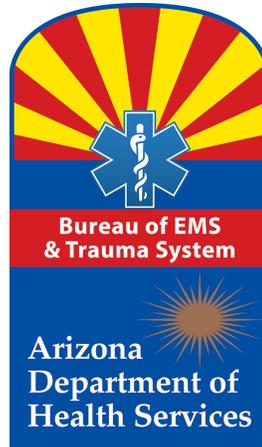


**ARIZONA DEPARTMENT OF HEALTH SERVICES
BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM**



**PERFORMANCE IMPROVEMENT TOOLKIT:
STEMI
AZ-PIERS 2014 - Q3 & Q4**

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Report No. 14-4-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 Quarters 1 and 2 of 2014 in confirmed ST segment 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 prehospital aspirin and oxygen therapy,
5. Reduce the mortality and morbidity of STEMI patients.

Methodology:

The [Arizona Prehospital Information & EMS Registry System \(AZ-PIERS\)](#) was analyzed to find records where a probable STEMI occurred. Probable STEMI were identified by EMS reporting a probable STEMI (IT12_5) or a patient that met the STEMI triage criteria (IT12_1). The records in this analysis were pulled on October 16, 2014, and had:

1. A unit notified date range of January 1, 2014, to June 30, 2014, AND
2. *Stemi Triage Criteria* (IT12_1) = Yes and/or *STEMI Probable* (IT 12_5) = Yes

This report presents the EMS performance measures for the 484 STEMI cases as identified and reported by the participating AZ-PIERS agencies.

STEMI registry: The Save Hearts in Arizona Registry and Education (SHARE) STEMI registry was used to get STEMI patient outcomes. In the SHARE STEMI registry, a total of 466 records were identified as confirmed STEMI cases by cardiac centers (receiving/referral) and were treated or transported to the hospital by the AZ-PIERS agencies.

Linkage: An attempt to match AZ-PIERS records (484) with the SHARE STEMI registry cases (466) was made using LINK-PLUS software by CDC.

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).

- State benchmarks are restricted to include those agencies that participated 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.
- The *STEMI Triage Criteria* (IT12_1) and *STEMI Probable* (IT12.5) are not standard NEMIS 2 variables and may not be well collected by some submitting agencies.
- The STEMI SHARE registry contains confirmed cases from hospitals recognized as cardiac centers (receiving/referral). Any suspected STEMI patients taken to a non-cardiac center by AZ-PIERS submitting agencies will not be present in this report.

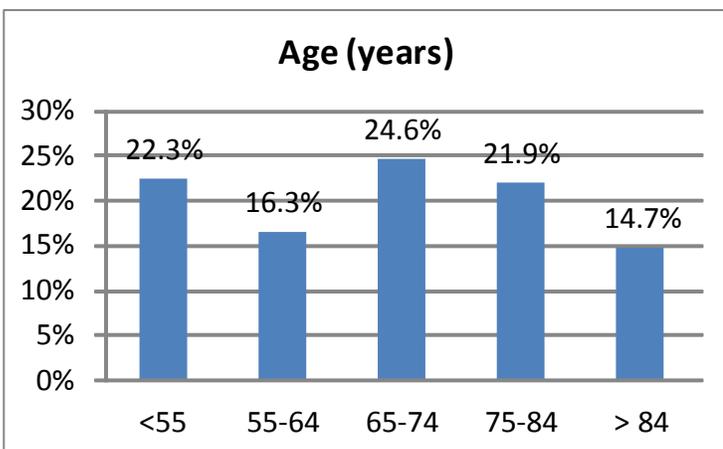
Table 1: STEMI patient demographics (n=484)

	N	%
Suspected STEMI cases	484	100%
Age (years)		
Missing	1	0.2%
< 55	108	22.31%
55-64	79	16.32%
65-74	119	24.58%
75-84	106	21.9%
> 84	71	14.66%
Gender		
Missing	14	2.89%
Female	182	37.6%
Male	288	59.5%
Race/ethnicity		
Missing	327	67.56%
American Indian or Alaska Native	22	4.54%
Black or African American	3	0.61%
Native Hawaiian or Other Pacific Islander	3	0.61%
Other Race	6	1.23%
White	123	25.41%
EMS Discharge Status		
Treated and transferred	118	24.38%
Treated and transported	366	75.61%

A total of 484 STEMI patients were identified from the AZPIERS database for quarter 1 and 2 of 2014. In 68% 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 67 years. Additionally, 35% were older than 74 and 22% were younger than 55.

Graph 1: Distribution of ages for STEMI patients (n=484)



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

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

Table 2: Patient contact to 12-lead time (n=484), (5 minute benchmark)

	N	%
Not documented	160	33.05%
≤ 5 minutes	72	14.87%
> 5 minutes	252	52.06%

Of the 484 STEMIs in AZ-PIERS, a large portion of cases (33%) failed to document an ECG acquisition. Documentation of an ECG occurs through the *Procedure* variable (E19_03).

Graph 2: Patient contact to 12-lead time (minutes) (n=324)

The median time from the patient contact to 12-lead ECG acquisition was 8 minutes. In 90% of cases, a 12-lead ECG was performed within 18 minutes after arriving on scene. A 12-lead ECG time was missing in 160 records. through the *Procedure* variable (E19_03).

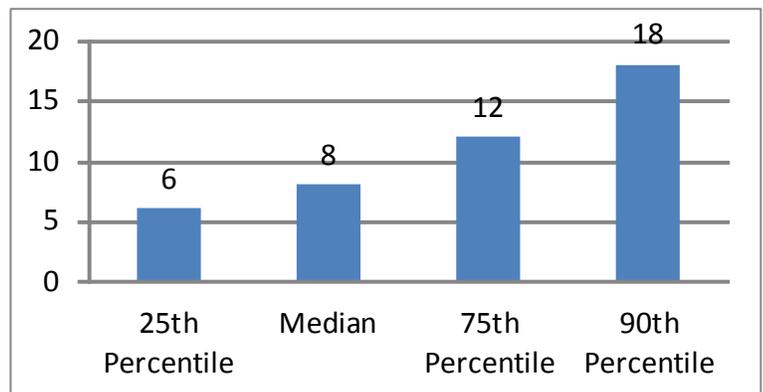


Table 3: Patient contact to 12-lead time (minutes) (n=324)

Total	Missing	25th	Median	75th	90th	Min	Max
324	160	6	8.0	12	18	0	185

A large portion of records (49%) had missing times and were unable to be calculated.

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

Table 4: Time to transmit 12-lead ECG (minutes) (n=484)

Total	Missing	25th Percentile	Median	75th Percentile	90th Percentile	Min	Max
484	416	2	4.0	9	14	0	83

*Of the 484 STEMIs only 68 ePCRs recorded a transmission time to the hospital

The 12-lead ECG transmission time was missing in 86% of records. AZ-PIERS collects this variable through the data elements *Receiving Hospital Contacted Date/Time* (IT5_71) or 12-Lead ECG transmitted time. In the 68 prehospital records, the 12-lead ECG had a median transmission time of 4 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.

Table 5: Patient contact to scene departure (minutes) (n=484)

Total	Missing	25th Percentile	Median	75th Percentile	90th Percentile	Min	Max
484	36	12	16	20	25	0	177

The median time for recognition and treatment of a STEMI in the field was 16 minutes. The overall system recommendation from first medical contact to Percutaneous Coronary Intervention (PCI) is 90 minutes.

Table 6: Patient contact to scene departure (30 minute benchmark)

	N	%
<i>Not documented</i>	36	7.43%
<i>≤ 30 minutes</i>	427	88.22%
<i>> 30 minutes</i>	21	4.33%

Table 7: Patient contact to scene departure (20 minute benchmark)

	N	%
<i>Not documented</i>	36	7.43%
<i>≤ 20 minutes</i>	355	73.34%
<i>>20 minutes</i>	93	19.21%

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

Table 8: Hospital destination for STEMI patients as reported by AZ-PIERS (n=484)

Hospital destination	N	%
Missing	8	1.65%
Non-cardiac center (receiving/referral)	225	46.48%
Cardiac center (receiving/referral)	251	51.85%

Only 51% of patients were transported to a cardiac receiving or referral center. Suspected STEMI patients who went to a non-cardiac center will be missing outcomes.

A complete list can be found of cardiac centers can be found at:

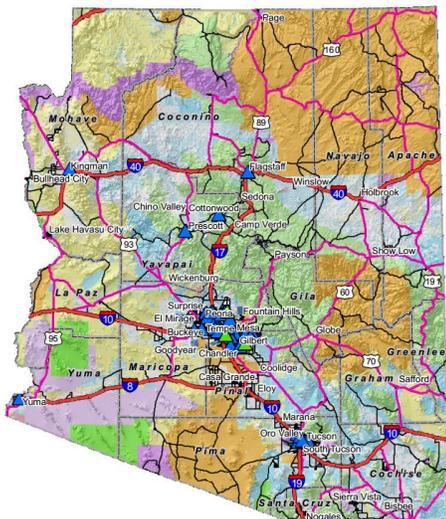
Cardiac Receiving Centers:

<http://www.azdhs.gov/azshare/documents/cardiac-receiving-centers.pdf>

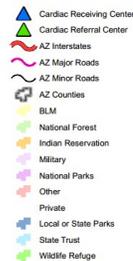
Cardiac Referral Center:

<http://www.azdhs.gov/azshare/documents/cardiac-referral-centers.pdf>

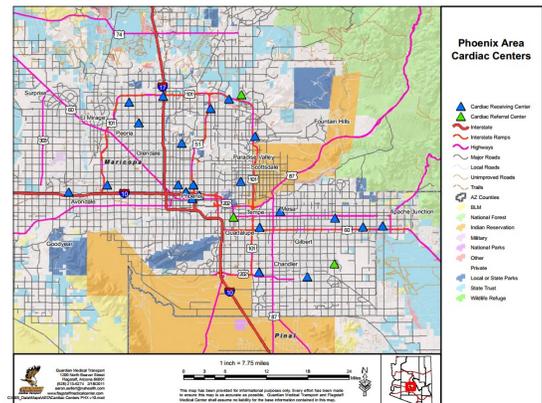
Map 1: Arizona cardiac receiving/referral centers



Arizona Cardiac Centers



Map 2: Phoenix cardiac receiving/referral centers



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

Graph 4: Suspected STEMI patients who received oxygen and aspirin (n=484)

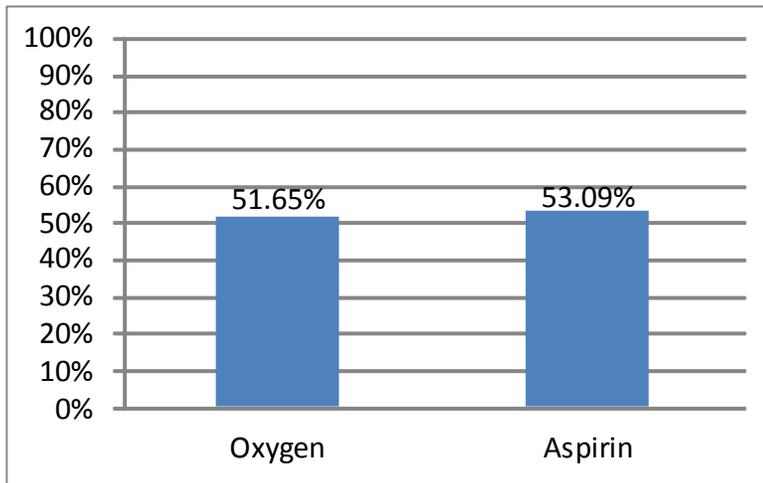


Table 9: STEMI patients who received oxygen and aspirin (n=484)

	N	%
Oxygen		
Yes	250	51.65%
No	234	48.34%
Aspirin		
Yes	257	53.09%
No	227	46.9%

There are three possible reasons for reporting a “No/Not Documented”:

- The ePCR vendor failed to properly map the medication code - Aspirin (81) or Oxygen (910/9396/9397/9398) to “Medication Given” (E18_03),
- The provider did not document they provided aspirin or oxygen,
- The provider did not provide aspirin or oxygen.

Performance Measure 5: Reduce the mortality and morbidity of STEMI patients

Table 10: Confirmed STEMI cases (n=466)

	N	%
Total STEMI reported by STEMI registry	466	100%
12-lead ECG performed		
Missing	37	7.93%
No	57	12.23%
Yes	372	79.82%
EMS identified STEMI correctly		
Missing	118	25.32%
No	39	8.36%
Yes	309	66.3%
Patient survived		
Missing	11	2.36%
No	53	11.37%
Yes	402	86.26%

A total of 466 STEMI cases were reported by hospitals from participating AZPIERS agencies.

In AZPIERS, a total of 484 patient records showed met the inclusion of a suspected STEMI. Of the 413 confirmed STEMI only 48 STEMI cases were matched with AZPIERS STEMI cases.

Reasons for the non-matched cases may be due to:

- *Probable STEMI* (IT12_5) was not reported and excluded the case from matching,
- Vendors/agencies defaulted *Probable STEMI* (IT12_5) “Yes” by default,
- Values used for linking were mismatched due to data entry error.

Table 11: Linking STEMI patients from STEMI registry to AZ-PIERS STEMI cases

	N	%
Total cases reported in AZPIERS	484	100%
Unmatched cases	438	90.49%
Matched cases	46	9.5%