Foothills and Mile High RETAC
Cardiac Performance Measures
Challenges and Improvements Summary

The following is a list of challenges and possible ways to improve the collection of data for cardiac performance measures using the state database:

- NEMSIS v2.2 data elements E9.15 Primary and E9.16 Secondary Provider Impressions "Chest Pain/Discomfort" does not specify if it is cardiac or non-cardiac in nature. This is most likely the reason why acquisition of 12-lead averages 57% and aspirin administration averages 52% from the first quarter of 2014 to second quarter of 2015. In order to acquire more accurate values for these measures it needs to be noted the chest pain/discomfort is cardiac. There are still up to 4 quarters where data could be improved by mapping only provider impressions that are cardiac in nature to "Chest Pain/Discomfort" for the data submitted to the state and map all non-cardiac to "Pain".

- D4.6 - Medication Given, the NEMSIS v2.2 element, limits the data value to "Aspirin (ASA)" while element E12.8 - Medication Allergies allows free text entry. The following are some examples of the various ways aspirin was entered as an allergy:

Aspirin	aspirin	Aspirin (ASA)	ASA
Asprin	asprin	aspitin	

Standardizing how aspirin is entered as an allergy will improve the accuracy of measuring the administration performance measure. NEMSIS v3.4.0 will require it be chosen from the RxNorm or ICD-10 list.
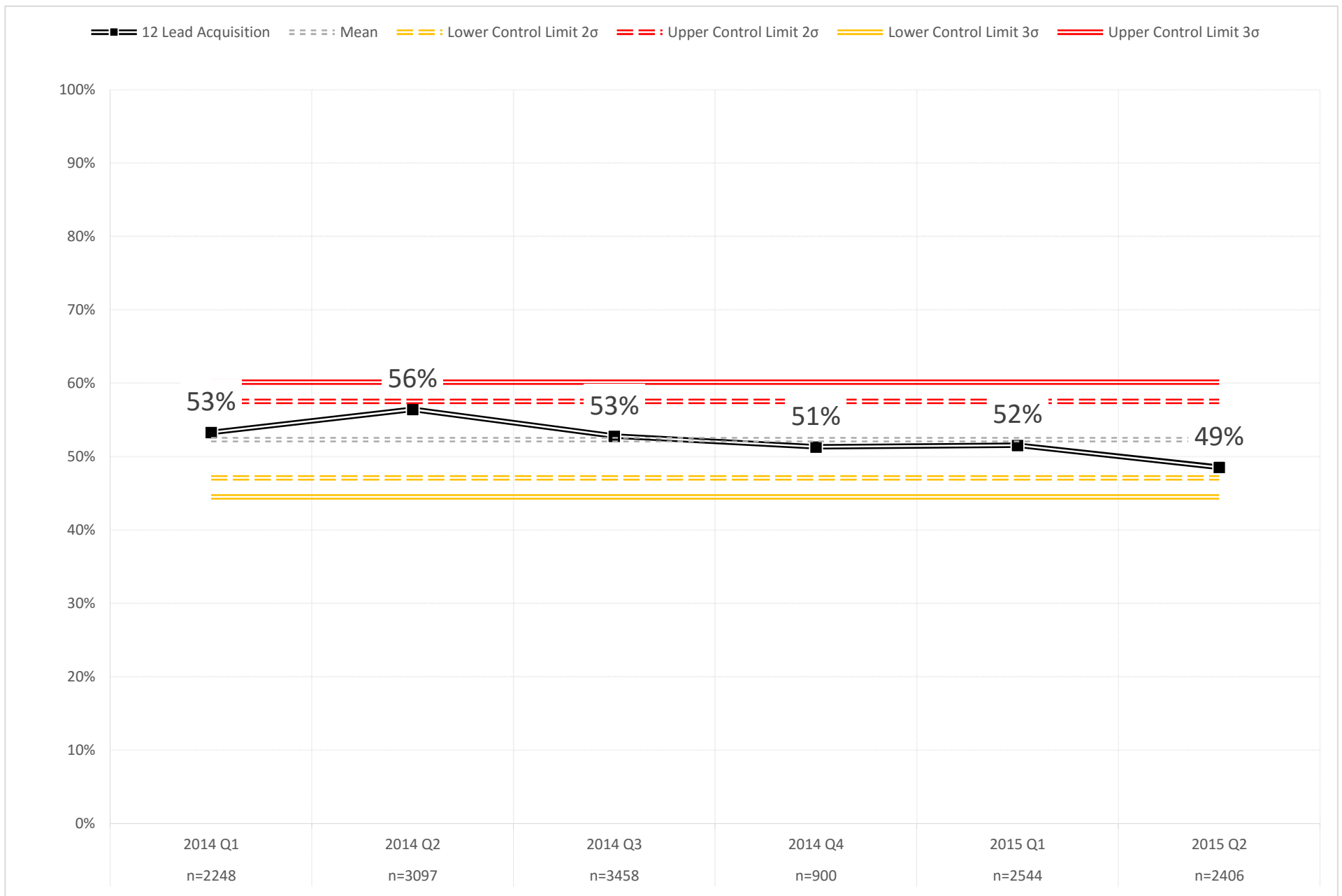
- Any care which is provided to the patient prior to the arrival of the providers can be documented in the NEMSIS v2.2 data element E09_01 - Prior Aid and E09_02 - Prior Aid Performed by, which are on the current state minimum data set, or as E18_02 - Medication Administered Prior to this Unit's EMS Care, which is not a part of the minimum data set but some agencies are still submitting this information to the state database. Both can be used to determine if aspirin was administered. This report was ran excluding all data where E09_01 has "Aspirin (ASA)" as the value but does include E18_02 administrations. NEMSIS v3.4.0 will be retiring Prior Aid elements and relying on eVitals.02 - Obtained Prior to this Unit's EMS Care, eMedications.02 - Medication Administered Prior to this Unit's EMS Care, and eProcedures.02 - Procedure Performed Prior to this Unit's EMS Care to note this in the future.

- For measurement of time to 12-lead performed, all times greater than 1 hour (n=226) and times that were negative or not documented (n=2887) were excluded from the report.

- With NEMSIS v3.4.0, documentation of 12-lead and time is it is acquired will be available under e.Vitals grouping. eVitals.03 - Cardiac Rhythm/ECG will be where the rhythm is documented. eVitals.04 - ECG Type will note type that was acquire, from 3-lead to 18-lead, and eVitals.05 - Method of ECG Interpretation will document if it interpretation as being by computer, manual, or transmitted to determine the rhythm. There is a high likelihood this information will be used for measuring of cardiac performance measures with the newer NEMSIS version.

- The following is a comparison of the number of records in the system and those used for calculating performance measure based on criteria used to filter data in state database:
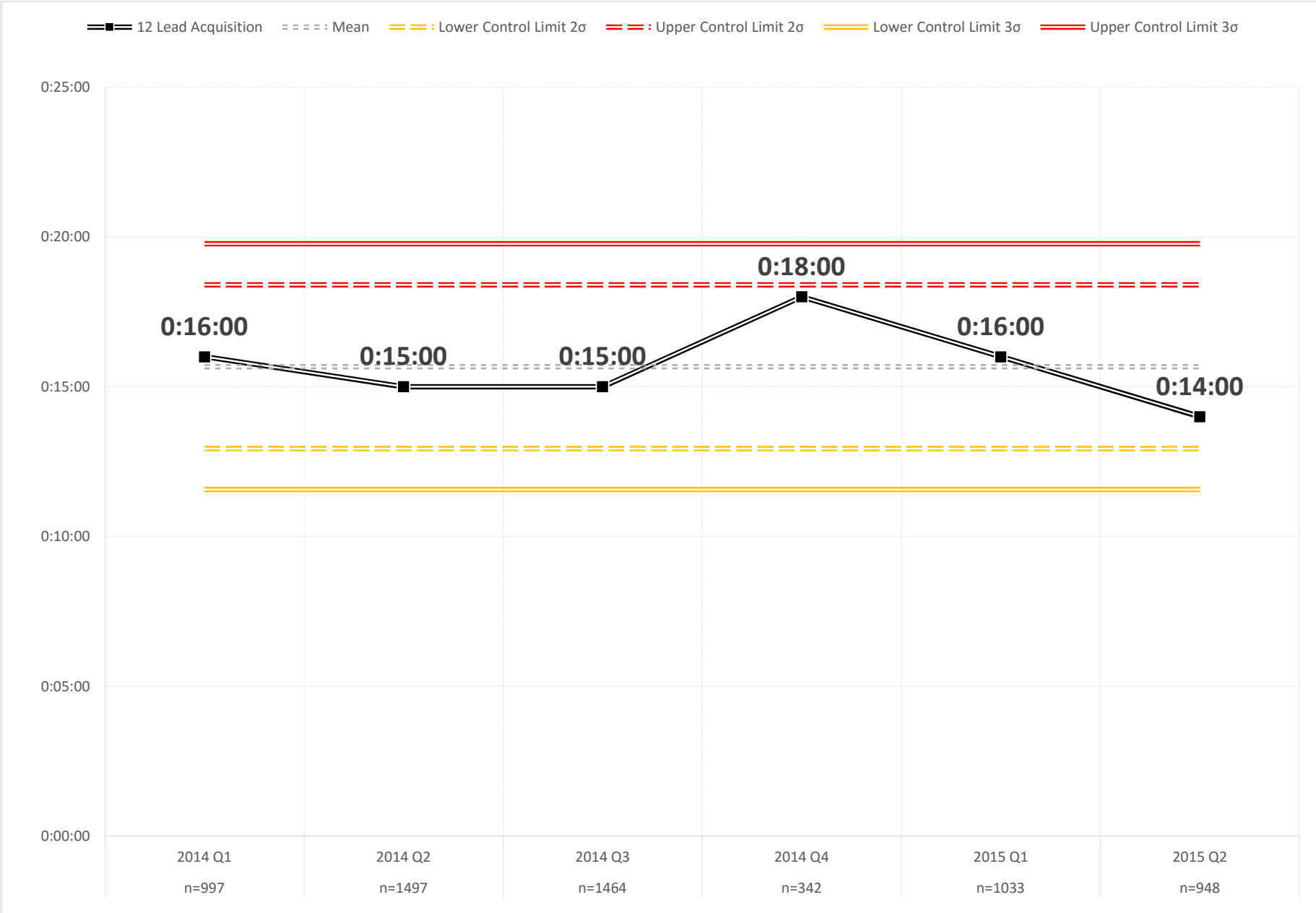
Quarter	All Records for Each Quarter	# of Records for Chest Pain/Discomfort as Impression	Transported with Chest Pain/Discomfort Impression	# of Records Used for 12-Lead Acquisition	# of Records Used for 12-Lead Time	# of Records Used for Aspirin Administration
2014 Q1	72965	3089	2717	2248	997	1591
2014 Q2	101563	4250	3692	3097	1497	2209
2014 Q3	111445	4694	4156	3458	1464	2389
2014 Q4	30330	1205	1046	900	342	607
2015 Q1	80474	3391	3007	2544	1033	1802
2015 Q2	79986	3052	2764	2406	948	1634

- ECG cardiac rhythm can be documented in E14.03 Cardiac Rhythm in the Assessment/Vital Signs group. The performance measure is based on "ischemia" and "ST elevation" values. These values are used to build the patients who met cardiac alert criteria performance measure. NEMSIS v2.2 utilizes E19.03 Procedures for capturing Cardiac Alert data. "Specialty Center Activation-STEMI" is the state defined value for a Cardiac Alert. As seen on the graph, it was only used once to document an activation. A new data element of eDisposition.24 - Destination Team Pre-Arrival Alert or Activation has been added to NEMSIS v3.4.0 for capturing of the activation, including date and time, of the receiving facility.

- Outcome data from the regional level is not available to measure provider accuracy when cardiac alert is activated.

Cardiac Performance - 12 Lead Acquisition

Cardiac Performance - Time to 12 Lead 90th Percentile   (H:MM:SS)

Legend: 12 Lead Acquisition — Mean — Lower Control Limit 2σ — Upper Control Limit 2σ — Lower Control Limit 3σ — Upper Control Limit 3σ

	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2
12 Lead Acquisition	0:16:00	0:15:00	0:15:00	0:18:00	0:16:00	0:14:00
	n=997	n=1497	n=1464	n=342	n=1033	n=948

12 Lead Time to Acquisition (H:MM:SS)
Foothills and Mile High RETAC
2014 Q1

Response Time

n=	997
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:09:00
Maximum	0:52:00
IQR	0:06:00
Lower Whisker	0:00:00
Upper Whisker	0:18:00

Outlier Count

Lower outliers	0
Upper outliers	74

Percentile

80th Percentile	0:11:00
90th Percentile	0:16:00

◆ 80th Percentile   ● 90th Percentile
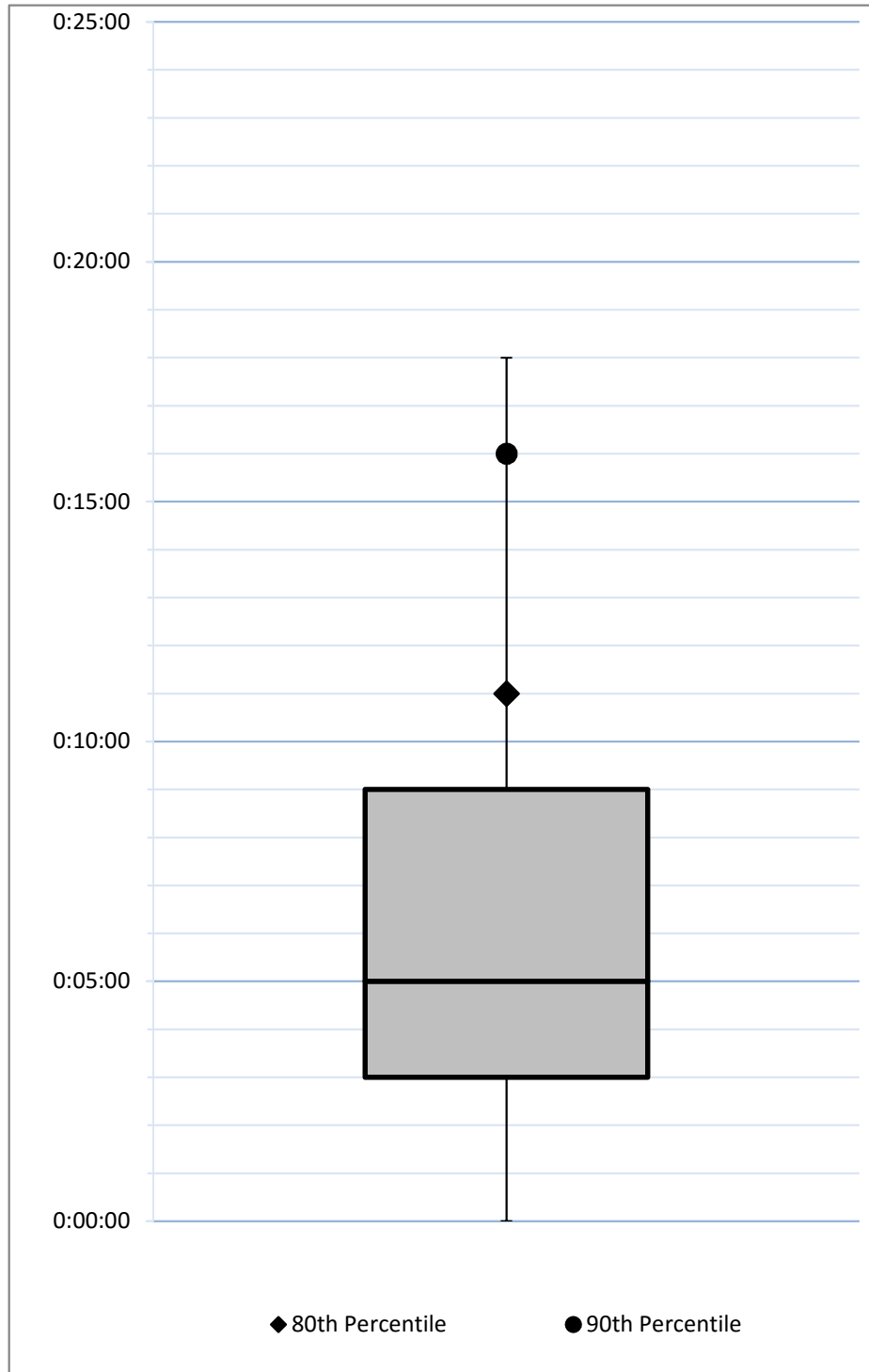
12 Lead Time to Acquisition (H:MM:SS)
Foothills and Mile High RETAC
2014 Q2

Response Time

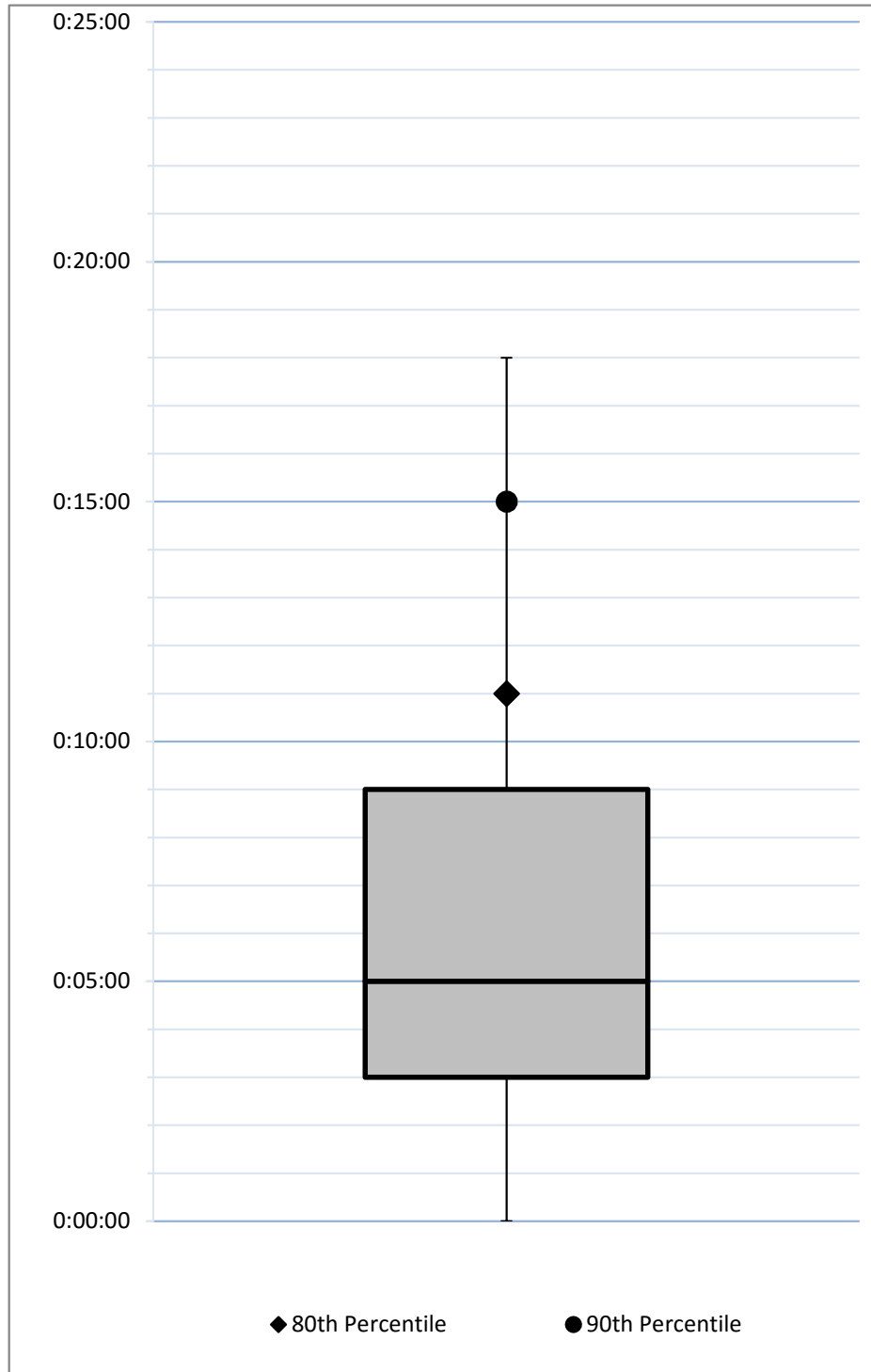|	
n=	1497
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:09:00
Maximum	0:59:00
IQR	0:06:00
Lower Whisker	0:00:00
Upper Whisker	0:18:00

Outlier Count

Lower outliers	0
Upper outliers	90

Percentile

80th Percentile	0:11:00
90th Percentile	0:15:00

12 Lead Time to Acquisition (H:MM:SS)
Foothills and Mile High RETAC
2014 Q3

Response Time

n=	1464
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:09:00
Maximum	0:55:00
IQR	0:06:00
Lower Whisker	0:00:00
Upper Whisker	0:18:00

Outlier Count

Lower outliers	0
Upper outliers	97

Percentile

80th Percentile	0:11:00
90th Percentile	0:15:00

◆ 80th Percentile   ● 90th Percentile

12 Lead Time to Acquisition (H:MM:SS)
Foothills and Mile High RETAC
2014 Q4

Response Time
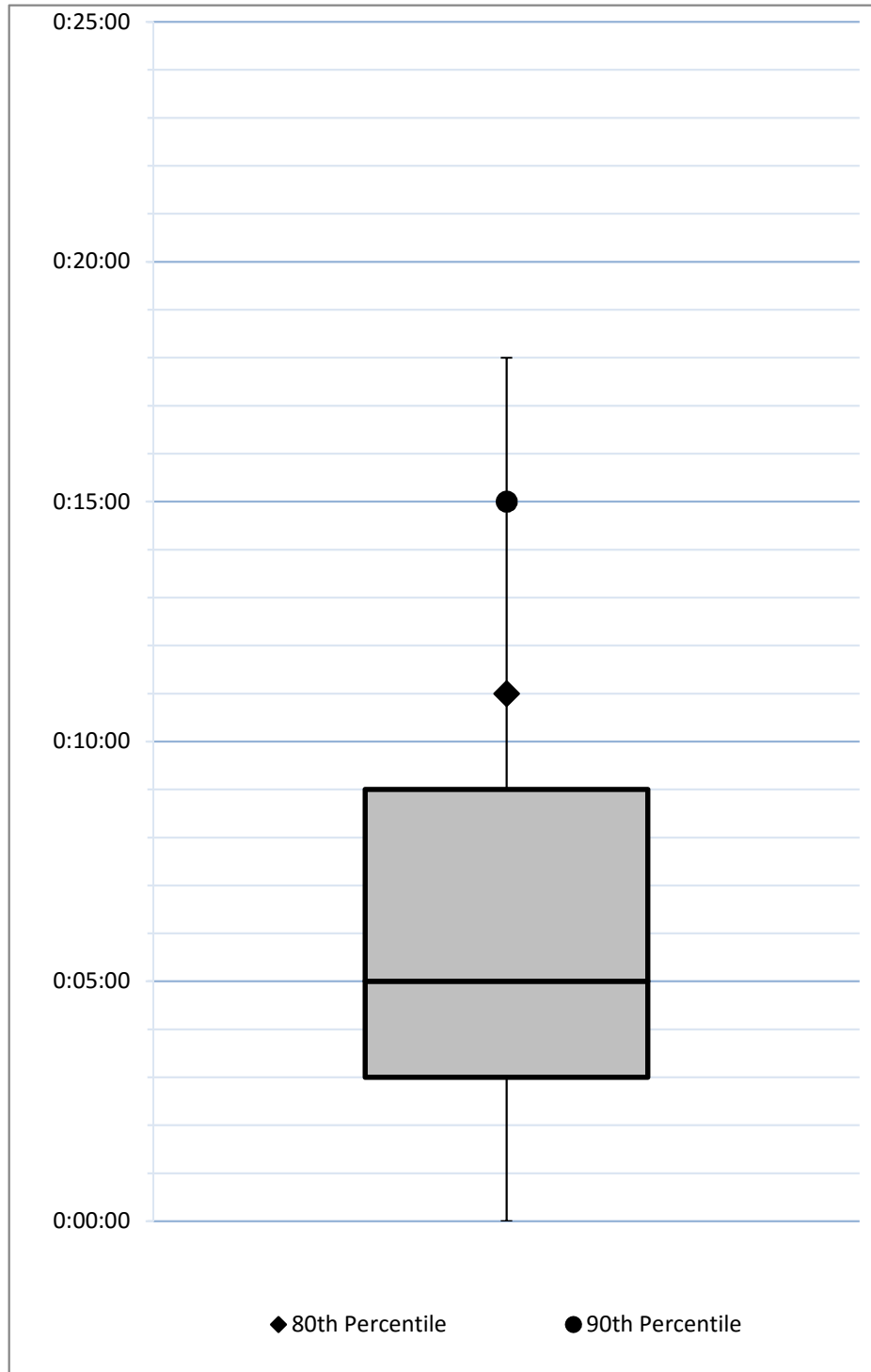
n=	342
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:10:00
Maximum	0:46:00
IQR	0:07:00
Lower Whisker	0:00:00
Upper Whisker	0:20:30

Outlier Count

Lower outliers	0
Upper outliers	25

Percentile

80th Percentile	0:11:24
90th Percentile	0:18:00

◆ 80th Percentile   ● 90th Percentile

12 Lead Time to Acquisition (H:MM:SS)
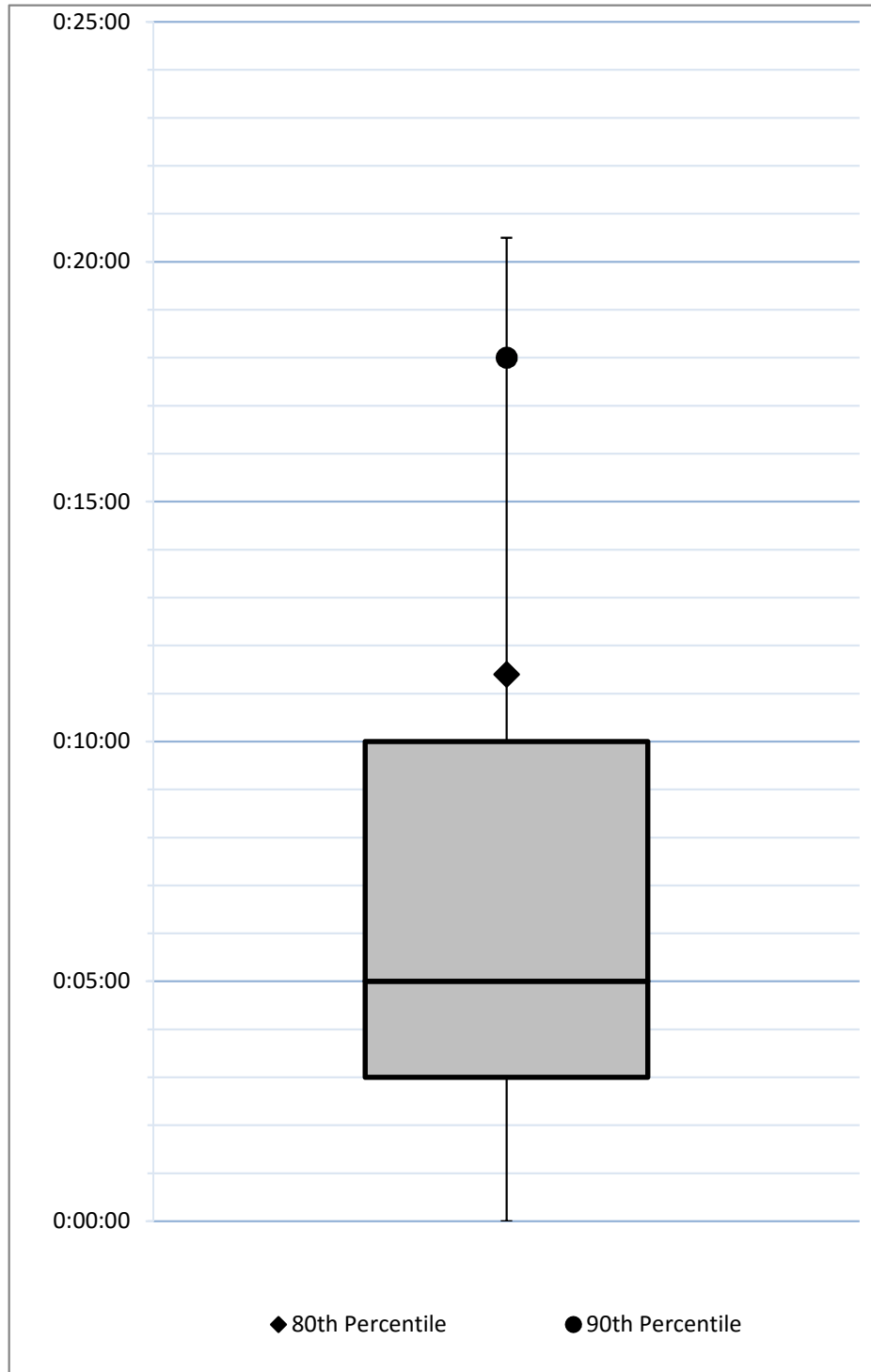## Foothills and Mile High RETAC
2015 Q1

Response Time

n=	1033
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:10:00
Maximum	0:59:00
IQR	0:07:00
Lower Whisker	0:00:00
Upper Whisker	0:20:30

Outlier Count

Lower outliers	0
Upper outliers	47

Percentile

80th Percentile	0:11:00
90th Percentile	0:16:00

◆ 80th Percentile   ● 90th Percentile

12 Lead Time to Acquisition (H:MM:SS)
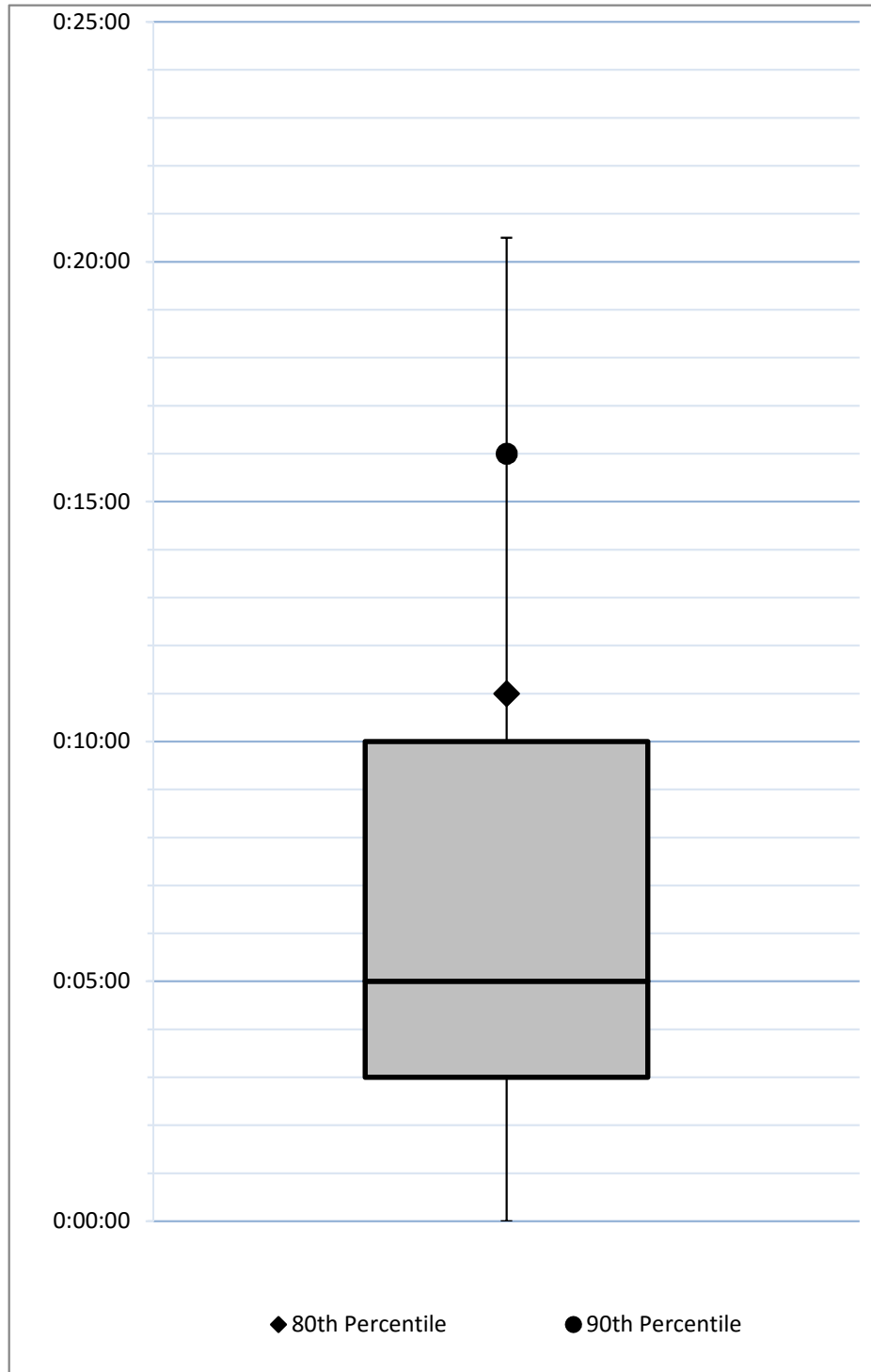## Foothills and Mile High RETAC
2015 Q2

Response Time

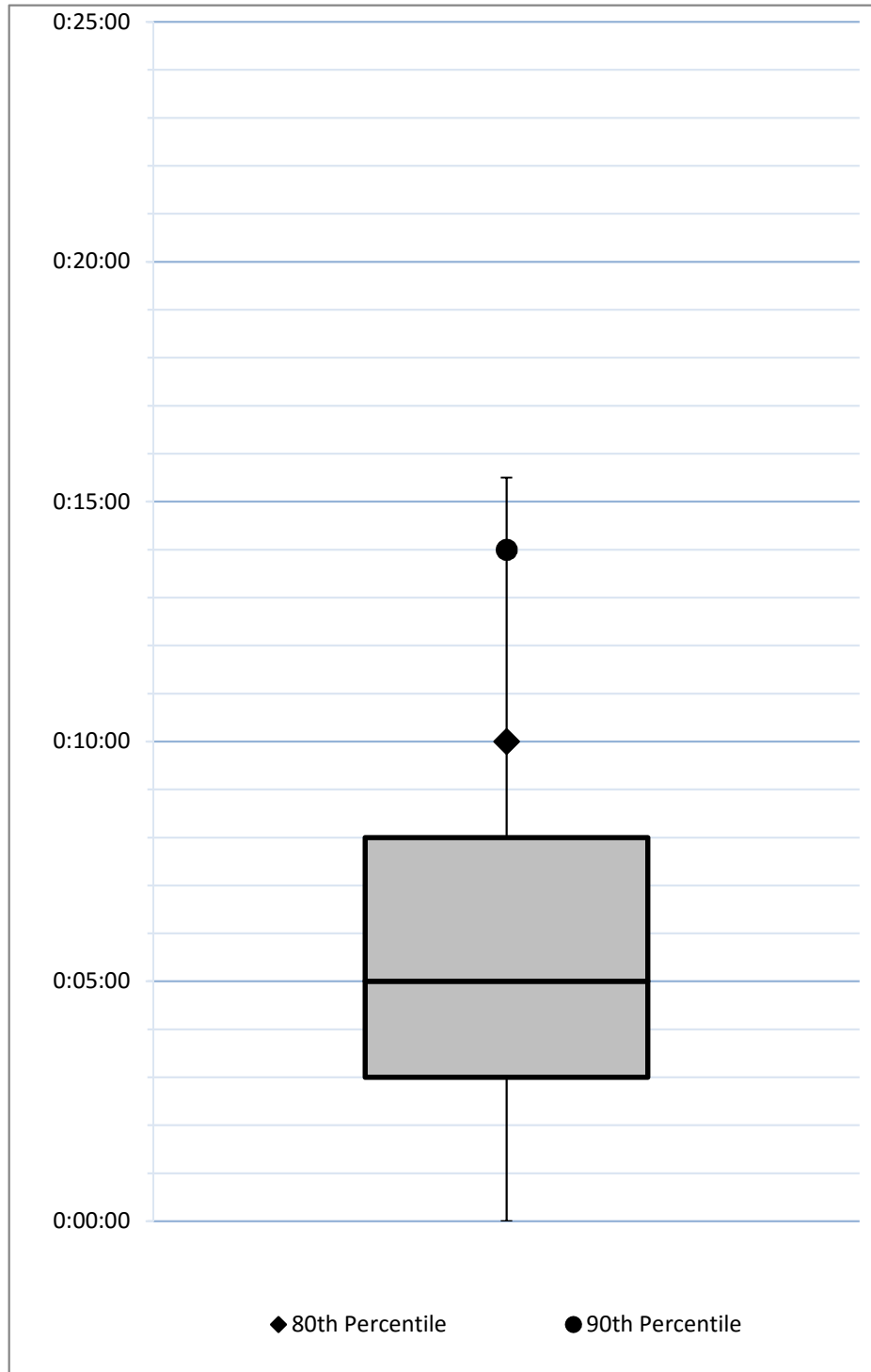|	
n=	948
Minimum	0:00:00
Q1	0:03:00
Median	0:05:00
Q3	0:08:00
Maximum	1:00:00
IQR	0:05:00
Lower Whisker	0:00:00
Upper Whisker	0:15:30

Outlier Count

Lower outliers	0
Upper outliers	75

Percentile

80th Percentile	0:10:00
90th Percentile	0:14:00

◆ 80th Percentile   ● 90th Percentile

Cardiac Performance - Aspirin Administration

Legend: 12 Lead Acquisition · Mean · Lower Control Limit 2σ · Upper Control Limit 2σ · Lower Control Limit 3σ · Upper Control Limit 3σ

2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2
57%	59%	56%	58%	58%	55%
n=1591	n=2209	n=2389	n=607	n=1802	n=1634
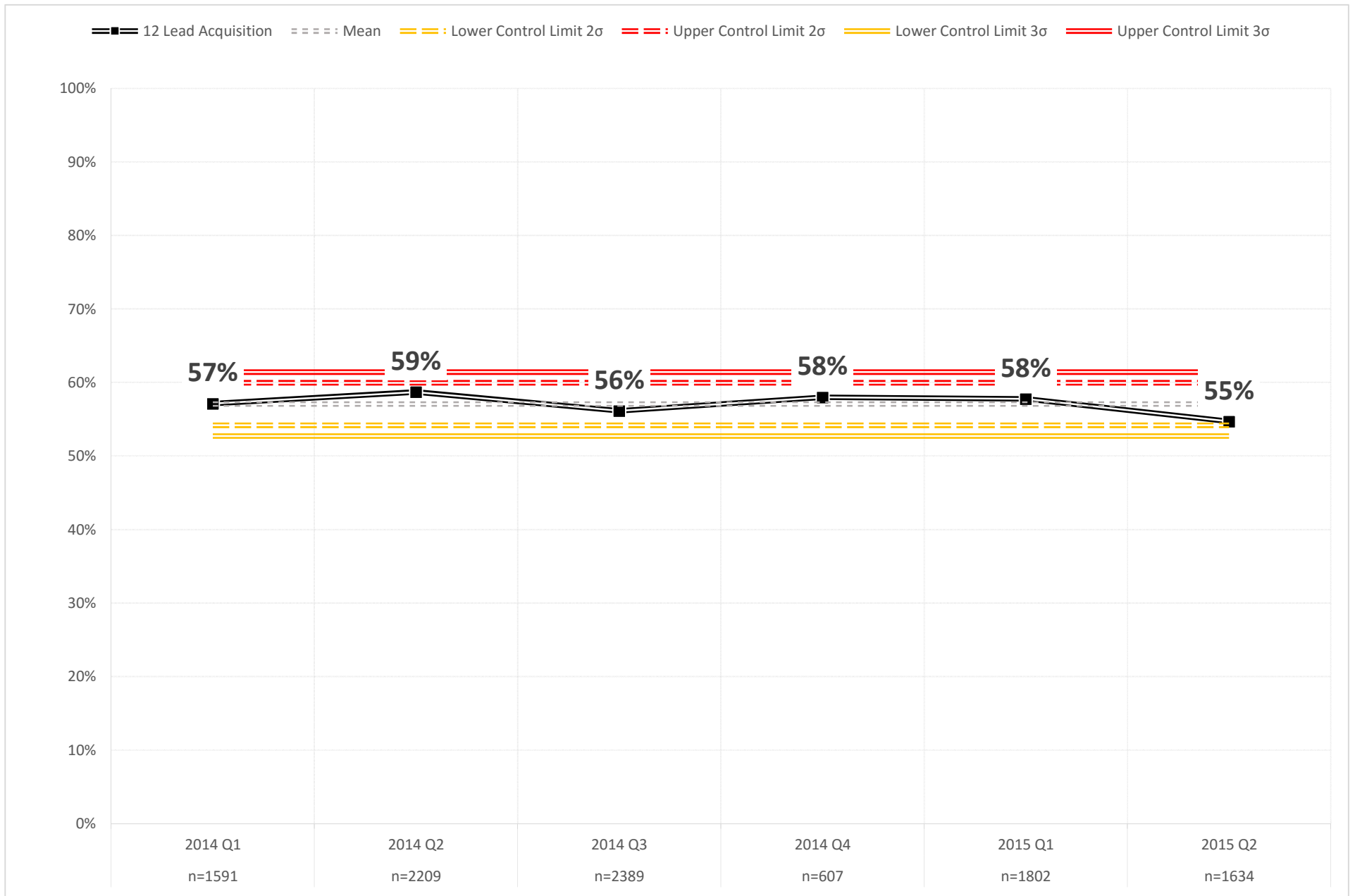
Cardiac Performance Measure
Count Patients Who Met Cardiac Alert Criteria and Activations
Foothills and Mile High RETAC
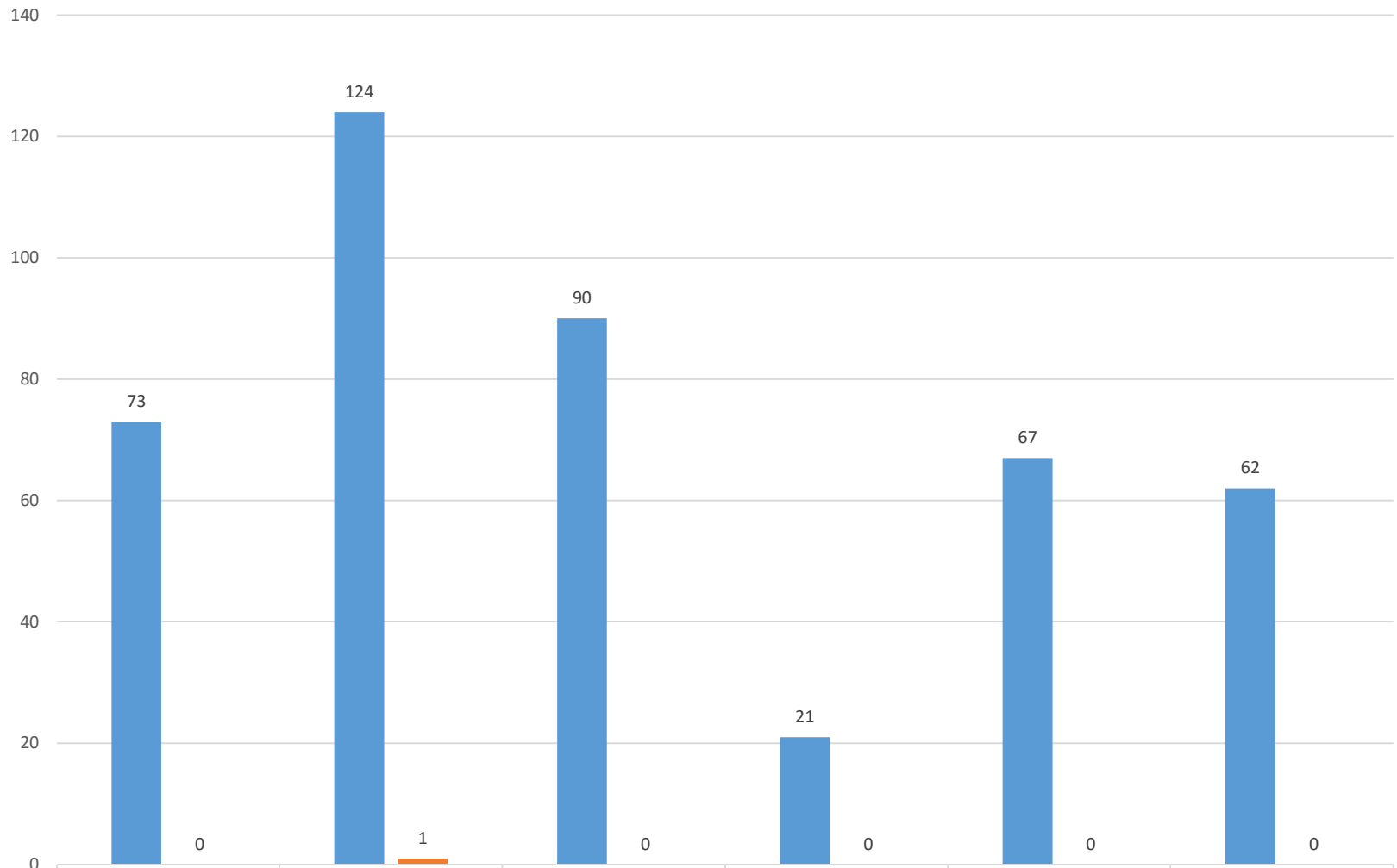
	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2
Count of ST Elevation	73	124	90	21	67	62
Activations	0	1	0	0	0	0

Suspected Cardiac Chest Pain and ST-Segment Elevation Myocardial Infarction (STEMI) Performance Measures

EVIDENCE BASED SOURCE:	Emergency Medical Services Performance Measures: Recommended Attributes and Indicators for System and Service Performance; NHTSA, December 2009. 7 (CC), 8 (CC), and 9 (CC) Evidence-Based Performance Measures for Emergency Medical Services Systems: A Model for Expanded EMS Benchmarking; Myers, et al. Prehospital Emergency Care 2008; 12:141-151. California EMS System Core Quality Measures Data Years 2012/2013; Emergency Medical Service Authority: California Health and Human Services Agency, January 2013.

Performance Measure Name:		Performance Measure Question:
Acquisition of 12-lead		What is the number and/or percentage of patients with suspected cardiac chest pain or other cardiac symptoms who received a 12-lead for patients 35 years and older?

DATA FIELDS

NAME (NEMSIS v2DATA)	INCLUSION CRITERIA	EXCLUSION CRITERIA	Calculation Data
Age (E06_14)		<35 years old	Count of patients <35 years old
Provider primary impression (E09_15)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Provider secondary impression (E09_16)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Procedures performed (E19_03)	12-lead ECG		Count of 12-lead ECG performed

CALCULATIONS

REPORTING FREQUENCY	Quarterly
Greater than 20 patients	(Procedure Performed - Age) ÷ (Provider primary impression + Provider secondary impression - Age) = Percentage of 12-lead acquired
20 patients or less	Ratio – (Procedure performed - Age) / (Provider primary impression + Provider secondary impression - Age)

Performance Measure Name:		Performance Measure Question:
Time to 12-lead performed		What is the measure of time from first patient contact to first 12-lead performed for patients with suspected cardiac chest pain or other cardiac symptoms for patients 35 years and older?

DATA FIELDS

NAME (NEMSIS v2DATA)	INCLUSION CRITERIA	EXCLUSION CRITERIA	Calculation Data
Data from "Acquisition of 12-lead" will be used for this performance measure; use only patients who were counted in this performance measure			
Arrived at patient date/time (E05_07)			First patient contact time
Date/Time Procedure Performed Successfully (E19_01)	First 12-lead		First 12-lead time

CALCULATIONS

REPORTING FREQUENCY	Quarterly
How patient contact time is collected	2 choices – "Hard time stamp" which is documented immediately at time of patient contact or "Soft time stamp" which is documented after the call has ended
Time to 12-lead	90th percentile of (12-lead time - First patient contact time)

Performance Measure Name:		Performance Measure Question:	
Aspirin administration		What is the number and/or percentage of patients with suspected cardiac chest pain or other cardiac symptoms for patients between 35 years and 85 years old who received aspirin?	

DATA FIELDS			
NAME (NEMSIS v2DATA)	INCLUSION CRITERIA	EXCLUSION CRITERIA	Calculation Data
Age (E06_14)		<35 years and >85 years old	Count of patients <35 years and >85 years old
Provider primary impression (E09_15)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Provider secondary impression (E09_16)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Prior Aid (E09_01)		Aspirin	Count of aspirin given prior to arrival
Medication allergies (E12_08)		Aspirin	Count of aspirin allergies
Medication given (E18_03)	Aspirin		Count of aspirin given

CALCULATIONS	
REPORTING FREQUENCY	Quarterly
Greater than 20 patients	(Medication given - Age) ÷ (Provider primary impression + Provider secondary impression - Age - Medication allergies - Prior Aid) = Percentage of aspirin administration
20 patients or less	Ratio – (Medication given - Age) / (Provider primary impression + Provider secondary impression - Age - Medication allergies - Prior Aid)

Performance Measure Name:		Performance Measure Question:	
Patients who met criteria for Cardiac Alert		What is the number patients who met criteria for a Cardiac Alert 35 years to 85 years old?	

DATA FIELDS			
NAME (NEMSIS v2DATA)	INCLUSION CRITERIA	EXCLUSION CRITERIA	Calculation Data
Age (E06_14)		<35 years old and >85 years old	Count of patients <35 years old and >85 years old
Provider primary impression (E09_15)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Provider secondary impression (E09_16)	Suspected cardiac chest pain or other cardiac symptoms		Count of suspected cardiac chest pain or other cardiac symptoms
Cardiac rhythm (E14_03)	STEMI (≥1 mm ST segment elevation in 2 or more contiguous leads)	Wide complex rhythm	Count of STEMI

CALCULATIONS	
REPORTING FREQUENCY	Quarterly
Patients who met criteria for Cardiac Alert	(STEMI - Age) = Count of patient who met criteria for Cardiac Alert

Performance Measure Name:		**Performance Measure Question:**	
Patients who met criteria for cardiac alert but it was not called		What is the number and/or percentage of patients who met criteria for a Cardiac Alert but it was not called between 35 years and 85 years old?	
DATA FIELDS			
NAME (NEMSIS v2DATA)	**INCLUSION CRITERIA**	**EXCLUSION CRITERIA**	**Calculation Data**
Data from "Patients who met criteria for Cardiac Alert" will be used for this performance measure			
Specialty Center Activation-STEMI (101.104 Procedures D04_04)	Cardiac Alert activation = "No"		Count of "No" Cardiac Alert activations
CALCULATIONS			
REPORTING FREQUENCY	Quarterly		
Greater than 20 patients	Count of "No" Cardiac Alert activation ÷ Patients who met criteria for Cardiac Alert = Percentage of patients who met criteria but it was not called		
20 patients or less	Ratio – Count of "No" Cardiac Alert activation / Patients who met criteria for Cardiac Alert		

Performance Measure Name:		**Performance Measure Question:**	
Provider accuracy when Cardiac Alert is called		What is the number and/or percentage of Cardiac Alerts called by field providers that were diagnosed as a STEMI by the receiving facility?	
DATA FIELDS			
NAME (NEMSIS v2DATA)	**INCLUSION CRITERIA**	**EXCLUSION CRITERIA**	**Calculation Data**
Specialty Center Activation-STEMI (101.104 Procedures D04_04)	Cardiac alert activation = "Yes"		Count of cardiac alert activations
Patient outcome (from receiving facility)	Diagnosed STEMI		Count of patient outcome diagnosed as STEMI by receiving facility
CALCULATIONS			
REPORTING FREQUENCY	Quarterly		
Greater than 20 patients	Diagnosed STEMI ÷ Cardiac Alert activation = Cardiac Alert accuracy percentage		
20 patients or less	Ratio – Diagnosed STEMI / Cardiac Alert activation		