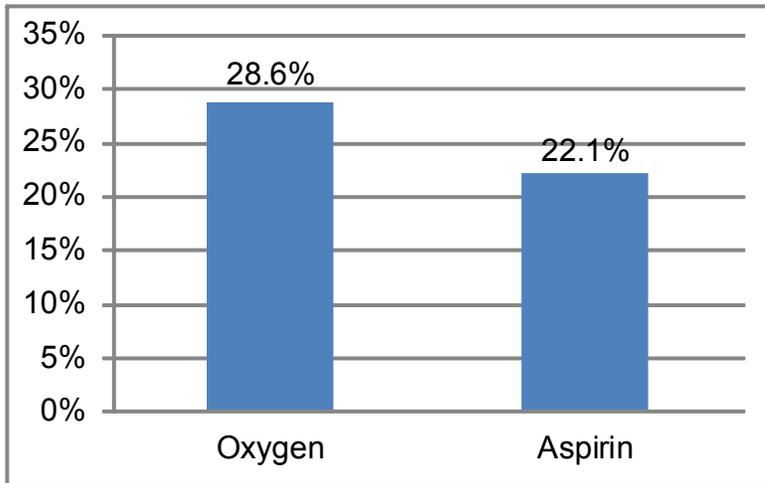
**Table 8: STEMI patient hospital discharge status**

	<b>N</b>	<b>%</b>
<i>Missing</i>	<b>4</b>	<b>0.71%</b>
<i>Home</i>	<b>451</b>	<b>80.24%</b>
<i>Transferred to Acute Care</i>	<b>10</b>	<b>1.77%</b>
<i>ALF/Long Term/ Rehab/SNF</i>	<b>35</b>	<b>6.22%</b>
<i>Expired</i>	<b>55</b>	<b>9.78%</b>
<i>Hospice</i>	<b>7</b>	<b>1.24%</b>

ALF=Assisted Living Facility; SNF=Skilled Nursing Facility

**Performance Measure 4: Increase the frequency that STEMI patients receive prehospital aspirin and oxygen**

**Graph 4: STEMI patients who received oxygen and aspirin (n=562)**



**Table 9: STEMI patients who received oxygen and aspirin (n=562)**

	<i>N</i>	<i>%</i>
<b><i>Oxygen</i></b>		
<b><i>No</i></b>	<b>401</b>	<b>71.3%</b>
<b><i>Yes</i></b>	<b>161</b>	<b>28.6%</b>
<b><i>Aspirin</i></b>		
<b><i>No</i></b>	<b>438</b>	<b>77.9%</b>
<b><i>Yes</i></b>	<b>124</b>	<b>22%</b>