EMS Core Measures Project

Reporting Capability of EMSA and LEMSA Data Systems

and

Results from Clinical Measures Reports

Data Years 2012 - 2013

Funded by a grant from The California HealthCare Foundation (No. 16933)

June 2014

EMS Core Measures Project, Reported 2014: Reporting Capability of EMSA and LEMSA Data Systems and Results from Clinical Measure Reports

Introduction

The purpose of emergency medical services (EMS) is to provide timely and appropriate emergency medical care and transportation of the ill and injured, thereby reducing death and disability. EMS is an integral part of every community's emergency health care delivery system, and continuous quality improvement (QI) practices must become an essential part of EMS systems. Evaluation of standard clinical and response performance indicators is a crucial component of a quality improvement program to ensure that EMS services operate safely and effectively and follow evidence based clinical practices to maximize outcomes.

Robust data systems, with the ability to report clinical indicators and performance measures, are a key tool to accomplish quality improvement activities. In order to optimally evaluate patient outcomes, the continuum of care from dispatch to pre-hospital to hospital disposition must be connected.

Background

California is a large, diverse state with a two-tiered regulatory system consisting of State EMSA and 33 local EMS agencies (LEMSA). California statute (Health and Safety Code 1797.103) maintains that one of the required elements of an EMS system is data collection and evaluation, and mandates the establishment and development of quality improvement guidelines. Local EMS agencies are required to plan, implement, and evaluate an EMS system (CCR Title 22 Division 9 Chapter 12). As such, they are charged with the responsibility for establishing a data collection system and setting standards at the local level. Additionally, the EMS system quality improvement regulations define the requirements for LEMSAs, EMS service providers, and base hospitals. These requirements include, but are not limited to the implementation of an EMSA approved EMS Quality Improvement Program, and the use of defined indicators to assess the local EMS system.

In April 2012, the EMS Authority received a grant award from the California HealthCare Foundation (CHCF) to support data and quality management activities. As part of the work plan for this one-year grant period, the EMS Authority tested the ability of its current data assets to answer questions about EMS in California. The process of testing and analyzing the results were performed by the State in collaboration with local and regional EMS partners. After seeing the promising results from the first year of the program, CHCF agreed to allow carry-over funding to support a second year of the project from July 2013 through June 2014.

A task force was convened to assist in the development of these core measures, consisting of key data and quality leaders from local EMS agencies, medical directors, hospitals, and pre-hospital EMS providers. The measures are based on evidence-based processes and treatments for a condition or illness. Core measures help EMS systems improve the quality of patient care by focusing on key processes and results of care. The California EMS System Core Quality Measures, EMSA 166, Appendix E defines the specific definitions, data sources, and methodology for reporting each measure. The measures were refined after the first year to yield better results.

Reporting Capability

California EMS Information System (CEMSIS)

Prior to development of the Core Measures, the CEMSIS demonstration project had not been comprehensively evaluated. EMSA engaged a contractor to evaluate the CEMSIS system, which had been in use for three years and had accumulated approximately 600,000 patient care records submitted by seventeen local EMS agencies.

The *Health Services Advisory Group*, a contractor experienced in evaluating quality improvement initiatives found that the existing CEMSIS system had a number of weaknesses that made validated EMS information difficult to collect and to report. Problems included errors in the data dictionary, errors during local data transmission, and inconsistencies found inside the state system itself. Overall, CEMSIS was able to produce data for only nine of the 28 core measure reports. For a single LEMSA, CEMSIS could generate, on average, six of nine reports. Only a fraction of these reports appeared to reflect actual EMS business processes as determined by EMSA.

In the second year of this project, EMSA entered into an agreement with Inland Counties EMS Agency (ICEMA) to utilize their new data system, ImageTrend®, which is proving to be more capable of receiving data from LEMSAs with fewer errors and generating reports. In twelve months, the new database has received 1.5 million records from fourteen LEMSAs. Since the system is new, there are relatively few LEMSAs submitting data; however, work to receive data from the varied local systems is progressing well. California does not have a single, statewide data system and variability exists between LEMSA data systems.

Methods

Year two measures relied on retrospective data collected prior to the development of the measures for 2013. At this time, CEMSIS is still unable to run reports on the core measures from the state-level aggregated data due to the limited number of LEMSAs able to submit their records. LEMSAs submit reports based on analysis of their local database.

The LEMSAs faced many challenges in reporting the core measures to EMSA. These are enumerated below. Despite multiple barriers, the LEMSAs embraced the need for EMS quality core measures and understand the value in standardized metrics statewide. Of the 33 LEMSAs, 31 were able to report at least one clinical measure for 2013 data.

OSHPD analysts conducted some analyses of the aggregated results to evaluate the consistency and validity of the data. They categorized the seventeen clinical measures into two groups: scene time (measures TRA-1, ACS-3, and STR-3) and scores (measures TRA-2, ACS-1, ACS-2, ACS-5, CAR-2, CAR-3, CAR-4, STR-2, STR-5, RES-2, PED-1, PAI-1, SKL-1, SKL-2). An OSHPD analyst reviewed the data to determine if additional analysis could be done to explore data validity and confidence.

Limitations

Core measure reporting is a new project that depends on the development of compatible data systems at several levels of the EMS system and will take several more years to achieve the level of confidence of other healthcare sector quality assessment reporting. Barriers and limitations during reporting years one and two for LEMSAs to report core measures include the following:

New data systems - Some of the LEMSAs had migrated to new data systems and the prior data was no longer available or the LEMSA was unable to incur the costs of retrieving the data. This problem was noted in the first year of the project, and continued to be a barrier to success in year two for several jurisdictions.

Variability in data collection methodology – In a 2013 Health Information Exchange Readiness Survey conducted by Lumetra, ten of 32 EMS systems reported use paper pre-hospital care reports (PCR) by at least one provider in their region, while other providers use electronic patient care record (ePCR). Abstracting information from paper forms is difficult, time-consuming, and not necessarily accurate. In contrast, some software systems with ePCR have a high degree of technological sophistication with rules that forces users to complete forms before closing the record. This barrier will continue to be a problem until all providers and LEMSAs are using ePCR.

Documentation by Non-Trained Providers - EMS field personnel did not receive advanced training prior to data entry. Consequently, responders likely did not consistently record all the data elements required for core measures. With additional education and training, the problems caused by this will diminish. New ePCR software has rules that can mandate values for key fields.

Data Sampling - Some LEMSAs reported measures using sampling and abstracting rather than conducting an analysis of all of their annual population data. While theoretically this should not make a difference, this could be a source of bias for information reporting. This is most notable when examining the denominator populations reported by the LEMSAs, where it is unclear what population was considered for a given measure.

Hospital Outcome Data – Similar to last year, one of the clear challenges identified was the difficulty in obtaining hospital outcome data on every ambulance transport. These measures rely upon the hospital to report survival to emergency department discharge and survival to hospital discharge. While the response rate increased for specific cardiac arrest outcome measures (CAR- 3 and CAR-4), these measures did not have the number of responses expected from the LEMSAs.

Patient Records in Tiered EMS systems - One of the significant challenges of reporting EMS information is related to the nature of the “tiered” EMS system in place in most of California. Because EMS first responders and separate ambulance transport units that arrive at a later time often two (2) records are initiated for each patient. LEMSAs have not established a mechanism—either manually or technologically—to capture the full treatment provided to a single patient. This inability to aggregate first responder data with transport provider data could lead to a conclusion that care was not provided, when in fact, it may have been provided to the patient by a different provider. This is a critical policy issue and highlights the need for a “one patient, one record” system to allow for a complete picture of patient care.

OSHPD noted several similar and a few additional limitations.

Aggregate data--The data provided is aggregated summary data reported by each LEMSA, not individual patient-level data, which limits the types of analyses that can be done. More in-depth statistical analyses could be performed if patient-level data from all LEMSAs had been collected.

Data quality and reliability--There are many differences in data collection and reporting practices across LEMSAs. This lack of data standardization and consistency further limited analysis and limit reliability of the measures reported by each LEMSA. Though all LEMSAs were given the same instructions to calculate the measures, not all LEMSAs were able to adhere to instructions due to many constraints and inconsistencies in data collection and measure calculation methods. Greater data standardization would lead to results with greater certainty of accuracy and comparability. Unless data quality checks or audits are performed by LEMSAs before measures were calculated and submitted, the accuracy of the data cannot be ascertained. This is compounded where there is manual data entry.

Data Sampling-- It is generally not possible to perform comparative analyses using sample data from some LEMSAs and population-based data from others. If sample data were to be used in the future, then all LEMSAs should sample their entire dataset in the same manner using a standardized sampling scheme. Statistical expertise is needed to properly identify the most appropriate sampling method, and it must be done consistently.

In future years, system improvements that will facilitate data collection and more accurate reporting include:

1. Additional LEMSAs successfully exporting data to CEMSIS
2. CEMSIS accumulating sufficient records to generate reports on core measures, and
3. Transition to NEMSIS 3.x, a national, standardized data dictionary.

Recommendations on future methodology development (from OSHPD analysts)

- Utilize patient-level data for measure calculation. This may be made easier for LEMSAs in the future with the establishment of the (NEMSIS) Version 3 system.
- Optimally, utilize the entire dataset of all LEMSA data versus summarized measures calculated by each LEMSA.
- Standardize the methodology and data collection for measure calculation.
- Utilize all patient-level data for measure calculation; do not sample. This will allow for greater statistical power, so statistically valid conclusions can be made.
- Perform routine data audit and quality checks to assure accuracy of the data that are used to calculate the measures.

- Patient-identifying data elements would allow linkages to OSHPD's Patient Discharge Dataset and Emergency Department Dataset for calculating measures CAR-3 and CAR-4. This would also help to identify duplicate records to avoid double-counting (or multi-counting) of patients.

- More consistent reporting of all measures by all LEMSAs is necessary for true comparability to evaluate the entire California EMS system and to identify procedures that should be targeted and steps that should be initiated to improve EMS care and response.

General Findings

- LEMSAs serving a population size of less than 200,000 tended to report fewer measures overall.

- There was large variation for all the measures, both across LEMSAs and within each LEMSA.

Results

LEMSAs Reporting Data For Any Core Measure (Table 1)

The BLUE cells, with "NEW" on the table, correspond to LEMSAs that reported one or more measures for that data year in the second year of reporting. WHITE cells indicate LEMSAs that did not submit any measures for that data year in either the first or second year of the project. GREEN cells with "X" denote a LEMSA that submitted at least one core measure during the first year of reporting.

- Utilizing their current system methodology, of the seventeen clinical and three response and transport measures, 32 of 33 (97%) of the LEMSAs were able to submit at least one core measure for any year (2012-2013).
- For data year 2012, 25 of 32 LEMSAs were able to report information to EMSA. For 2013 data submissions, that number increased to 32 of the 33 LEMSAs (97%) being able to report core measure information on at least one measure. (The number of LEMSAs increased because Napa County split off from a regional LEMSA and became independent.) Six LEMSAs submitted core measures reports for the first time.
- Imperial County EMS was the only LEMSA that did not report data in either 2012 or 2013. El Dorado County EMS was only able to submit information on two of the three response and transport measures but none of the measures.
- 25 of the 32 LEMSAs (78%) were able to report at least one of seventeen clinical measures from 2012 data. 31 of 33 LEMSAs (94%) were able to submit at least one clinical measure from 2013 data. Several LEMSAs reported that they had changed data systems during the past several years, which limited their ability to report either some of the clinical elements or some of the years requested.

LEMSAs Reporting Data For Any Core Measure (Table 1)

	2009	2010	2011	2012	2013
Alameda County EMS		X	X	NEW	NEW
Central California EMS	X	X	X	X	NEW
Coastal Valleys EMS				NEW	NEW
Contra Costa County EMS		X	X	X	NEW
El Dorado County EMS				NEW	NEW
Imperial County EMS					
Inland Counties EMS	X	X	X	X	NEW
Kern County EMS		X	X		NEW
Los Angeles County EMS	X	X	X	NEW	NEW
Marin County EMS		X	X		NEW
Merced County EMS	X	X	X	X	NEW
Monterey County EMS		X	X	X	NEW
Mountain Valley EMS		X	X	NEW	NEW
Napa County EMS					NEW
North Coast EMS		X	X	NEW	NEW
Northern California EMS	X	X	X	X	NEW
Orange County EMS					NEW
Riverside County EMS		X	X	X	NEW
Sacramento County EMS		X	X	NEW	NEW
San Benito County EMS					NEW
San Diego County EMS		X	X	NEW	NEW
San Francisco EMS	X	X	X	NEW	NEW
San Joaquin County EMS				X	NEW
San Luis Obispo County EMS		X	X	X	NEW
San Mateo County EMS		X	X	X	NEW
Santa Barbara County EMS	X	X	X	NEW	NEW
Santa Clara County EMS	X	X	X	X	NEW
Santa Cruz County EMS	X	X	X		NEW
Sierra-Sacramento Valley EMS	X	X	X	NEW	NEW
Solano County EMS				NEW	NEW
Tuolumne County EMS		X	X	X	NEW
Ventura County EMS				X	NEW
Yolo County EMS					NEW
Totals Measure Responses (including RSTs and 2014 Measures)	10	23	23	25	32

Clinical Measures Response Count, Submission Rate, Average, and Median as Reported by LEMSA (Table 2)

This table displays the response count, denominator population, submission rate, average, and median of each measure for 2012 and 2013 data.

Eleven of the seventeen measures had a 75% response rate or greater. The following measures were reported by 25 of 33 LEMSAs (75%):

- TRA-1 Scene time for severely injured trauma patients
- TRA-2 Direct transport to designated trauma center for severely injured trauma patients meeting criteria
- ACS-1 Aspirin administration for chest pain/discomfort rate
- ACS-2 12 lead ECG performance
- ACS-3 Scene time for suspected heart attack patients
- ACS-5 Direct transport to designated STEMI receiving center for suspected patients meeting criteria
- CAR-2 Out-of-hospital cardiac arrests return of spontaneous circulation
- STR-2 Glucose testing for suspected acute stroke patients
- STR-3 Scene time for suspected acute stroke patients
- STR-5 Direct transport to stroke center for suspected acute stroke patients meeting criteria
- RES-2 Beta2 agonist administration for adult patients
- PED-1 Pediatric asthma patients receiving bronchodilators
- PAI-1 Pain intervention
- SKL-1 Endotracheal intubation success rate
- SKL-2 End-tidal CO2 performed on any successful endotracheal intubation

Measures with the lowest response rate included:

- CAR-3 Out of hospital Cardiac Arrest Survival to Emergency Department Discharge
- CAR-4 Out of hospital Cardiac Arrest Survival to Hospital Discharge

Both measures proved difficult to obtain in the first year of the core measure project, with eight of 32 (25%) reporting CAR-3 and nine of 32 (28%) reporting from 2011 data. CAR-4 in 2011. CAR-3 and CAR-4 measurements were equally challenging this year due to the inability of LEMSAs to obtain hospital outcome data. This will continue to be a challenge for future years. The next lowest response count for a measure was PAI-1 Pain Intervention with a 58% response rate (19 of 33) for 2013.

Clinical Measures Response Count, Denominator Total, Submission Rate, Average, and Median as Reported by LEMSA (Table 2)

2012

Measure ID	TRA-1	TRA-2	ACS-1	ACS-2	ACS-3	ACS-5	CAR-2	CAR-3	CAR-4	STR-2	STR-3	STR-5	RES-2	PED-1	PAI-1	SKL-1	SKL-2
Response Count	17	17	22	22	20	21	21	11	10	22	20	16	21	20	16	21	20
Denominator Total	14918	12185	90238	75642	11523	11598	10023	7991	7446	33872	34197	20822	52807	2829	135417	9130	6100
Submission Rate (n=32)	51.52%	51.52%	66.67%	66.67%	60.61%	63.64%	63.64%	33.33%	30.30%	66.67%	60.61%	48.48%	63.64%	60.61%	48.48%	63.64%	60.61%
Average	0:22:40	68.91%	60.36%	71.21%	0:23:00	79.56%	23.56%	24.01%	10.87%	66.02%	0:21:49	55.39%	56.28%	60.98%	53.44%	79.23%	72.51%
Median	0:21:48	70.30%	57.23%	78.80%	0:23:36	92.00%	25.00%	24.00%	10.62%	76.12%	0:22:24	72.67%	64.00%	68.80%	36.70%	80.45%	85.32%

25 Total Submissions considered in this table

2013

Measure ID	TRA-1	TRA-2	ACS-1	ACS-2	ACS-3	ACS-5	CAR-2	CAR-3	CAR-4	STR-2	STR-3	STR-5	RES-2	PED-1	PAI-1	SKL-1	SKL-2
Response Count	23	25	27	28	28	27	27	12	11	27	26	20	27	27	19	25	22
Denominator Total	16382	9481	108544	118811	13587	11316	16825	14242	14026	34364	31196	23389	62830	5254	131130	11930	10032
Submission Rate (n=33)	69.70%	75.76%	81.82%	84.85%	84.85%	81.82%	81.82%	36.36%	33.33%	81.82%	78.79%	60.61%	81.82%	81.82%	57.58%	75.76%	66.67%
Average	0:22:20	70.01%	65.51%	75.90%	0:22:36	75.56%	28.90%	28.82%	10.82%	81.88%	0:21:03	69.80%	58.48%	56.96%	45.18%	74.61%	71.34%
Median	0:22:00	82.00%	67.34%	80.80%	0:22:44	91.53%	25.25%	30.12%	11.53%	87.00%	0:20:10	86.00%	61.59%	64.18%	33.23%	75.57%	78.86%

31 Total Submissions considered in this table

LEMSA Response Count to Clinical Measures (Graph 1 Graph 2 and Table 3)

Also of interest to EMSA, was which clinical measures had the most ability to be evaluated at the LEMSA level. Out of the seventeen clinical measures, 25 of 33 LEMSAs (75%) were able to report nine or more.

The ability (or inability) to report these measures is not indicative of a LEMSAs commitment to data collection or quality improvement. It is an indicator of the ability of the LEMSA data system to report retrospective clinical data. The barriers previously mentioned impacted the ability of the LEMSAs to report this information.

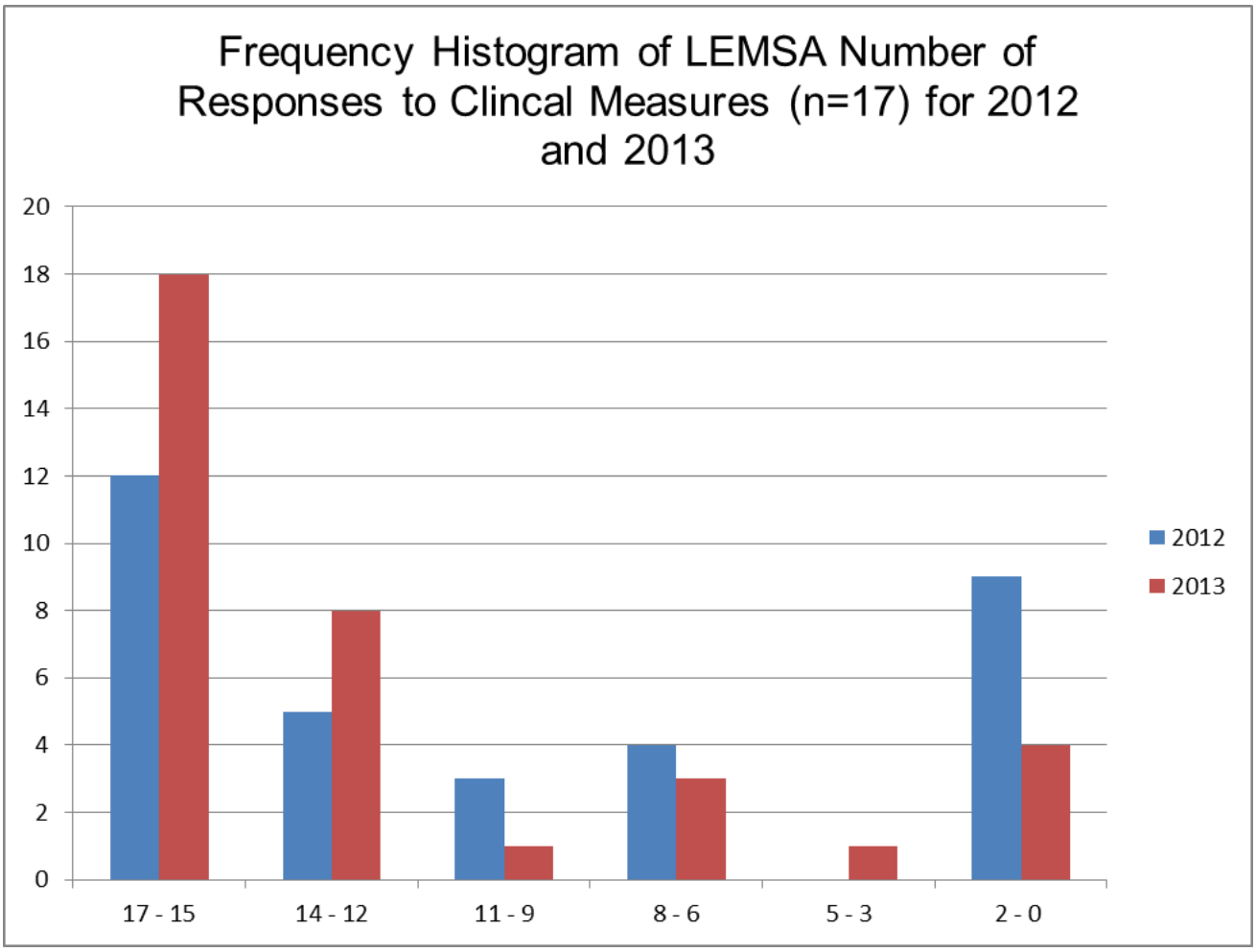
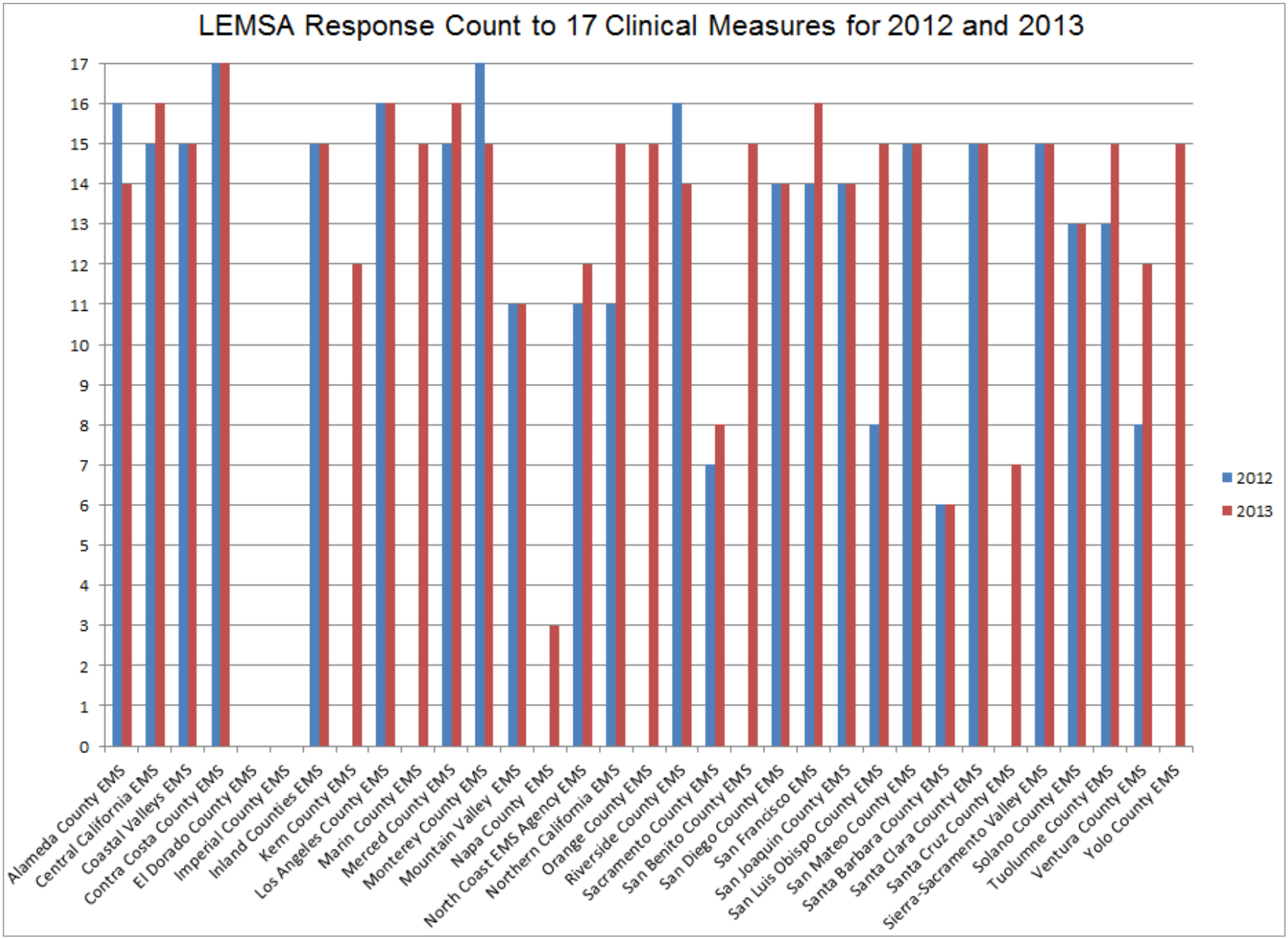


Table 3

Bin	2012	2013
17 - 15	12	18
14 - 12	5	8
11 - 9	3	1
8 - 6	4	3
5 - 3	0	1
2 - 0	9	4

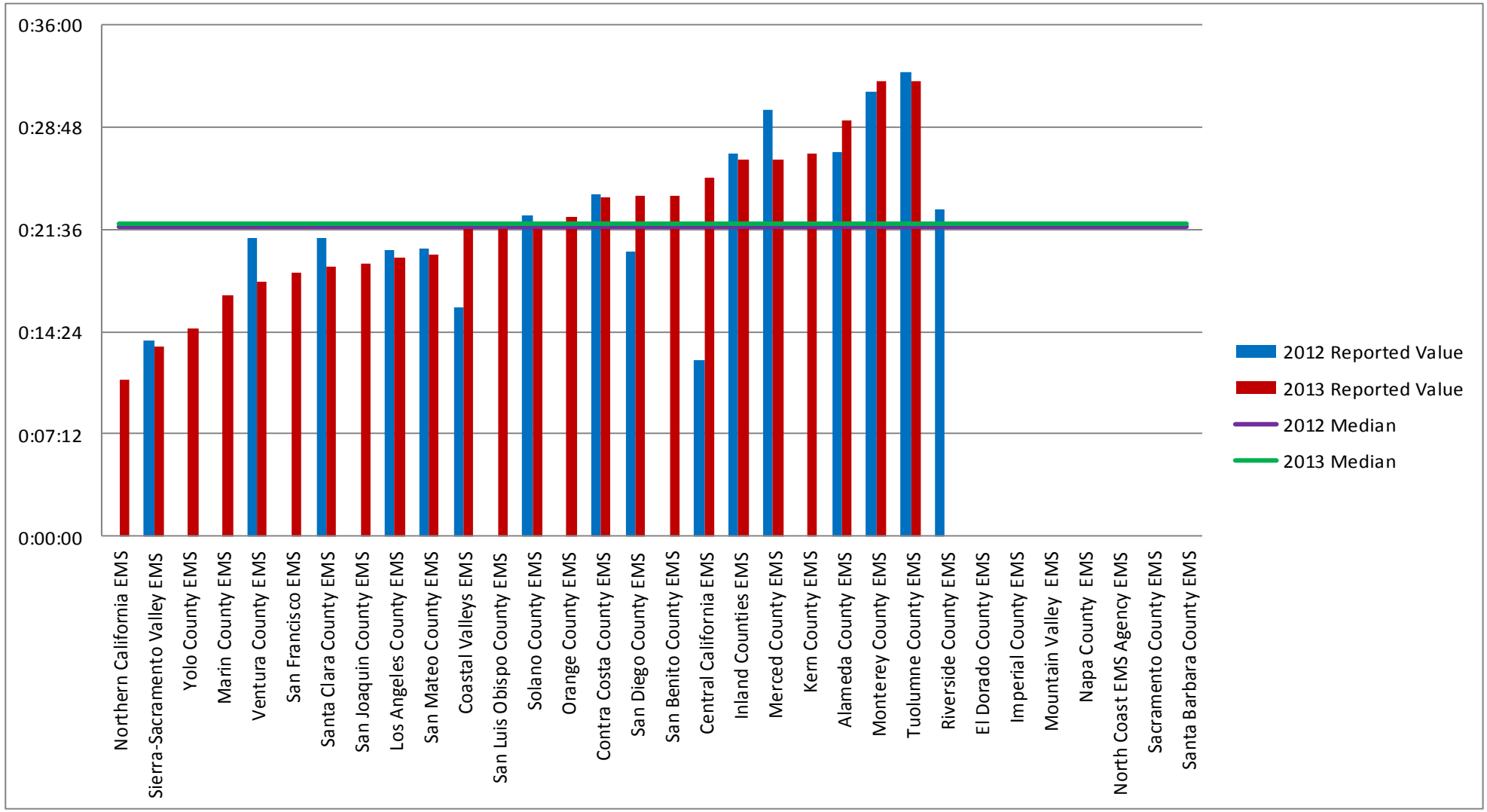

LEMSA Response Count to 17 Clinical Measures for 2012 and 2013
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
2012
2013
Alameda County EMS
Central California EMS
Coastal Valleys EMS
Contra Costa County EMS
El Dorado County EMS
Imperial County EMS
Inland Counties EMS
Kern County EMS
Los Angeles County EMS
Marin County EMS
Merced County EMS
Monterey County EMS
Mountain Valley EMS
Napa County EMS
North Coast EMS Agency EMS
Northern California EMS
Orange County EMS
Riverside County EMS
Sacramento County EMS
San Benito County EMS
San Diego County EMS
San Francisco EMS
San Joaquin County EMS
San Luis Obispo County EMS
San Mateo County EMS
Santa Barbara County EMS
Santa Clara County EMS
Santa Cruz County EMS
Sierra-Sacramento Valley EMS
Solano County EMS
Tuolumne County EMS
Ventura County EMS
Yolo County EMS

Charts and Tables for Clinical Core Measures Based on Data from 2012 and 2013 Data Submissions from California Local EMS Agencies

Core Measures Reporting – Tables and Charts

Important Notes:
The California EMS System Core Quality Measures, EMSA 166, Appendix E defines the specific definitions, data sources, and methodology for reporting each measure. Limitations of EMS data collection, aggregation, and reporting were discussed above. These data, tables, and charts are the early phase of a long-term EMS data collection and reporting effort that should be considered investigational at this time. It does not yet have sufficient reliability to reflect the quality of care by Local EMS Agency (LEMSA) and should not be used to compare LEMSAs. This information currently represents the ability of local EMS data systems to produce core measure reports from retrospective data. Source data was not submitted to EMSA, so these results cannot be validated within or between LEMSAs. Central California, Santa Clara and Kern County Local EMS Agencies submitted amended results after the tables and graphs had been completed. These revised measures are listed on page 47.

TRA-1: Scene Time for Severely Injured Trauma Patients – Part 1 of 2



Multiple factors impact the validity and analysis of these retrospective data, including but not limited to incomplete documentation, documentation not reflective of services provided prior to ambulance arrival, inconsistent data dictionary definitions between local jurisdictions, geographic resource disparities, and inability to collect hospital outcome data. This retrospective data has not been validated. These limitations caution against comparison between jurisdictions and limit the reliance of the aggregate values.

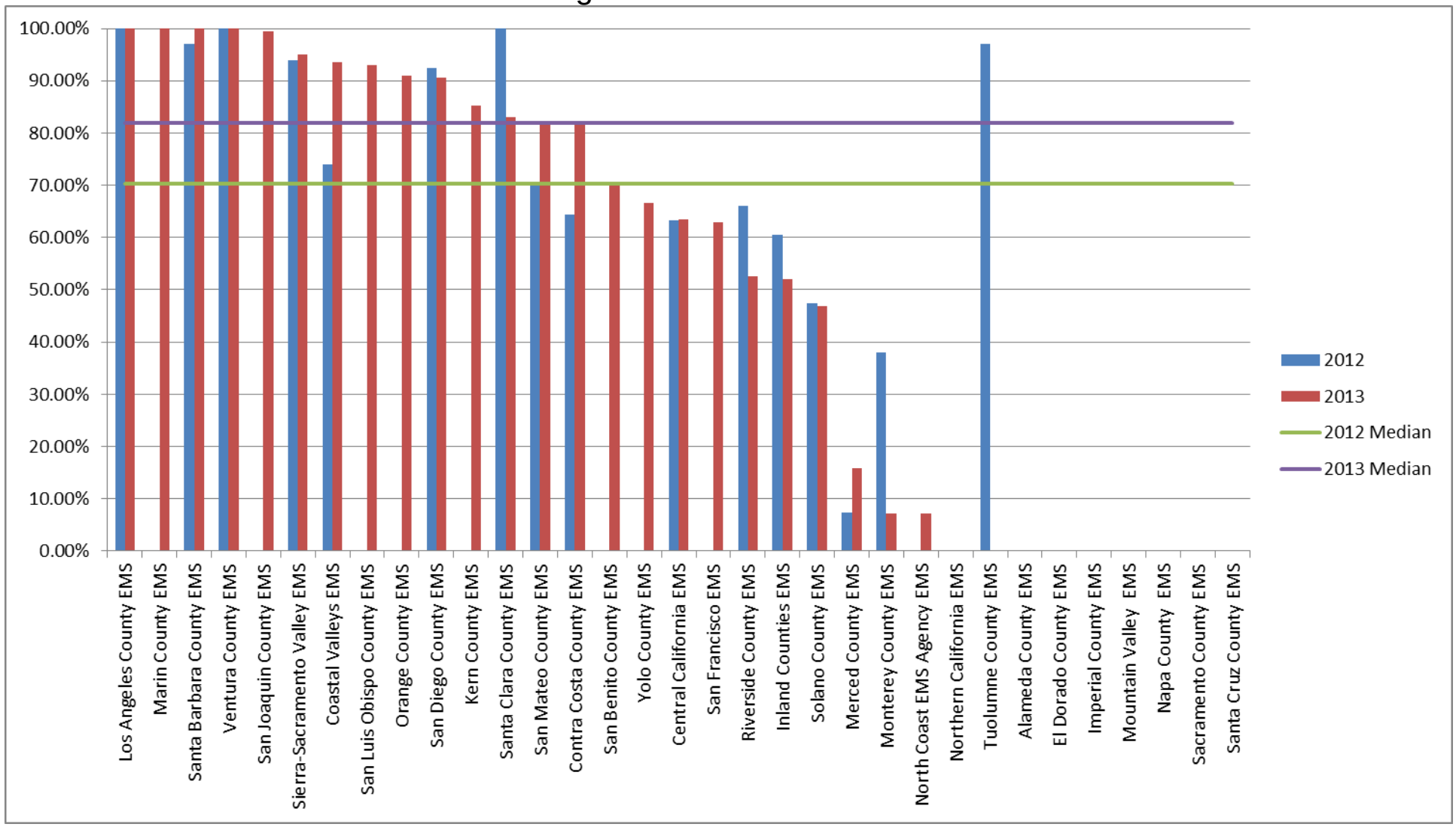
Scene Time for Severely Injured Trauma Patients – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Northern California EMS		1	0:11:00	1
Sierra-Sacramento Valley EMS	0:13:49	385	0:13:23	412
Yolo County EMS			0:14:35	35
Marin County EMS			0:17:00	
Ventura County EMS	0:21:03		0:17:57	17
San Francisco EMS			0:18:36	32
Santa Clara County EMS	0:21:00	3940	0:19:00	4957
San Joaquin County EMS		92	0:19:15	200
Los Angeles County EMS	0:20:08	73	0:19:36	88
San Mateo County EMS	0:20:17	27	0:19:48	34
Coastal Valleys EMS	0:16:09	23	0:21:40	31
San Luis Obispo County EMS			0:22:00	99
Solano County EMS	0:22:34	4525	0:22:00	4460
Orange County EMS			0:22:28	116
Contra Costa County EMS	0:24:06	269	0:23:52	200
San Diego County EMS	0:20:00	61	0:24:00	40
San Benito County EMS			0:24:00	10
Central California EMS	0:12:23	1461	0:25:15	1254
Inland Counties EMS	0:27:00	417	0:26:30	843
Merced County EMS	0:30:04	27	0:26:31	44
Kern County EMS			0:27:00	
Alameda County EMS	0:27:02	3037	0:29:17	3185
Monterey County EMS	0:31:20	58	0:32:00	249
Tuolumne County EMS	0:32:40	54	0:32:00	62
Riverside County EMS	0:23:00	463		
El Dorado County EMS				
Imperial County EMS				
Mountain Valley EMS				
Napa County EMS				
North Coast EMS Agency EMS		5		13
Sacramento County EMS				
Santa Barbara County EMS				
Santa Cruz County EMS				

Measure ID	TRA-1 2012	TRA-1 2013
Response Count	17	23
Denominator Total	14918	16382
Submission Rate (n=33)	51.52%	69.70%
Average	0:22:40	0:22:20
Median	0:21:48	0:22:00

Of the 23 LEMSAs reporting these data for 2013, the median scene time was approximately 22 minutes, essentially the same as last year. The common expectation is for short scene times, targeted at 15 minutes, with rapid transport to remain within a “golden hour” for care in a hospital with surgical capability. It may be worthwhile for LEMSAs to evaluate field protocols and actual provider field practices. Fifteen minutes may be unrealistic and unnecessary. Reported scene times may be influenced by extrication. The Golden Hour concept and trauma response time have both been challenged in the literature.

TRA-2: Direct Transport to Designated Trauma Center for Severely Injured Trauma Patients Meeting Criteria – Part 1 of 2



Multiple factors impact the validity and analysis of these retrospective data, including but not limited to incomplete documentation, documentation not reflective of services provided prior to ambulance arrival, inconsistent data dictionary definitions between local jurisdictions, geographic resource disparities, and inability to collect hospital outcome data. This retrospective data has not been validated. These limitations caution against comparison between jurisdictions and limit the reliance of the aggregate values.

Direct Transport to Designated Trauma Center for Severely Injured Trauma Patients Meeting Criteria – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Los Angeles County EMS	100%	76	100.00%	96
Marin County EMS			100%	78
Santa Barbara County EMS	97%	292	100.00%	154
Ventura County EMS	100%	16	100%	17
San Joaquin County EMS	0%	92	99.50%	200
Sierra-Sacramento Valley EMS	94%	385	95.00%	412
Coastal Valleys EMS	73.91%	23	93.55%	31
San Luis Obispo County EMS			93.00%	99
Orange County EMS			91.00%	33
San Diego County EMS	92.45%	53	90.70%	43
Kern County EMS			85.21%	507
Santa Clara County EMS	100%	3940	83.00%	144
San Mateo County EMS	70.30%	27	82.00%	34
Contra Costa County EMS	64.32%	269	81.90%	304
San Benito County EMS			70.00%	10
Yolo County EMS			66.67%	35
Central California EMS	63.20%	1462	63.40%	1254
San Francisco EMS			63.00%	32
Riverside County EMS	66%	463	52.62%	325
Inland Counties EMS	60%	417	51.96%	843
Solano County EMS	47.49%	4525	46.91%	4460
Merced County EMS	7.41%	27	15.91%	44
Monterey County EMS	38%	58	7.23%	249
North Coast EMS Agency EMS		5	7.14%	14
Northern California EMS		1	0.00%	1
Tuolumne County EMS	97%	54		62
Alameda County EMS				
El Dorado County EMS				
Imperial County EMS				
Mountain Valley EMS				
Napa County EMS				
Sacramento County EMS				
Santa Cruz County EMS				

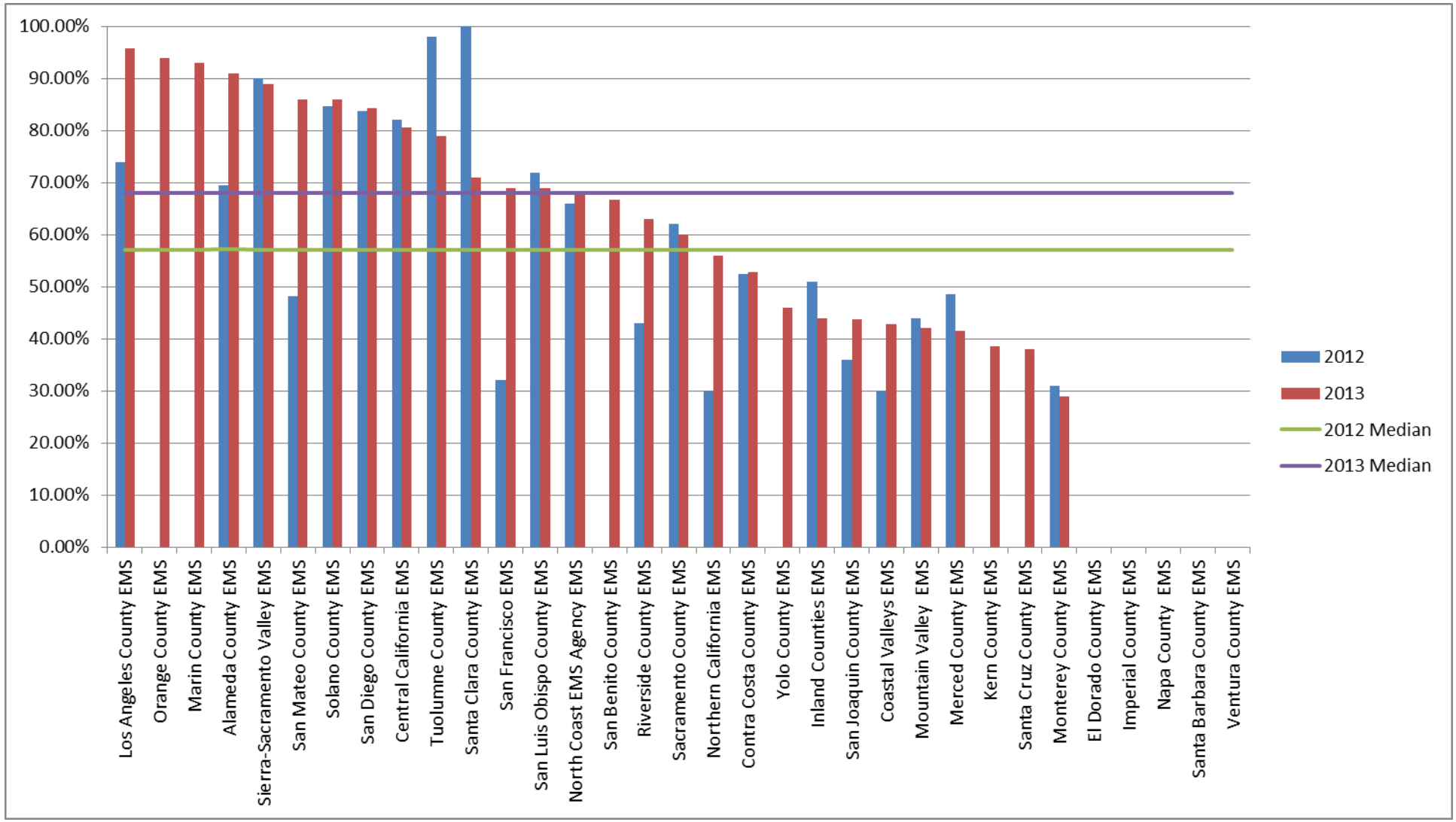
Measure ID	TRA-2 2012	TRA-2 2013
Response Count	17	25
Denominator Total	12185	9481
Submission Rate (n=33)	51.52%	75.76%
Average	68.91%	70.01%
Median	70.30%	82.00%

Of the 25 LEMSAs reporting these data for 2013, the median number of patients able to be transported directly to a trauma center was 82%, a significant increase from the year 1 median of 70.3%.

Since the overall number of records analyzed declined, this is likely related to more refined inclusion criteria due to variability in definitions for a severely injured trauma patient and the revised trauma score. Variation between denominator values and the actual population of a region may reflect sampling.

Moreover, direct transport to trauma centers for severely injured trauma patients will vary by geography and availability of resources in a given area, so expected values are very low or zero for LEMSAs without a trauma center or with long transport distances and times to a trauma center. To improve consistency, CDC guidelines will be used to define trauma patients for future measurements.

ACS-1: Aspirin Administration for Chest Pain/Discomfort Rate – Part 1 of 2



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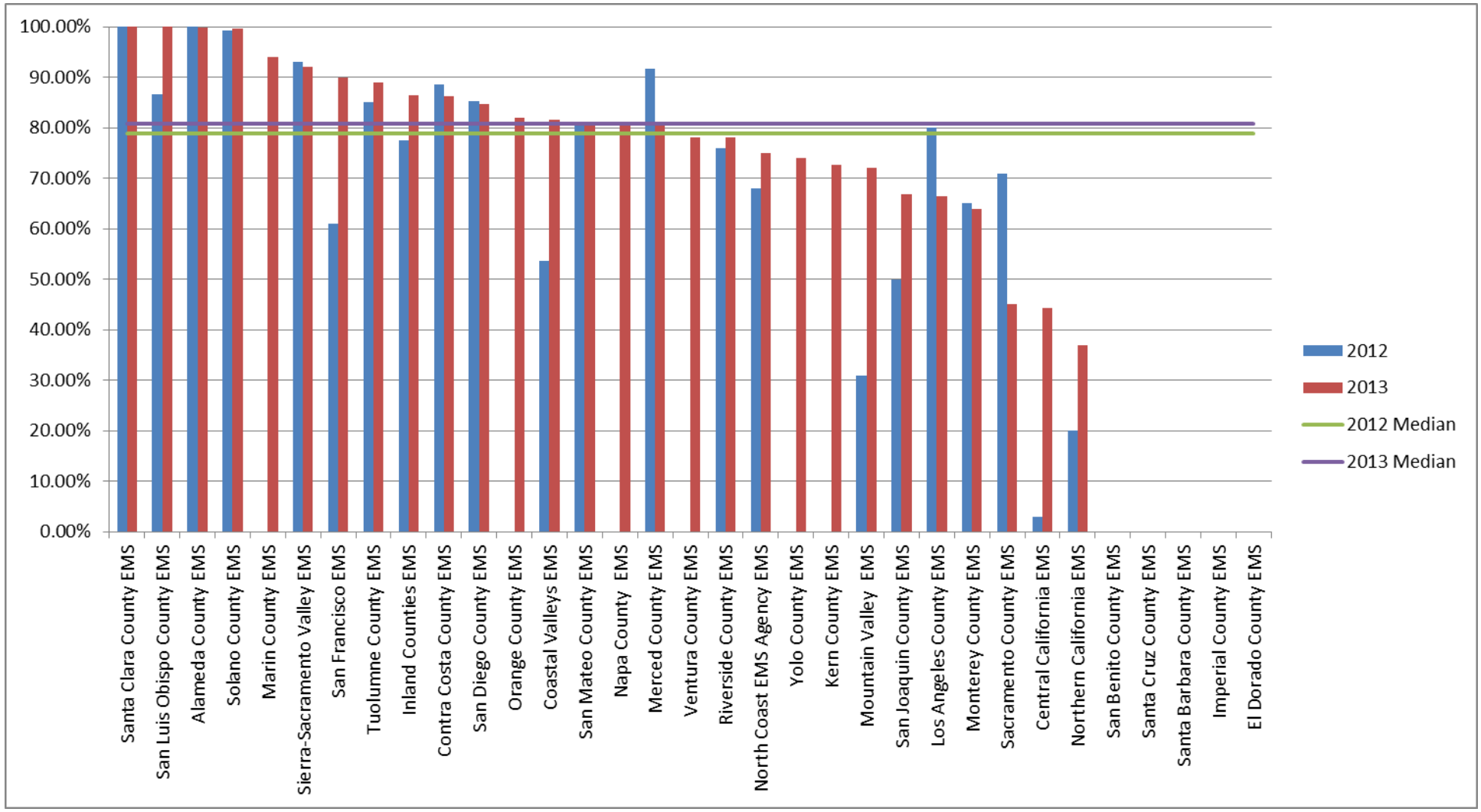
Aspirin Administration for Chest Pain/Discomfort Rate – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Los Angeles County EMS	74%	20665	95.70%	26606
Orange County EMS			94.00%	191
Marin County EMS			93%	366
Alameda County EMS	69%	1892	90.94%	2175
Sierra-Sacramento Valley EMS	90%	3985	89.00%	4139
San Mateo County EMS	48.20%	1743	86.00%	1496
Solano County EMS	84.60%	1532	85.97%	1347
San Diego County EMS	83.75%	11046	84.22%	10551
Central California EMS	82.13%	4085	80.53%	2995
Tuolumne County EMS	98%	273	79.00%	349
Santa Clara County EMS	100%	2306	71.00%	139
San Francisco EMS	32%	1249	69.00%	1490
San Luis Obispo County EMS	71.90%	768	69.00%	657
North Coast EMS Agency EMS	66.00%	535	68.00%	435
San Benito County EMS			66.67%	42
Riverside County EMS	43%	13738	63.00%	20768
Sacramento County EMS	62%	652	60.00%	47
Northern California EMS	30%	10	56.00%	248
Contra Costa County EMS	52.45%	4726	52.87%	4341
Yolo County EMS			46.00%	936
Inland Counties EMS	50.99%	10044	43.92%	10637
San Joaquin County EMS	36%	3878	43.66%	3298
Coastal Valleys EMS	30.00%	930	42.86%	1435
Mountain Valley EMS	44%	3140	42.00%	4085
Merced County EMS	48.55%	1485	41.53%	1871
Kern County EMS			38.55%	5692
Santa Cruz County EMS			38.00%	680
Monterey County EMS	31%	1556	29.00%	1611
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
Santa Barbara County EMS				
Ventura County EMS				

Measure ID	ACS-1 2012	ACS-1 2013
Response Count	22	27
Denominator Total	90238	108544
Submission Rate (n=32, 33)	66.67%	81.82%
Average	60.36%	65.51%
Median	57.23%	67.34%

Of the 27 LEMSAs reporting these data for 2013, the median number of patients receiving aspirin in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 67.3%. Factors for a low reported value include lack of documentation, or aspirin administered by the patient/family or first responder paramedics but not reflected in the patient care record by the ambulance transport service. Variation is also introduced by which chest pain patients are identified in the data search. The significant increase in the median as well as the increased records analyzed is likely due to methodological refinements and new LEMSAs reporting. The wide variation should not be attributed to performance at this time, but should prompt evaluation of protocols and discussion with field providers.

ACS-2: 12 Lead ECG Performance – Part 1 of 2



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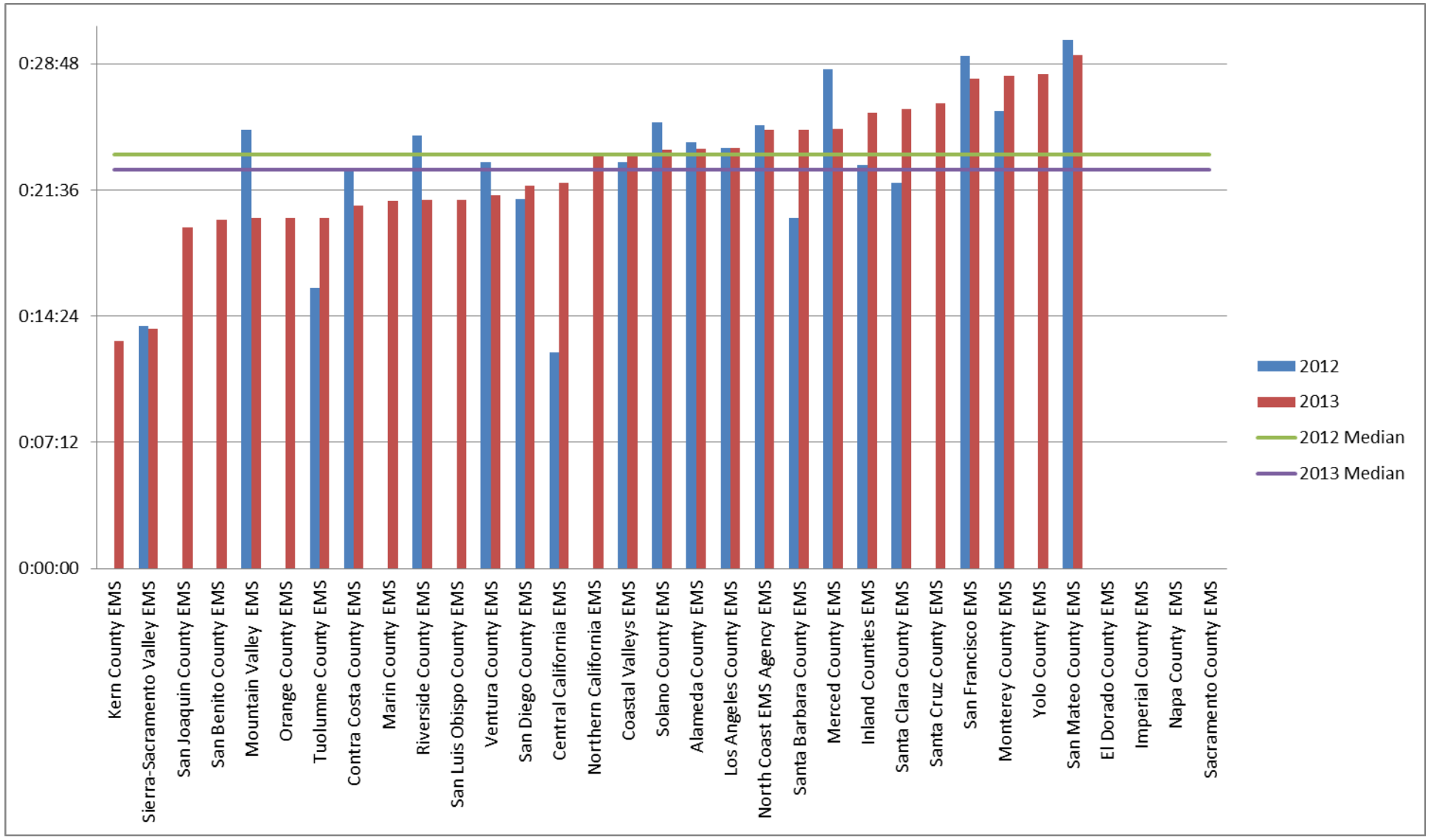
12 Lead ECG Performance – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Santa Clara County EMS	100%	634	100.00%	2377
San Luis Obispo County EMS	86.60%	768	100.00%	556
Alameda County EMS	100%	1892	99.77%	2175
Solano County EMS	99.22%	1532	99.70%	1347
Marin County EMS			94.00%	474
Sierra-Sacramento Valley EMS	93%	3985	92.00%	4139
San Francisco EMS	61.00%	1249	90.00%	1490
Tuolumne County EMS	85%	231	89.00%	349
Inland Counties EMS	77.59%	10044	86.51%	10637
Contra Costa County EMS	88.57%	4726	86.31%	4341
San Diego County EMS	85.22%	11046	84.65%	10551
Orange County EMS			82.00%	49
Coastal Valleys EMS	53.55%	930	81.53%	1435
San Mateo County EMS	81.10%	1743	81.00%	1496
Napa County EMS			80.88%	712
Merced County EMS	91.72%	1485	80.60%	1871
Ventura County EMS			78%	2870
Riverside County EMS	76%	13738	78.00%	20768
North Coast EMS Agency EMS	68.00%	535	75.00%	435
Yolo County EMS			74.00%	936
Kern County EMS			72.59%	5692
Mountain Valley EMS	31%	3140	72.00%	4085
San Joaquin County EMS	50%	3878	66.89%	3298
Los Angeles County EMS	80%	7880	66.50%	26606
Monterey County EMS	65%	1561	64.00%	1611
Sacramento County EMS	71.00%	477	45.00%	388
Central California EMS	3.05%	4158	44.30%	7916
Northern California EMS	20%	10	37.00%	248
San Benito County EMS			0.00%	42
Santa Cruz County EMS				
Santa Barbara County EMS				
Imperial County EMS				
El Dorado County EMS				

Measure ID	ACS-2 2012	ACS-2 2013
Response Count	22	28
Denominator Total	75642	118811
Submission Rate (n=32, 33)	66.67%	84.85%
Average	71.21%	75.90%
Median	78.80%	80.80%

Of the 28 LEMSAs reporting these data for 2013, the median number of patients receiving 12-Lead ECG in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 80.8%. There was a marked increase in number of records analyzed and additional LEMSAs reporting, but the median increased minimally. There was moderate consistency in this measure, with most LEMSAs reporting 70-100% compliance. Low values more likely represent data and methodological issues rather than actual performance. This measure is of particular importance with the widespread development of STEMI centers.

ACS-3: Scene Time for Suspected Heart Attack Patients – Part 1 of 2



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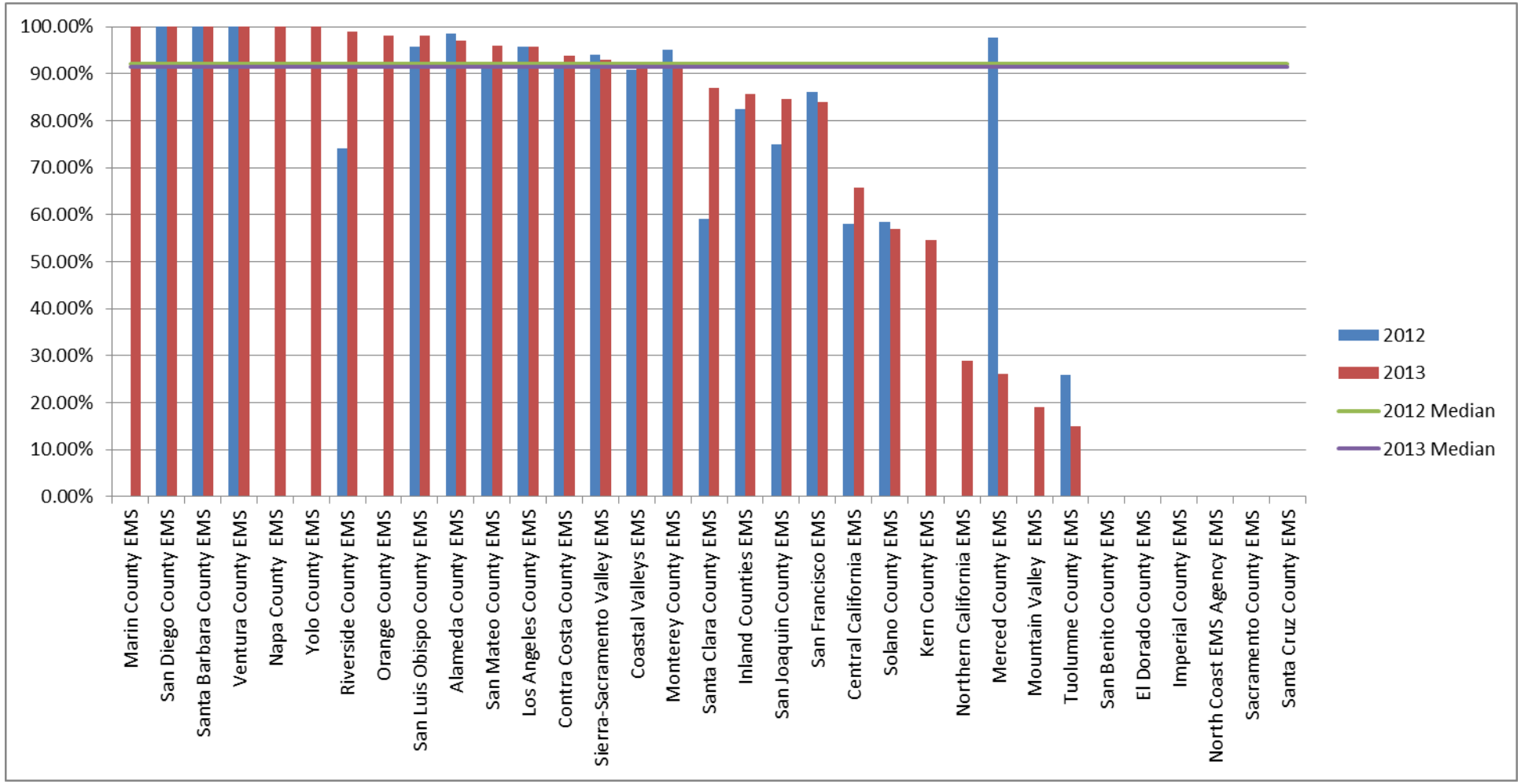
Scene Time for Suspected Heart Attack Patients – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Kern County EMS			0:13:00	
Sierra-Sacramento Valley EMS	0:13:49	339	0:13:39	348
San Joaquin County EMS		68	0:19:29	176
San Benito County EMS			0:19:54	11
Mountain Valley EMS	0:25:00	16	0:20:00	26
Orange County EMS			0:20:00	
Tuolumne County EMS	0:16:00	23	0:20:00	349
Contra Costa County EMS	0:22:40	219	0:20:41	481
Marin County EMS			0:20:59	
Riverside County EMS	0:24:42	488	0:21:00	311
San Luis Obispo County EMS			0:21:00	
Ventura County EMS	0:23:10		0:21:18	189
San Diego County EMS	0:21:05	1166	0:21:49	1320
Central California EMS	0:12:21	4077	0:22:00	4798
Northern California EMS			0:23:30	6
Coastal Valleys EMS	0:23:12	78	0:23:33	160
Solano County EMS	0:25:28	1702	0:23:53	1432
Alameda County EMS	0:24:20	333	0:23:58	381
Los Angeles County EMS	0:24:00	1804	0:24:00	2049
North Coast EMS Agency EMS	0:25:18	108	0:25:00	72
Santa Barbara County EMS	0:20:00	95	0:25:00	118
Merced County EMS	0:28:30	44	0:25:05	192
Inland Counties EMS	0:23:00	323	0:26:00	297
Santa Clara County EMS	0:22:00	321	0:26:12	55
Santa Cruz County EMS			0:26:33	163
San Francisco EMS	0:29:14	46	0:27:57	182
Monterey County EMS	0:26:07	137	0:28:06	214
Yolo County EMS			0:28:13	100
San Mateo County EMS	0:30:09	136	0:29:18	157
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
Sacramento County EMS				

Measure ID	ACS-3 2012	ACS-3 2013
Response Count	20	28
Denominator Total	11523	13587
Submission Rate (n=32, 33)	60.61%	84.85%
Average	0:23:00	0:22:36
Median	0:23:36	0:22:44

Of the 28 LEMSAs reporting these data for 2013, the median scene time by ground ambulance for suspected heart attack patients with ST elevation on ECG was approximately 22 minutes and 44 seconds, slightly decreased from last year. There is considerable variation with most agencies between 18-28 minutes. Typically LEMSA protocols encourage paramedics to transport STEMI patients from the scene in 15 minutes or less since there is a time dependent goal to take the patient to the hospital catheterization suite to open blocked vessels. Further examination of this measure is warranted, including methodology, documentation, and validation. Given the evaluation and interventions needed for these patients, 15 minutes may be unrealistic.

ACS-5: Direct Transport to Designated STEMI Receiving Center for Suspected Patients Meeting Criteria – Part 1 of 2



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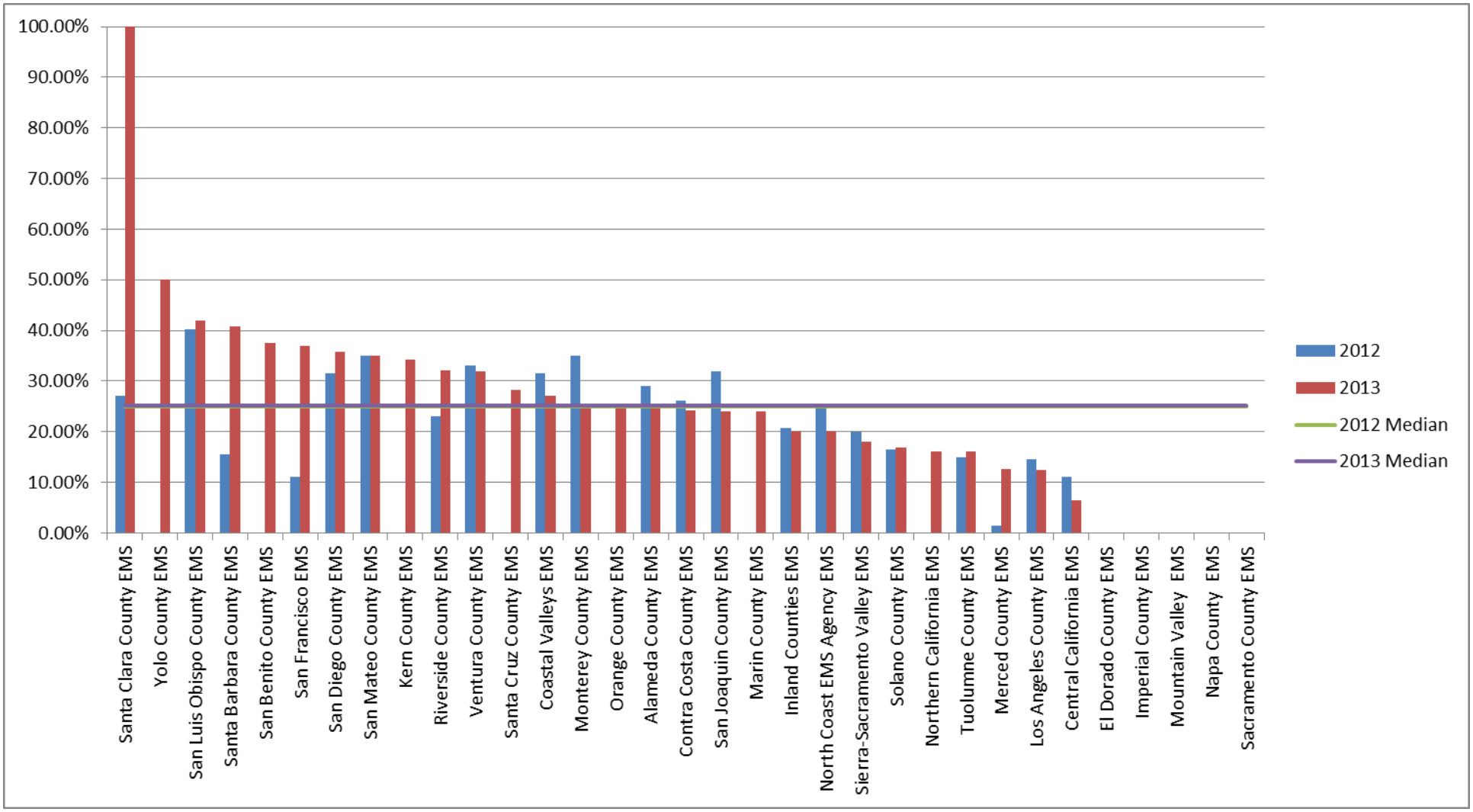
Direct Transport to Designated STEMI Receiving Center for Suspected Patients Meeting Criteria – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Marin County EMS			100.00%	106
San Diego County EMS	100%	591	100.00%	579
Santa Barbara County EMS	100%	96	100.00%	118
Ventura County EMS	100%	154	100%	188
Napa County EMS			100.00%	133
Yolo County EMS			100.00%	105
Riverside County EMS	74%	898	99.04%	311
Orange County EMS			98.00%	80
San Luis Obispo County EMS	95.70%	70	98.00%	61
Alameda County EMS	98.49%	333	96.95%	394
San Mateo County EMS	92%	178	96.00%	171
Los Angeles County EMS	95.73%	1804	95.70%	2137
Contra Costa County EMS	92.34%	370	93.72%	414
Sierra-Sacramento Valley EMS	94%	339	93.00%	348
Coastal Valleys EMS	90.74%	108	91.67%	204
Monterey County EMS	95%	151	91.53%	189
Santa Clara County EMS	59%	321	87.00%	55
Inland Counties EMS	82.51%	566	85.58%	312
San Joaquin County EMS	75%	216	84.51%	226
San Francisco EMS	86%	65	84.00%	199
Central California EMS	58.12%	3534	65.75%	3197
Solano County EMS	58.40%	1702	56.91%	1432
Kern County EMS			54.55%	33
Northern California EMS			29.00%	7
Merced County EMS	97.73%	44	26.04%	192
Mountain Valley EMS	0%	16	19.00%	26
Tuolumne County EMS	26%	23	15.00%	13
San Benito County EMS			0.00%	13
El Dorado County EMS				
Imperial County EMS				
North Coast EMS Agency EMS		19		12
Sacramento County EMS				
Santa Cruz County EMS				61

Measure ID	ACS-5 2012	ACS-5 2013
Response Count	21	27
Denominator Total	11598	11316
Submission Rate (n=32, 33)	63.64%	81.82%
Average	79.56%	75.56%
Median	92.00%	91.53%

Of the 27 LEMSAs reporting these data, the median number of patients appropriately transported directly to a STEMI center was 91.5%, unchanged from last year. STEMI systems have been under local development for the past 5 years. Direct transport of patients to a STEMI centers with PCI capability will vary by geography, and availability of resources in a given area. Generally, LEMSAs with a higher level of direct transport are urban areas with a STEMI system in their geographic area. Lower values would be expected in a rural area which may not have an established STEMI system or one that can be accessed rapidly in a neighboring LEMSA.

CAR-2: Out-Of-Hospital Cardiac Arrest Return of Spontaneous Circulation – Part 1 of 2



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Out-Of-Hospital Cardiac Arrest Return of Spontaneous Circulation – Part 2 of 2

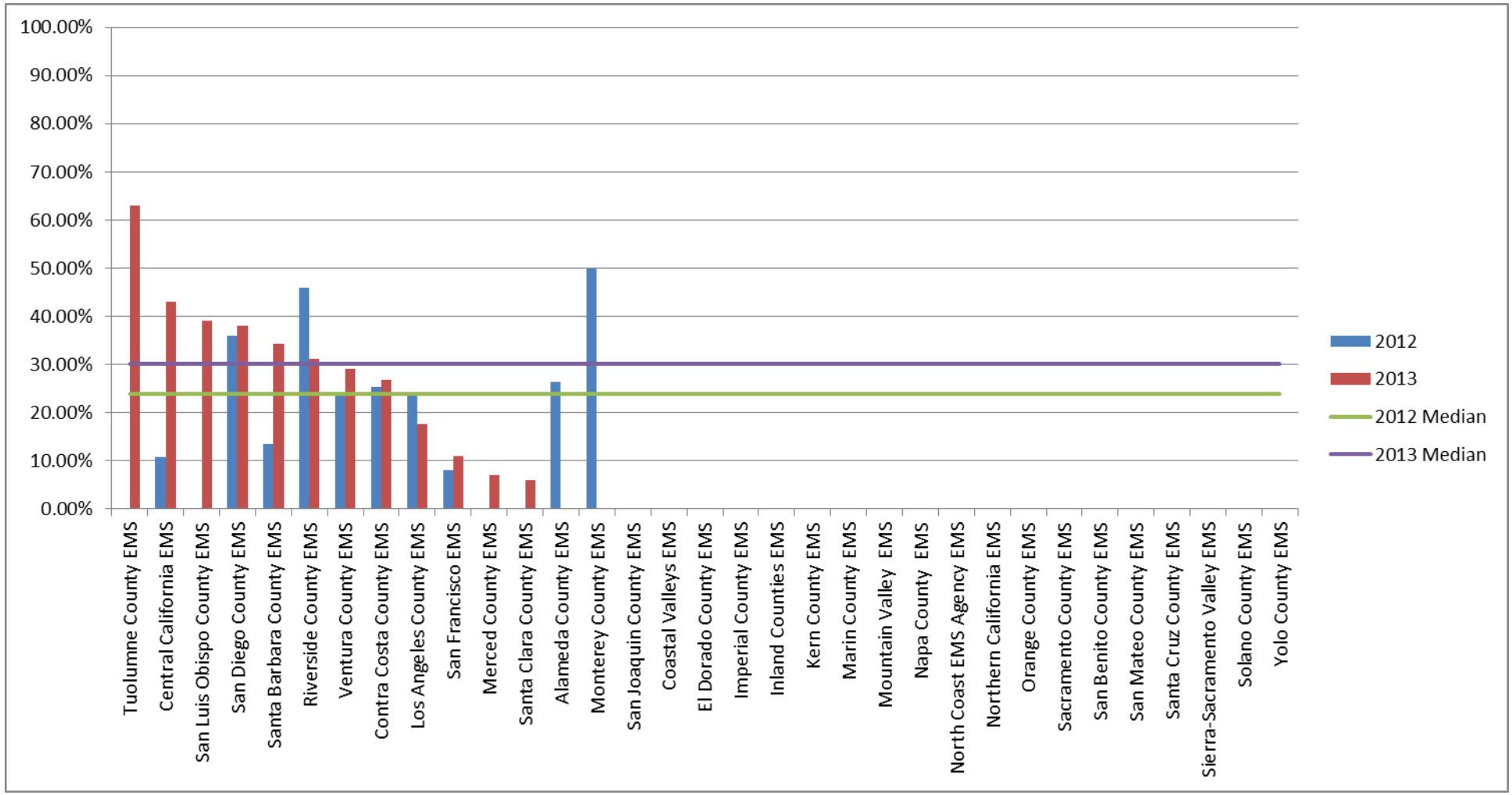
	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Santa Clara County EMS	27%	322	100.00%	55
Yolo County EMS			50.00%	51
San Luis Obispo County EMS	40.30%	124	42.00%	113
Santa Barbara County EMS	15.60%	199	40.70%	199
San Benito County EMS			37.50%	8
San Francisco EMS	11%	243	37.00%	381
San Diego County EMS	31.54%	577	35.79%	598
San Mateo County EMS	35.09%	151	35.00%	165
Kern County EMS			34.17%	120
Riverside County EMS	23%	452	32.15%	1571
Ventura County EMS	33%	379	32%	412
Santa Cruz County EMS			28.30%	106
Coastal Valleys EMS	31.48%	54	27.10%	107
Monterey County EMS	35%	91	25.50%	251
Orange County EMS			25.00%	325
Alameda County EMS	29%	675	25.00%	1118
Contra Costa County EMS	26.17%	297	24.14%	468
San Joaquin County EMS	32%	173	24.06%	374
Marin County EMS			24.00%	113
Inland Counties EMS	20.77%	443	20.09%	871
North Coast EMS Agency EMS	25.00%	104	20.09%	91
Sierra-Sacramento Valley EMS	20%	198	18.00%	297
Solano County EMS	16.48%	273	16.91%	278
Northern California EMS			16.00%	50
Tuolumne County EMS	15%	78	16.00%	99
Merced County EMS	1.45%	207	12.59%	270
Los Angeles County EMS	14.61%	4052	12.40%	6741
Central California EMS	11.17%	931	6.40%	1593
El Dorado County EMS				
Imperial County EMS				
Mountain Valley EMS				
Napa County EMS				
Sacramento County EMS				

Measure ID	CAR-2 2012	CAR-2 2013
Response Count	21	27
Denominator Total	10023	16825
Submission Rate (n=32, 33)	63.64%	81.82%
Average	23.56%	28.90%
Median	25.00%	25.25%

Of the 27 LEMSAs reporting these data for 2013, the median number of patients that had a return of spontaneous circulation in the field after a cardiac arrest from all causes was 25.2%, unchanged from last year. Nationally, this rate varies considerably by state and by local agency. Most jurisdictions reported rates from 10-40%, which is credible. In addition to methodological challenges (evidenced by one LEMSA reporting 100%), this outcome measure is dependent upon multiple factors that vary considerably by community, including rapid public response, bystander CPR, automated external defibrillation use, response times by first responders and ALS providers, and presenting cardiac rhythm. At this time, these results should not be considered accurate measures of performance.

CAR-3: Out-Of-Hospital Cardiac Arrest Survival to Emergency Department Discharge

Part 1 of 2



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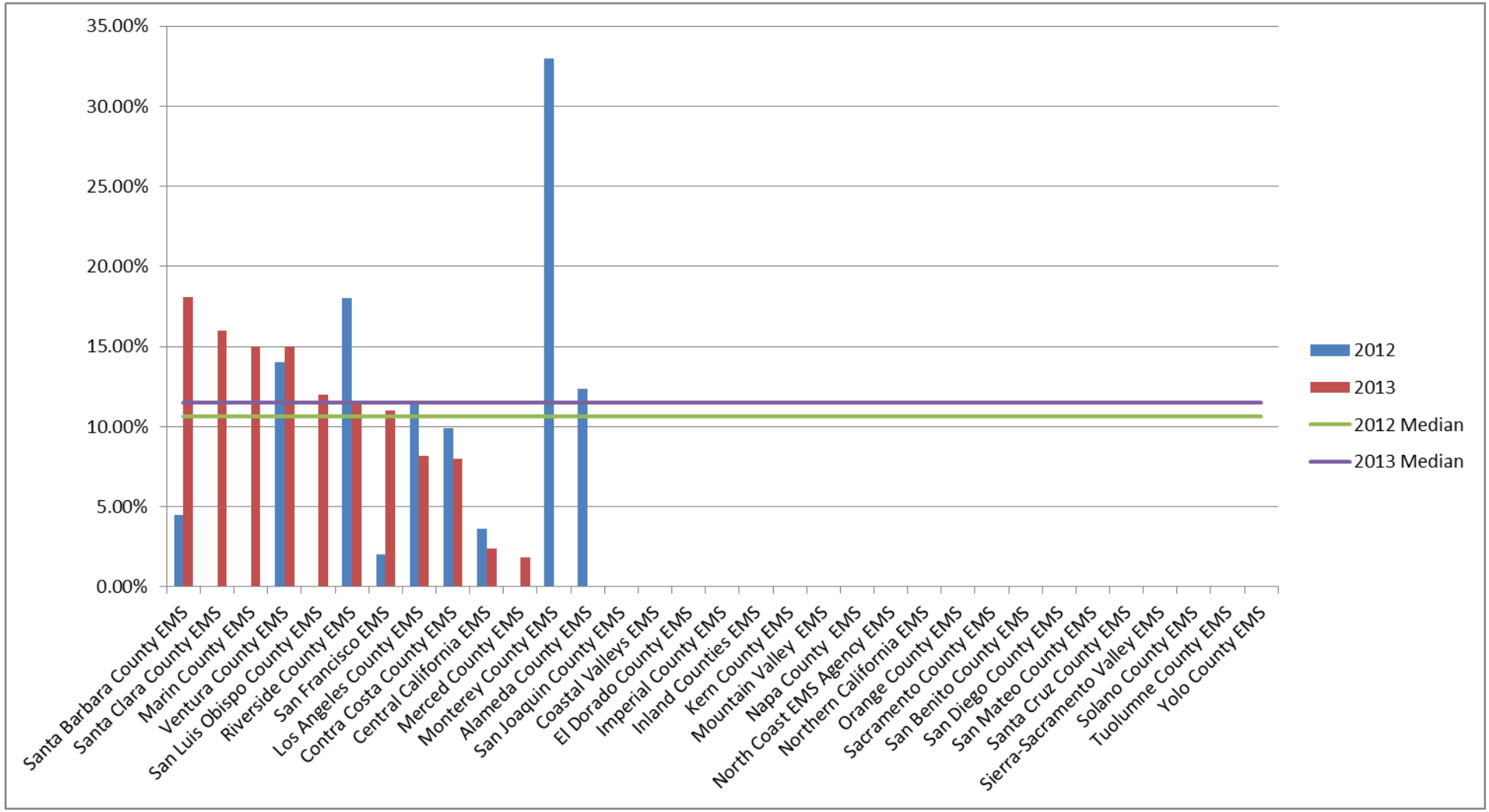
Out-Of-Hospital Cardiac Arrest Survival to Emergency Department Discharge - Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Tuolumne County EMS			63.00%	16
Central California EMS	10.85%	931	43.00%	1593
San Luis Obispo County EMS			39.00%	113
San Diego County EMS	35.91%	298	38.02%	313
Santa Barbara County EMS	13.60%	199	34.20%	199
Riverside County EMS	46%	300	31.24%	893
Ventura County EMS	24%	379	29%	412
Contra Costa County EMS	25.38%	465	26.71%	468
Los Angeles County EMS	23.84%	4052	17.60%	6741
San Francisco EMS	8%	243	11.00%	381
Merced County EMS			7.04%	270
Santa Clara County EMS			6.00%	983
Alameda County EMS	26.50%	675		
Monterey County EMS	50%	6		240
San Joaquin County EMS	0%	0		374
Coastal Valleys EMS				
El Dorado County EMS				
Imperial County EMS				
Inland Counties EMS		443		871
Kern County EMS				
Marin County EMS				
Mountain Valley EMS				
Napa County EMS				
North Coast EMS Agency EMS				
Northern California EMS				50
Orange County EMS				325
Sacramento County EMS				
San Benito County EMS				
San Mateo County EMS				
Santa Cruz County EMS				
Sierra-Sacramento Valley EMS				
Solano County EMS				
Yolo County EMS				

Measure ID	CAR-3 2012	CAR-3 2013
Response Count	11	12
Denominator Total	7991	14242
Submission Rate (n=32, 33)	33.33%	36.36%
Average	24.01%	28.82%
Median	24.00%	30.12%

Of the 12 LEMSAs reporting these data for 2013, the median number of patients that had survived a return hospital cardiac arrest to be admitted to the hospital was 30.2%. This measure yielded a low number of responses from LEMSAs because of challenges obtaining hospital outcome data. Accurate measure of this outcome is an important future quality improvement goal and supports the need to develop exchange of health information with hospitals.

CAR-4: Out-Of-Hospital Cardiac Arrest Survival to Hospital Discharge – Part 1 of 2



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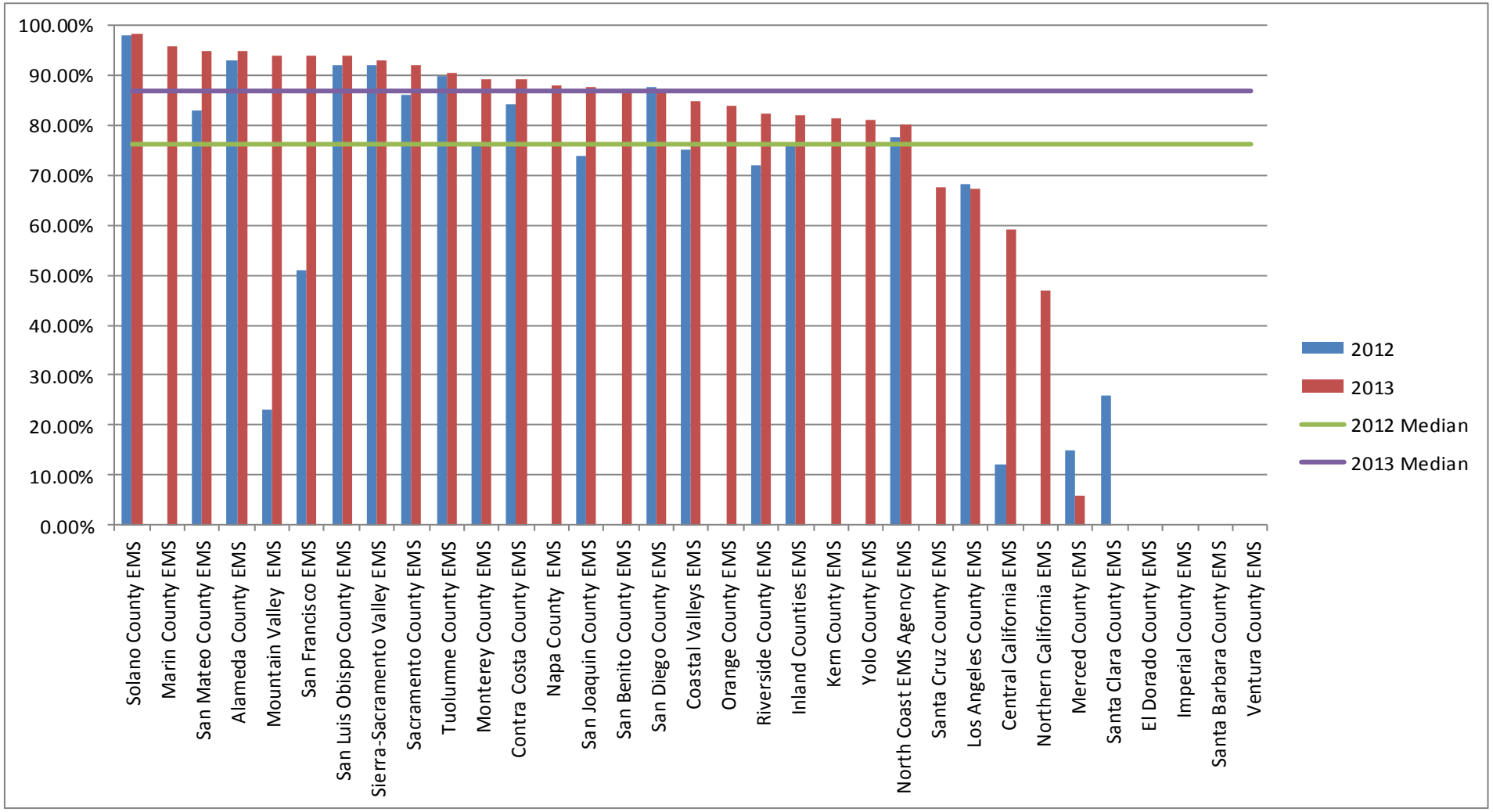
Out-Of-Hospital Cardiac Arrest Survival to Hospital Discharge – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Santa Barbara County EMS	4.50%	199	18.09%	199
Santa Clara County EMS			16.00%	983
Marin County EMS			15.00%	113
Ventura County EMS	14%	379	15%	412
San Luis Obispo County EMS			12.00%	113
Riverside County EMS	18%	53	11.53%	893
San Francisco EMS	2%	243	11.00%	381
Los Angeles County EMS	11.35%	4052	8.20%	6741
Contra Costa County EMS	9.89%	465	8.00%	468
Central California EMS	3.65%	931	2.39%	1593
Merced County EMS			1.85%	270
Monterey County EMS	33%	6		240
Alameda County EMS	12.34%	675		
San Joaquin County EMS	0%	0		374
Coastal Valleys EMS				
El Dorado County EMS				
Imperial County EMS				
Inland Counties EMS		443		871
Kern County EMS				
Mountain Valley EMS				
Napa County EMS				
North Coast EMS Agency EMS				
Northern California EMS				50
Orange County EMS				325
Sacramento County EMS				
San Benito County EMS				
San Diego County EMS				
San Mateo County EMS				
Santa Cruz County EMS				
Sierra-Sacramento Valley EMS				
Solano County EMS				
Tuolumne County EMS				
Yolo County EMS				

Measure ID	CAR-4 2012	CAR-4 2013
Response Count	10	11
Denominator Total	7446	14026
Submission Rate (n=32, 33)	30.30%	33.33%
Average	10.87%	10.82%
Median	10.62%	11.53%

Of the 11 LEMSAs reporting these data for 2013, the median number of patients that had survived an out of hospital cardiac arrest and were discharged from the hospital was 11.5%. This measure yielded the lowest number of responses from LEMSAs because of the difficulties in obtaining hospital outcome data. Accurate measure of this outcome is an important future quality improvement goal and supports the need to develop exchange of health information with hospitals. An important refinement to this measure is the functional status on discharge.

STR-2: Glucose Testing for Suspected Acute Stroke Patients – Part 1 of 2



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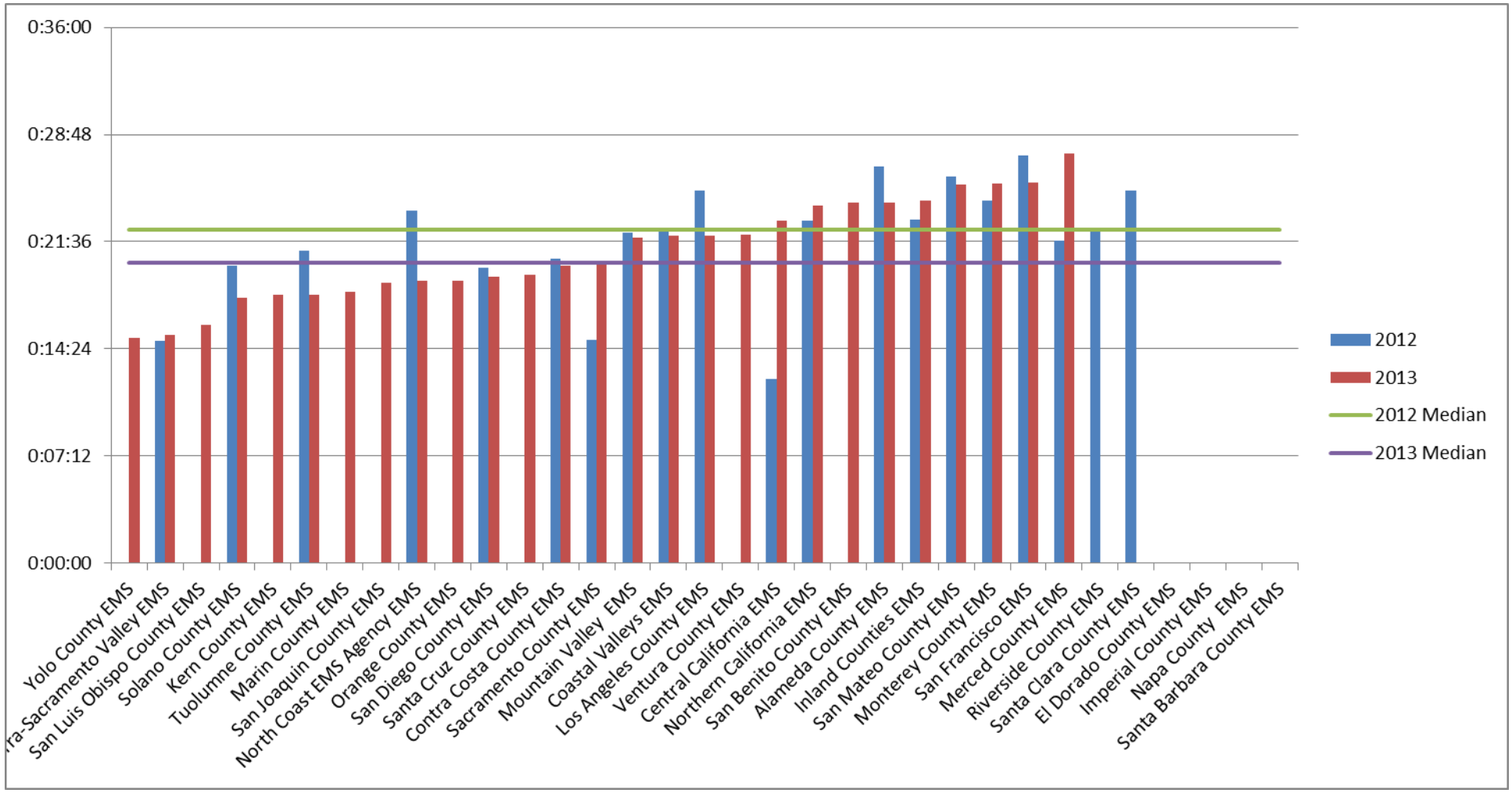
Glucose Testing for Suspected Acute Stroke Patients – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Solano County EMS	98.16%	326	98.46%	389
Marin County EMS			96.00%	263
San Mateo County EMS	83%	808	95.00%	646
Alameda County EMS	93.00%	1242	95.00%	1545
Mountain Valley EMS	23%	567	94.00%	494
San Francisco EMS	51.0%	481	94.00%	707
San Luis Obispo County EMS	92%	89	94.00%	72
Sierra-Sacramento Valley EMS	92%	1485	93.00%	1543
Sacramento County EMS	86.10%	36	92.00%	49
Tuolumne County EMS	90%	98	90.40%	105
Monterey County EMS	76%	552	89.35%	460
Contra Costa County EMS	84.32%	1495	89.23%	1375
Napa County EMS			87.86%	220
San Joaquin County EMS	74%	989	87.82%	911
San Benito County EMS			86.96%	23
San Diego County EMS	87.57%	3476	86.79%	3589
Coastal Valleys EMS	75.30%	328	84.92%	451
Orange County EMS			84.00%	594
Riverside County EMS	72%	3174	82.39%	3384
Inland Counties EMS	76.23%	1569	82.20%	1539
Kern County EMS			81.39%	1193
Yolo County EMS			81.25%	258
North Coast EMS Agency EMS	77.59%	241	80.03%	218
Santa Cruz County EMS			67.73%	375
Los Angeles County EMS	68.32%	3624	67.20%	5808
Central California EMS	11.95%	9493	59.17%	7790
Northern California EMS	0%	17	47.00%	87
Merced County EMS	14.95%	194	5.71%	280
Santa Clara County EMS	26%	3588		
El Dorado County EMS				
Imperial County EMS				
Santa Barbara County EMS				
Ventura County EMS				

Measure ID	STR-2 2012	STR-2 2013
Response Count	22	27
Denominator Total	33872	34364
Submission Rate (n=32, 33)	66.67%	81.82%
Average	66.02%	81.88%
Median	76.12%	87.00%

Of the 27 LEMSAs reporting these data for 2013, the median number of patients receiving glucose testing in the field for a possible stroke was 87%. The consistency of results suggests that the methodology of data extraction for this measure is less of a problem. Inconsistent low values are likely invalid. Diabetic causes of neurologic symptoms are important to exclude prior to transporting to a stroke center.

STR-3: Scene Time for Suspected Acute Stroke Patients – Part 1 of 2



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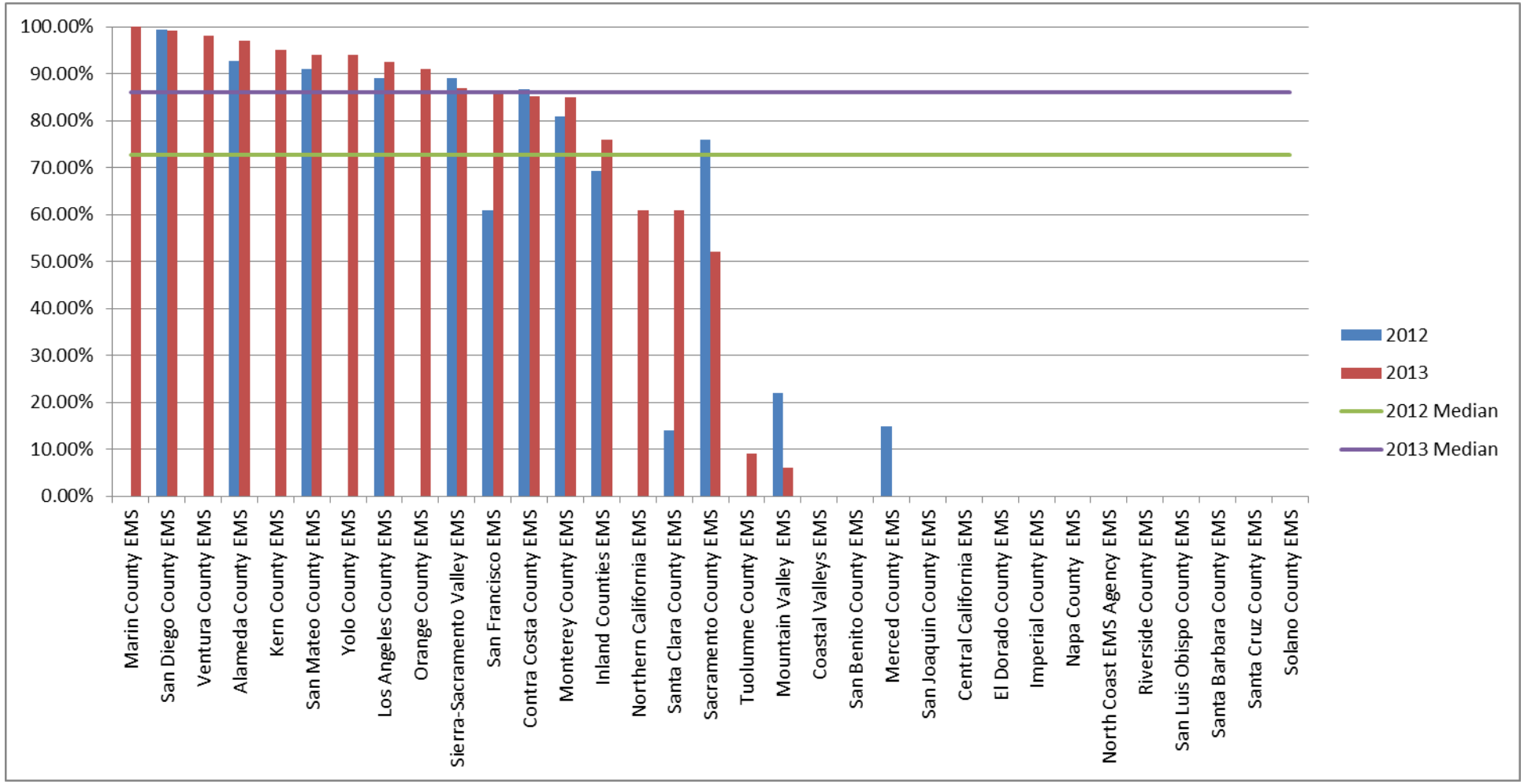
Scene Time for Suspected Acute Stroke Patients – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Yolo County EMS			0:15:09	244
Sierra-Sacramento Valley EMS	0:14:56	1485	0:15:18	1543
San Luis Obispo County EMS			0:16:00	72
Solano County EMS	0:20:00	418	0:17:50	466
Kern County EMS			0:18:00	
Tuolumne County EMS	0:21:00	98	0:18:00	105
Marin County EMS			0:18:14	
San Joaquin County EMS			0:18:50	891
North Coast EMS Agency EMS	0:23:42	234	0:19:00	204
Orange County EMS			0:19:00	
San Diego County EMS	0:19:49	5943	0:19:16	6060
Santa Cruz County EMS			0:19:21	122
Contra Costa County EMS	0:20:25	1390	0:19:57	1292
Sacramento County EMS	0:15:00	3	0:20:10	106
Mountain Valley EMS	0:22:10	691	0:21:50	586
Coastal Valleys EMS	0:22:17	299	0:22:00	439
Los Angeles County EMS	0:25:00	3624	0:22:00	5597
Ventura County EMS			0:22:02	668
Central California EMS	0:12:23	9493	0:23:00	7790
Northern California EMS	0:23:00	17	0:24:00	62
San Benito County EMS			0:24:12	22
Alameda County EMS	0:26:40	1242	0:24:13	1545
Inland Counties EMS	0:23:03	1369	0:24:23	1346
San Mateo County EMS	0:26:00	759	0:25:25	635
Monterey County EMS	0:24:20	458	0:25:29	418
San Francisco EMS	0:27:23	291	0:25:33	703
Merced County EMS	0:21:39	194	0:27:30	280
Riverside County EMS	0:22:31	2601		
Santa Clara County EMS	0:25:00	3588		
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
Santa Barbara County EMS				

Measure ID	STR-3 2012	STR-3 2013
Response Count	20	26
Denominator Total	34197	31196
Submission Rate (n=32, 33)	60.61%	78.79%
Average	0:21:49	0:21:03
Median	0:22:24	0:20:10

Of the 26 LEMSAs reporting these data for 2013, the median scene time by an ambulance for suspected stroke patients was approximately 20 minutes, a reduction of 2 minutes compared to last year. Nearly all local jurisdiction average times for this measure ranged between 14 and 24 minutes. Typically, LEMSA protocols in California encourage paramedics to transport stroke patients from the scene in 15 minutes or less; however, this may not be realistic for many patients who require more time for history, examination, and extraction from their residence. Stroke evaluation and treatment is a time sensitive measure, so extra minutes in the field add up with additional delays within the healthcare system. Further examination of this measure is warranted, including methodology, documentation, and validation.

STR-5: Direct Transport to Stroke Center for Suspected Acute Stroke Patients Meeting Criteria Part 1 of 2



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Direct Transport to Stroke Center for Suspected Acute Stroke Patients Meeting Criteria
Part 2 of 2

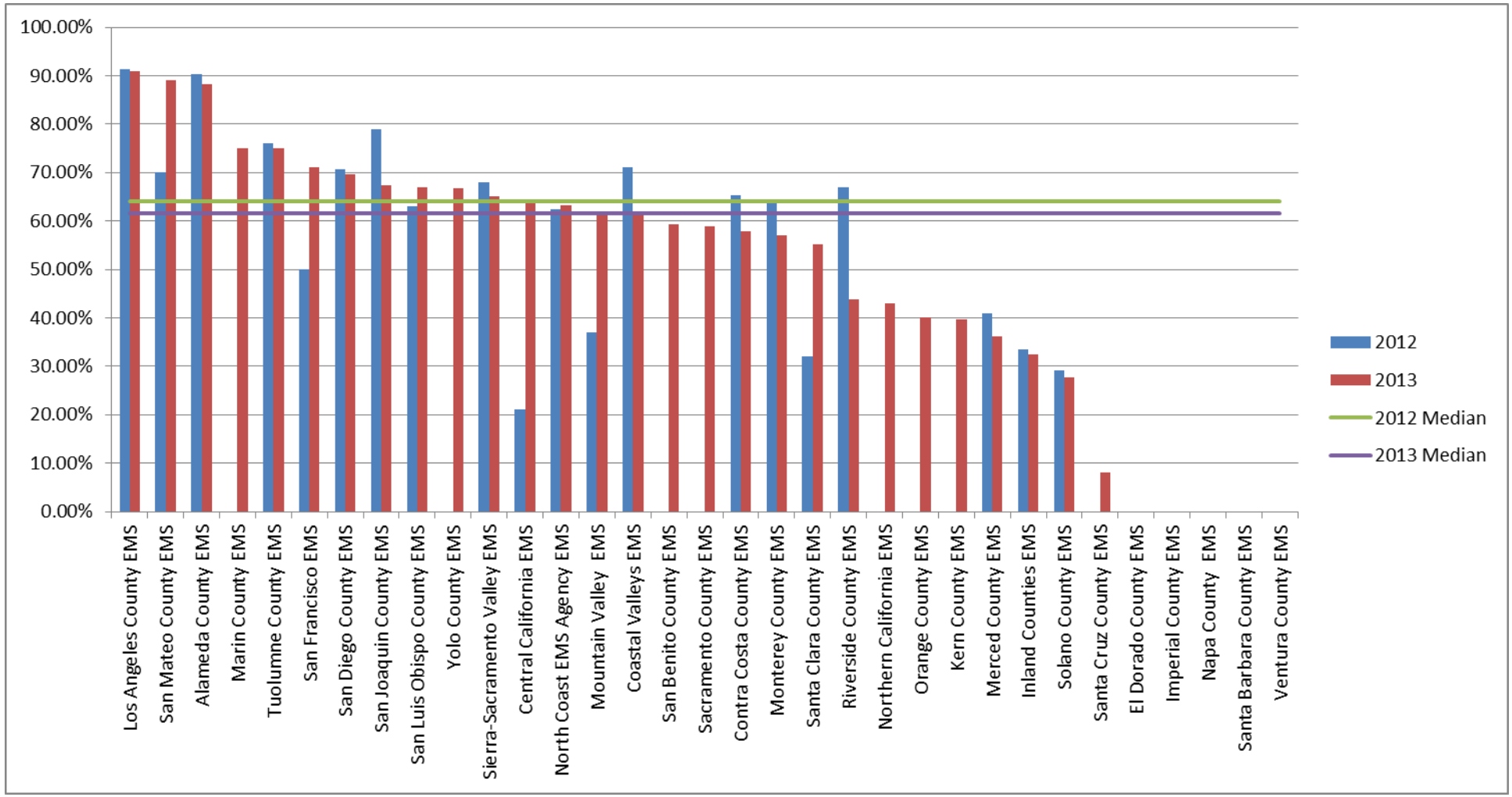
	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Marin County EMS			100.00%	263
San Diego County EMS	99.39%	3437	99.27%	3548
Ventura County EMS			98%	721
Alameda County EMS	0.9275	1242	97%	1545
Kern County EMS			95.00%	1051
San Mateo County EMS	91%	808	94.00%	646
Yolo County EMS			94.00%	236
Los Angeles County EMS	89%	3624	92.60%	5808
Orange County EMS			91.00%	607
Sierra-Sacramento Valley EMS	89%	1485	87.00%	1543
San Francisco EMS	61.0%	481	86.00%	745
Contra Costa County EMS	86.76%	1495	85.10%	1376
Monterey County EMS	81%	552	85.00%	495
Inland Counties EMS	69.33%	1552	76.03%	1335
Northern California EMS	0%	17	61.00%	74
Santa Clara County EMS	14%	3588	61.00%	1109
Sacramento County EMS	76.00%	331	52.00%	106
Tuolumne County EMS			9.00%	105
Mountain Valley EMS	22%	699	6.00%	586
Coastal Valleys EMS	0.00%	328	0.00%	486
San Benito County EMS			0.00%	29
Merced County EMS	14.95%	194		
San Joaquin County EMS	0%	989		953
Central California EMS				
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
North Coast EMS Agency EMS				
Riverside County EMS				
San Luis Obispo County EMS				
Santa Barbara County EMS				
Santa Cruz County EMS				
Solano County EMS				

Measure ID	STR-5 2012	STR-5 2013
Response Count	16	20
Denominator Total	20822	23389
Submission Rate (n=32, 33)	48.48%	60.61%
Average	55.39%	69.80%
Median	72.67%	86.00%

Of the 20 LEMSAs reporting these data for 2013, the median number of patients transported directly to a Stroke center by ground ambulance was 86%, a significant increase from last year.

Direct transport of patients to a Stroke center will vary by geography and availability of resources in a given area. Lower values are expected in rural areas or jurisdictions that do not have an established system with designated specialty care hospitals or rapid access to a center in a neighboring jurisdiction.

RES-2: Beta2 Agonist Administration for Adult Patients – Part 1 of 2



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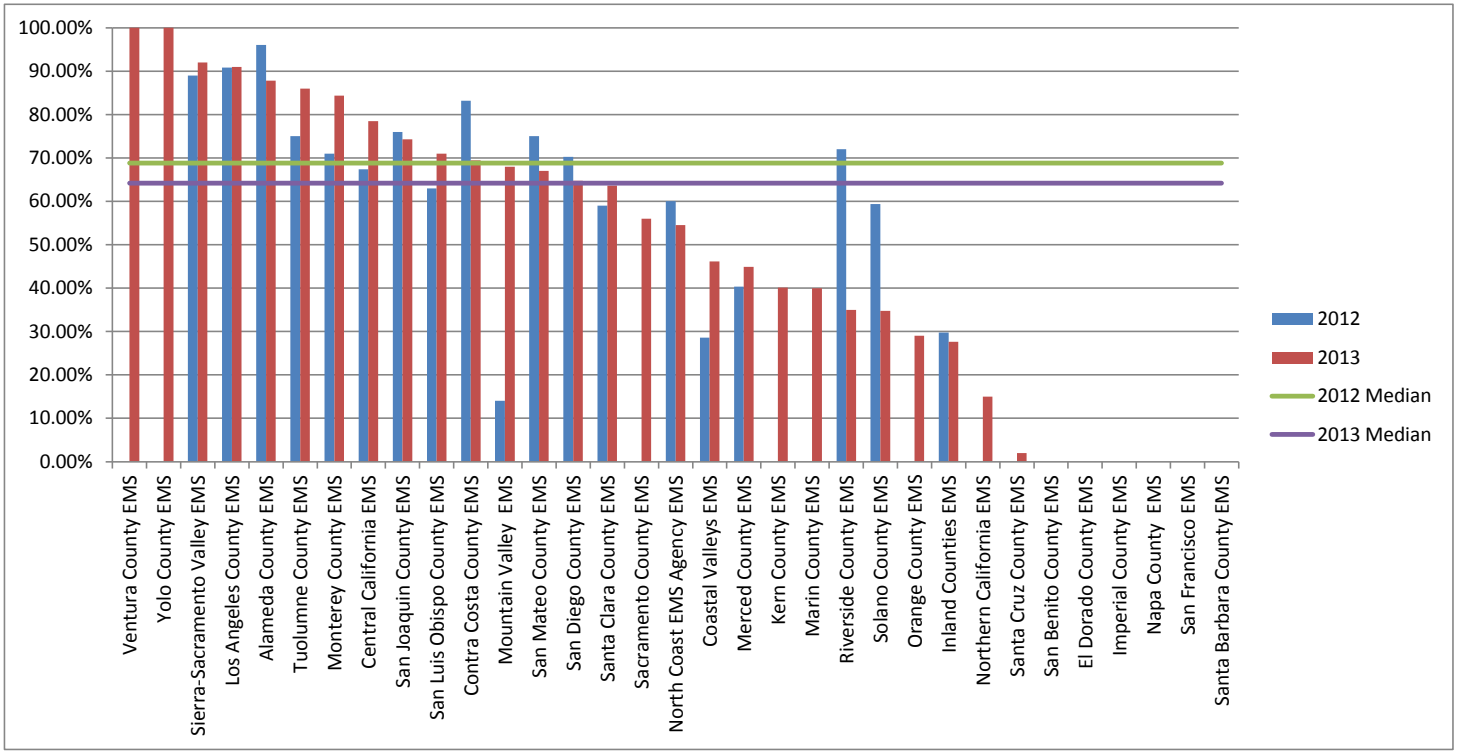
Beta2 Agonist Administration for Adult Patients – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Los Angeles County EMS	91.38%	6558	91.00%	6863
San Mateo County EMS	70%	447	89.00%	681
Alameda County EMS	90%	4115	88.29%	4367
Marin County EMS			75.00%	124
Tuolumne County EMS	76%	141	75.00%	152
San Francisco EMS	50.0%	142	71.00%	1876
San Diego County EMS	70.74%	5170	69.64%	5356
San Joaquin County EMS	79%	1454	67.45%	1650
San Luis Obispo County EMS	63%	533	67.00%	522
Yolo County EMS			66.67%	381
Sierra-Sacramento Valley EMS	68%	1842	65.00%	1920
Central California EMS	21.07%	13221	64.13%	3591
North Coast EMS Agency EMS	62.32%	781	63.30%	765
Mountain Valley EMS	37%	135	62.00%	893
Coastal Valleys EMS	71.13%	239	61.17%	394
San Benito County EMS			59.26%	27
Sacramento County EMS			59.00%	123
Contra Costa County EMS	65.24%	2625	57.91%	1958
Monterey County EMS	64%	363	57.00%	556
Santa Clara County EMS	32%	2352	55.22%	565
Riverside County EMS	67%	2989	43.81%	4619
Northern California EMS	0%	39	43.00%	336
Orange County EMS			40.00%	1796
Kern County EMS			39.66%	5426
Merced County EMS	40.86%	1723	36.12%	1977
Inland Counties EMS	33.50%	5081	32.45%	12743
Solano County EMS	29.23%	2857	27.76%	2644
Santa Cruz County EMS			8.00%	525
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
Santa Barbara County EMS				
Ventura County EMS				

Measure ID	RES-2 2012	RES-2 2013
Response Count	21	27
Denominator Total	52807	62830
Submission Rate (n=32, 33)	63.64%	81.82%
Average	56.28%	58.48%
Median	64.00%	61.59%

Of the 27 LEMSAs reporting these data for 2013, the median number of patients receiving a Beta-2 Agonist/bronchodilator for bronchospasm in adults (age 14 or older) was 61%, slightly less than last year. Values do appear to cluster near the median. This measure likely has challenges identifying the appropriate denominator of patients for whom a bronchodilator is indicated.

PED-1: Pediatric Asthma Patients Receiving Bronchodilators – Part 1 of 2



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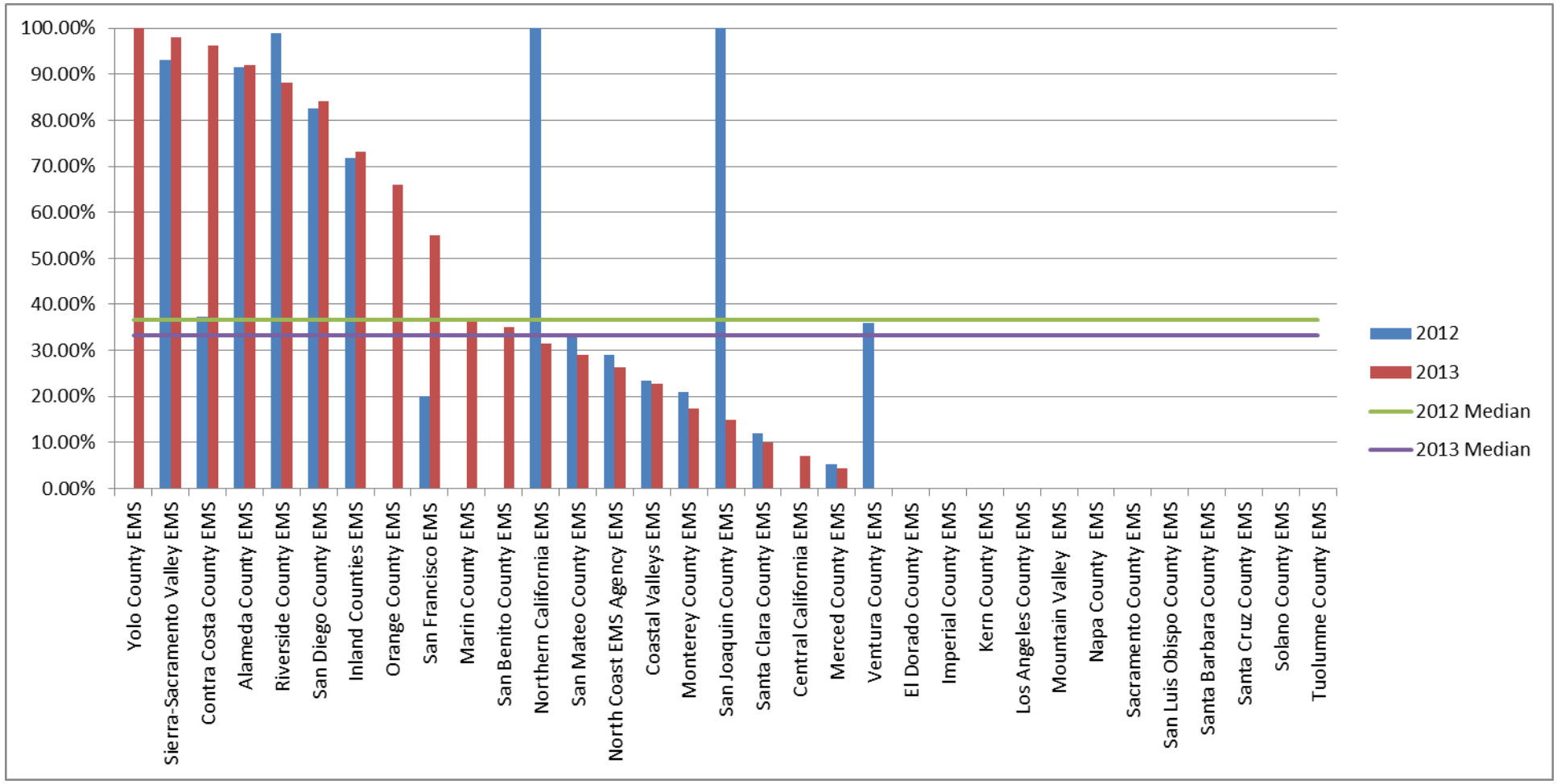
Pediatric Asthma Patients Receiving Bronchodilators – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Ventura County EMS			100%	42
Yolo County EMS			100.00%	25
Sierra-Sacramento Valley EMS	89%	89	92.00%	95
Los Angeles County EMS	90.82%	599	91.00%	631
Alameda County EMS	96.05%	203	87.84%	255
Tuolumne County EMS	75%	4	86.00%	8
Monterey County EMS	71%	17	84.38%	32
Central California EMS	67.37%	95	78.46%	65
San Joaquin County EMS	76%	88	74.26%	101
San Luis Obispo County EMS	63%	27	71.00%	17
Contra Costa County EMS	83.19%	113	69.42%	121
Mountain Valley EMS	14%	7	68.00%	50
San Mateo County EMS	75%	24	67.00%	21
San Diego County EMS	70.23%	346	64.72%	309
Santa Clara County EMS	59%	49	63.64%	33
Sacramento County EMS			56.00%	9
North Coast EMS Agency EMS	60.00%	15	54.55%	11
Coastal Valleys EMS	28.57%	7	46.15%	13
Merced County EMS	40.31%	129	44.92%	118
Kern County EMS			40.14%	416
Marin County EMS			40.00%	5
Riverside County EMS	72%	241	35.00%	1044
Solano County EMS	59.38%	160	34.72%	144
Orange County EMS			29.00%	149
Inland Counties EMS	29.76%	615	27.63%	1462
Northern California EMS	0%	1	15.00%	26
Santa Cruz County EMS			1.96%	51
San Benito County EMS			0.00%	1
El Dorado County EMS				
Imperial County EMS				
Napa County EMS				
San Francisco EMS				
Santa Barbara County EMS				

Measure ID	PED-1 2012	PED-1 2013
Response Count	20	27
Denominator Total	2829	5254
Submission Rate (n=32, 33)	60.61%	81.82%
Average	60.98%	56.96%
Median	68.80%	64.18%

Of the 27 LEMSAs reporting these data for 2013, the median number of pediatric patients receiving bronchodilators for asthma was 64.2%. This is a slight decrease from last year's value but similar to the equivalent adult measure, suggesting similar methodological issues. The pediatric measure should have more validity than the adult, since shortness of breath with wheezing in children is more likely due to asthma than adult symptoms that may be due to cardiac or chronic lung disease. Examination of this measure is recommended to ensure proper patient inclusion and documentation. It is not clear why the spectrum of results would be so variable. The measure would be more accurately titled "pediatric patients with wheezing receiving bronchodilators". Although this may be caused by other medical problems, wheezing in any population is not pathognomonic of asthma.

PAI-1: Pain Intervention – Part 1 of 2



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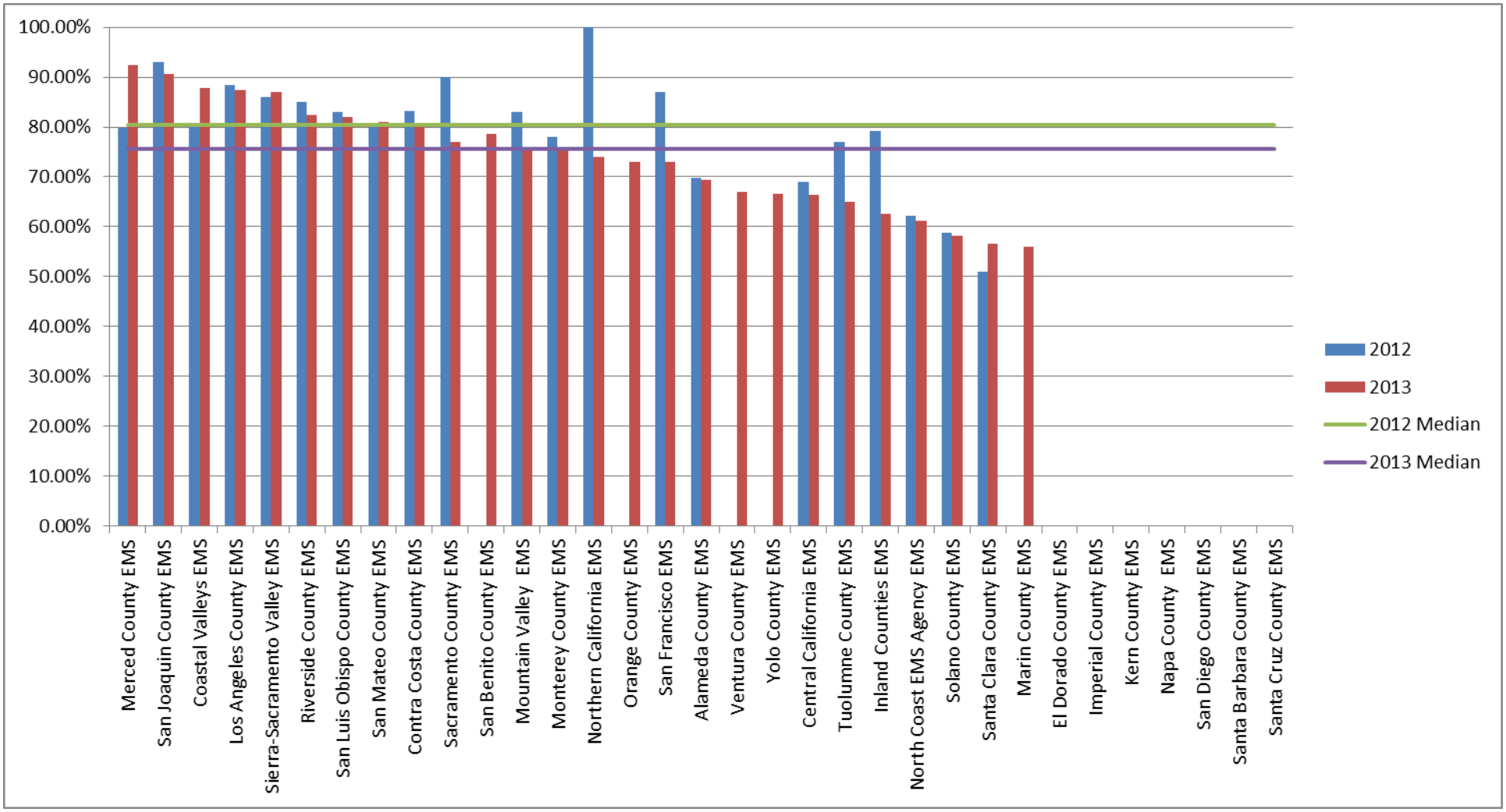
Pain Intervention – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Yolo County EMS			100.00%	2710
Sierra-Sacramento Valley EMS	93%	5628	98.00%	6053
Contra Costa County EMS	37.39%	9381	96.15%	13267
Alameda County EMS	91.62%	6215	91.90%	6535
Riverside County EMS	99%	22631	88.10%	35849
San Diego County EMS	82.51%	2493	84.05%	2251
Inland Counties EMS	71.88%	1515	73.04%	5735
Orange County EMS			66.00%	50
San Francisco EMS	20%	1848	55.00%	11538
Marin County EMS			36.26%	1048
San Benito County EMS			34.98%	283
Northern California EMS	100.00%	98	31.48%	1064
San Mateo County EMS	33%	3509	29.00%	4639
North Coast EMS Agency EMS	28.94%	2592	26.29%	2590
Coastal Valleys EMS	23.41%	1303	22.80%	3926
Monterey County EMS	21%	2838	17.29%	4072
San Joaquin County EMS	100%	4934	14.80%	1503
Santa Clara County EMS	12%	13188	10.06%	696
Central California EMS			7.16%	363
Merced County EMS	5.27%	1709	4.41%	1362
Ventura County EMS	36%	5651		
El Dorado County EMS				
Imperial County EMS				
Kern County EMS				
Los Angeles County EMS		49884		25596
Mountain Valley EMS				
Napa County EMS				
Sacramento County EMS				
San Luis Obispo County EMS				
Santa Barbara County EMS				
Santa Cruz County EMS				
Solano County EMS				
Tuolumne County EMS				

Measure ID	PAI-1 2012	PAI-1 2013
Response Count	16	19
Denominator Total	135417	131130
Submission Rate (n=32, 33)	48.48%	57.58%
Average	53.44%	45.18%
Median	36.70%	33.23%

Of the 19 LEMSAs reporting these data for 2013, the median percentage of patients receiving intervention for any pain reported as 7 or greater on a 10 point pain scale was 33.2%. Pain intervention was defined as any analgesic medication or accepted procedure to reduce pain. The low average and wide variation in the results suggest methodological challenges.

SKL-1: Endotracheal Intubation Success Rate – Part 1 of 2



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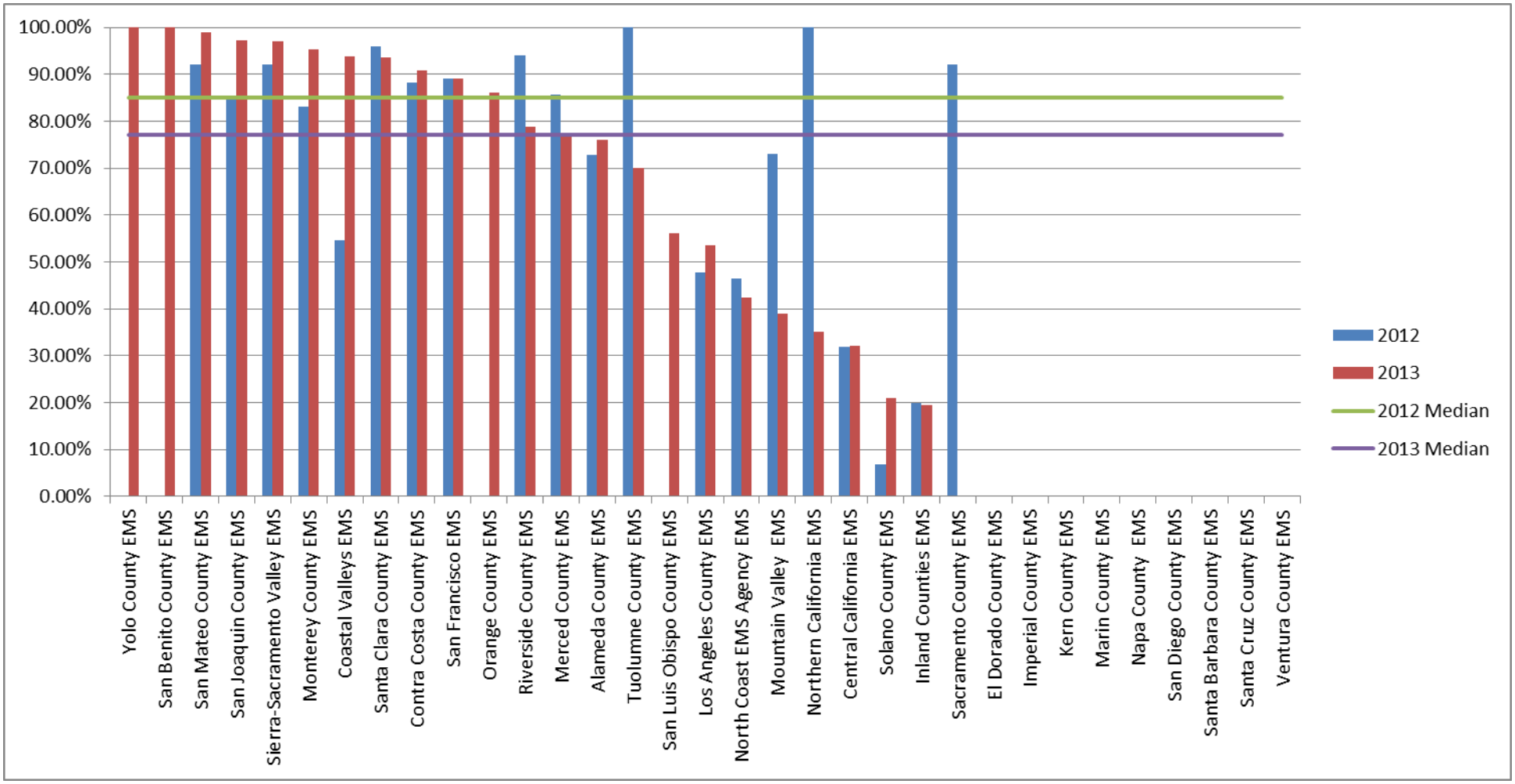
Endotracheal Intubation Success Rate – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Merced County EMS	79.79%	188	92.35%	196
San Joaquin County EMS	93%	501	90.58%	467
Coastal Valleys EMS	80.00%	55	87.91%	91
Los Angeles County EMS	88.49%	2050	87.50%	2402
Sierra-Sacramento Valley EMS	86%	342	87.00%	355
Riverside County EMS	85%	1221	82.50%	2337
San Luis Obispo County EMS	83.00%	160	82.00%	122
San Mateo County EMS	80.45%	266	81.00%	308
Contra Costa County EMS	83.12%	364	80.11%	533
Sacramento County EMS	90%	29	77.00%	66
San Benito County EMS			78.57%	28
Mountain Valley EMS	83%	281	76.00%	229
Monterey County EMS	78%	161	75.13%	189
Northern California EMS	100%	4	74.00%	57
Orange County EMS			73.00%	243
San Francisco EMS	87%	61	73.00%	220
Alameda County EMS	69.75%	744	69.31%	1222
Ventura County EMS			67%	207
Yolo County EMS			66.67%	100
Central California EMS	69.09%	508	66.30%	484
Tuolumne County EMS	77%	22	65.00%	31
Inland Counties EMS	79.12%	1164	62.51%	923
North Coast EMS Agency EMS	62.12%	198	61.14%	193
Solano County EMS	58.86%	175	58.25%	206
Santa Clara County EMS	51%	636	56.60%	689
Marin County EMS			56.00%	52
El Dorado County EMS				
Imperial County EMS				
Kern County EMS				
Napa County EMS				
San Diego County EMS				
Santa Barbara County EMS				
Santa Cruz County EMS				

Measure ID	SKL-1 2012	SKL-1 2013
Response Count	21	25
Denominator Total	9130	11930
Submission Rate (n=32, 33)	63.64%	75.76%
Average	79.23%	74.61%
Median	80.45%	75.57%

Of the 25 LEMSAs reporting these data for 2013, the median percentage of successful endotracheal intubations (within 2 attempts) was 75%. The slightly lower value compared to last year is likely related to refined measurement. The median is consistent with values reported in the literature. Bias may result because results are not based on verification in the emergency department.

SKL-2: End-tidal CO2 Performed on any Successful Endotracheal Intubation – Part 1 of 2



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End-tidal CO2 Performed on any Successful Endotracheal Intubation – Part 2 of 2

	2012 Value	2012 Denom.	2013 Value	2013 Denom.
Yolo County EMS			100.00%	80
San Benito County EMS			100.00%	22
San Mateo County EMS	92%	214	99.00%	250
San Joaquin County EMS	85%	464	97.16%	423
Sierra-Sacramento Valley EMS	92%	293	97.00%	308
Monterey County EMS	83%	126	95.27%	148
Coastal Valleys EMS	54.55%	44	93.75%	80
Santa Clara County EMS	96%	322	93.59%	390
Contra Costa County EMS	88.24%	302	90.90%	484
San Francisco EMS	89%	53	89.00%	161
Orange County EMS			86.00%	50
Riverside County EMS	94%	1041	78.86%	2190
Merced County EMS	85.64%	188	77.16%	197
Alameda County EMS	72.73%	744	75.94%	1222
Tuolumne County EMS	100%	17	70.00%	20
San Luis Obispo County EMS			56.00%	122
Los Angeles County EMS	47.83%	483	53.60%	2402
North Coast EMS Agency EMS	46.46%	99	42.42%	99
Mountain Valley EMS	73%	233	39.00%	229
Northern California EMS	100%	4	35.00%	51
Central California EMS	31.91%	351	32.09%	321
Solano County EMS	6.86%	175	20.87%	206
Inland Counties EMS	19.98%	921	19.41%	577
Sacramento County EMS	92%	26		
El Dorado County EMS				
Imperial County EMS				
Kern County EMS				
Marin County EMS				
Napa County EMS				
San Diego County EMS				
Santa Barbara County EMS				
Santa Cruz County EMS				
Ventura County EMS				

Measure ID	SKL-2 2012	SKL-2 2013
Response Count	20	22
Denominator Total	6100	10032
Submission Rate (n=32, 33)	60.61%	66.67%
Average	72.51%	71.34%
Median	85.32%	78.86%

Of the 22 LEMSAs reporting these data for 2013, the median percentage of End-Tidal CO2 monitoring with waveform capnography after any successful endotracheal intubations was 78.8%. The value decreased from last year but included 40% more records. Following clinical best practices, this indicator should be 100%, so it is important for local jurisdictions to evaluate whether this is documentation, a practice issue, or protocol deficiency.

Conclusion

During this second year of reporting the core measures, there were increases in the number of LEMSAs reporting, average number of measures reported, and the overall number of records incorporated in the analysis of the measures. It is still not possible to determine the validity of the results, and they should not be considered comparable between local agencies. However, it is reasonable to assume that accuracy and validity is improving with experience and refinement of methodology to generate the reports. Reporting will continue to improve as the measurement methods are improved, as provider agencies convert to ePCR that can better capture data and be aggregated at the LEMSA, and as field providers are instructed on documentation.

The coming year begins the transition to NEMSIS 3.x, a new national data standard, which will utilize an entirely new data dictionary and will increase accuracy as data is aggregated at the local and state EMS agencies and as the measures reflect the new data field definitions. However, there will be a two-year transition that will make any comparisons between prior years or between LEMSAs even less valid. However, the measures will continue to evolve with experience and further committee input. While these changes will limit statewide conclusions, local jurisdictions can still consider their results internally and gain further experience with analysis and reporting. Other states and federal agencies have shown considerable interest in this data experiment, which could lead to some national measures in the future.

Acknowledgements

The California EMS Authority wants to thank the California healthcare Foundation for funding this work, the Core Measures Workgroup for many hours developing these measures, and the local EMS Agencies and their staff for their participation. Also, special thanks to Adam Davis for leading this project at EMSA.

Addendum

Amendments to the *Reporting Capability of EMSA and LEMSA Data Systems and Results from Clinical Measure Reports* are listed below.

- North Coast EMS Agency is mislabeled as "North Coast EMS Agency EMS." This error is present on all tables and charts in the "Results from Clinical Measures Reports" section of the report.
- Santa Clara County revised their report values for 2013 data. The updated values are found in the table below.
- Central California EMS Agency revised their report values for 2013 data. The updated values are found in the table below.
- Kern County EMS Agency submitted 2012 data after the reporting deadline. The results are not incorporated into this report, but can be found in the table below.

	Central California 2013 Updated Values		Santa Clara EMS 2013 Updated Values		Kern County EMS 2012 Reported Values	
Measure ID	**Denominator Value (Population)**	**Reporting Value**	**Denominator Value (Population)**	**Reporting Value**	**Denominator Value (Population)**	**Reporting Value**
TRA-1 (mm:ss)		0:22:00				0:25:11
TRA-2	172	99.42%			435	92.87%
ACS-1	4761	80.53%	3967	56%	5371	40%
ACS-2	4761	72.88%	3967	11%	5371	52%
ACS-3 (mm:ss)		20:47	3967	0:23:36		19:36
ACS-5	819	99.15%	96	100%	44	79.55%
CAR-2			881	10%	107	32.71%
CAR-3			881	23%		
CAR-4			881	18%		
STR-2			1464	82%	1049	82.65%
STR-3			1464	0:20:16		0:16:00
STR-5			1302	98%	1049	86%
RES-2					5496	37.68%
PED-1					525	44.38%
PAI-1						
SKL-1						
SKL-2						