

EMS Core Measures Project Reporting Capability of EMSA and LEMSA Data Systems and

Results from Performance Measures

Data Year 2016

With Comparison to Years 2013, 2014 and 2015

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EMS Core Measures Project, Data from 2016:

Reporting Capability of EMSA and LEMSA Data Systems and Results from Clinical Measure Reports

Introduction

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

Robust data systems, with the ability to report clinical indicators and performance measures, are a key tool to accomplish QI activities. The goal is to connect data from across the continuum of care from dispatch to pre-hospital to hospital disposition in order to optimally evaluate patient outcomes.

Background and Authority

California is a large, diverse state with a two-tier regulatory system consisting of State Emergency Medical Services Authority (EMSA) and 33 local EMS agencies (LEMSA). California statute (Health and Safety Code 1797.103) states 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 establishing a data collection system and setting data and QI standards at the local level. Additionally, the EMS system QI 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 (requiring data reporting) and the use of defined indicators to assess the local EMS system as defined in CCR, Title 22, Division 9, Chapter 4, Section 100147, 100169, 100170.

Recent Data Legislation

State legislation is driving changes in EMS data systems related to data quality and data accuracy. Specifically, four bills were enacted in 2015 and became effective January 2016. These include:

- AB 1129 which requires each provider to utilize electronic health record systems that are compliant with the "current version of NEMSIS" to collect EMS data;
- AB 503 which authorizes a health facility to share patient-identifiable information with EMSA or other appropriate EMS entities for the purposes of addressing quality improvement;
- AB 1223 which requires EMSA to adopt standards related to data collection for ambulance patient off-load time; and

 SB 19 which requires EMSA to establish a pilot project to be known as the California POLST eRegistry for the purpose of collecting information received from a physician or their designee.

Each of these new laws may have some impact on the Core Measures effort, particularly AB 1129 and AB 1223.

Methodology

A task force consisting of data and quality leaders from local EMS agencies, LEMSA medical directors, hospitals, and pre-hospital EMS providers assisted in the development of these core measures (17 clinical and 3 related to response and transport). The measures are based on evidence-based processes and treatments for a condition or illness. Core measures are intended to help EMS systems improve the quality of patient care by focusing measurement specifications on key processes and results of care. *The California EMS System Core Quality Measures, EMSA 166, Appendix E* defines the specific data elements and instructions for reporting each measure. The measures are reviewed each year to improve results.

LEMSA participation in the California Emergency Medical Services Information System (CEMSIS) is required, consistent with HSC 1797.102, to provide the EMS Authority with information necessary to access the effectiveness of emergency medical services in each EMS area or the system's service area. The LEMSAs run their core measure reports from their local database and submit aggregate results to EMSA. Since each of the 33 LEMSAs maintains their own EMS database and each is dependent on their EMS provider agencies to submit data, there is variability in their capability to report core measures and some intrinsic variation in results. While sampling is an approved mechanism for the LEMSAs to calculate core measure values and has been done in the past, no LEMSAs reported data sampling this year.

In addition to core measure results, EMSA requested that each of the LEMSAs provide the following information on their process of collection and reporting of their information.

Please include in your data flow description:

- Paper Patient Care Records (PCRs)
 - How many providers are using paper PCRs;
 - How the data from the paper PCRs are being entered into the system from those providers;
- Electronic Paper Patient Care Records (ePCRs)
 - How many providers are using electronic ePCRs;
 - How the data from the ePCRs are being entered into the system;
- A general description of your data system to include:
 - A general idea of the data flow from the providers to EMSA;
 - Who compiles the data for the Core Measures Reports (LEMSA staff, contractor, provider, etc.;
 - Who submits the Core Measures Reports to EMSA;
 - Who compiles the data for the Core Measures Reports (LEMSA staff, contractor, etc.); and

 Any other information that would help us better understand the Core Measures data submitted

Limitations and Challenges

Core measure reporting depends on the development of compatible data systems at several levels of the EMS system, which will take several more years to achieve the level of confidence of other healthcare sector quality assessment reporting. Other challenges to reporting the core measures to EMSA are enumerated below. Of the 33 LEMSAs, 28 reported at least one clinical measure from 2016 data. With the upcoming transition to NEMSIS 3 and the ongoing transition by providers to electronic patient care records (ePCR), EMSA expects increased quality of data collected and improvements to reported values for the performance measures. EMSA will continue to work on these measures to improve the report specifications and to connect them to "best practices."

Data Collection and Reporting Limitations

<u>New data systems</u> - Some of the LEMSAs recently migrated to new data systems and the prior data were 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 has continued to be a barrier in the second and third years as others transition from NEMSIS 2 to NEMSIS 3 data systems.

<u>Transition to NEMSIS compliant electronic data systems</u> – Transition of EMS providers from manual paper records to electronic records continues. Abstracting information from paper forms is difficult, time-consuming, and inaccurate. This will continue to be a problem until all providers and LEMSAs are using ePCR with software that has a high degree of technological sophistication, including rules that forces users to complete forms before closing the record.

<u>Hospital Outcome Data</u> – One of the ongoing challenges is the difficulty in obtaining hospital outcome data on every ambulance transport. Several measures, for example resuscitation measures, rely on 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), the LEMSAs must invest considerable effort to acquire this information. Advances in health information exchange will make this much easier in the future.

Project Design Limitations

<u>Aggregate data</u> - The data provided are aggregated summary data reported by each LEMSA, which limits the types of analyses that can be done by EMSA. More in-depth statistical analyses could be performed if patient-level data were collected and analyzed by EMSA.

<u>Data quality and reliability</u>-There are many differences in data collection and reporting practices across LEMSAs. This lack of data standardization and consistency further limits reliability and comparability of the measures reported by each LEMSA. Though all LEMSAs were given the same specifications to calculate the measures, not all are able to adhere to these due to constraints and inconsistencies in data collection and measure calculation methods. Greater data standardization will lead to results with greater validity and comparability. Unless data quality checks or audits are performed by LEMSAs, the accuracy of the data cannot be ascertained. This is compounded where there is manual data entry.

<u>Documentation by Non-Trained Providers</u> - EMS field personnel generally do not receive core measures specific training on data entry. Consequently, data entry is not consistent for all the required data elements. Additional education and training would reduce this problem. EMSA will work with the LEMSAs to alert providers to specific elements in core measures data to ensure that those fields are properly populated. New ePCR software has rules that can mandate and limit values for key fields. This can be integrated into quality improvement plans to help with quality assurance in the future. Optimally these will be standardized statewide.

Patient Records in Tiered EMS systems - One of the significant challenges of reporting EMS information is related to the tiered EMS response system in most geographic areas. Two records are often initiated for each patient: one by EMS first responders and a second by ambulance transport units that arrive later. LEMSAs have not established a mechanism—either manually or technologically—to create an integrated record that captures 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 procedural issue and highlights the need for a "one patient, one record" system to allow for a complete picture of patient care. EMSA, LEMSAs, and providers continue to explore potential solutions to this challenge.

<u>Partial System Representation</u> – Only a portion of the actual EMS business conducted in California is represented in this report; the values reported by the LEMSAs do not represent 100% of the providers in the state. EMSA is providing local assistance grant opportunities through LEMSAs to assist all providers to adopt ePCR systems. Throughout the reporting year (2016) most LEMSAs were transitioning from NEMSIS 2.2.1 to NEMSIS 3 data standards. Due to the nature of the "transition" year, only NEMSIS 2.2.1 data was requested, which only represents a portion of the data year.

In future years, system improvements listed below will facilitate data collection and more accurate reporting. These advances should improve data validity and decrease variability related to documentation and measure specifications.

- 1. Additional LEMSAs successfully exporting data to CEMSIS
- 2. Transition from NEMSIS Version 2 to NEMSIS Version 3, an updated national data dictionary
- 3. CEMSIS accumulating sufficient records to generate reports on core measures from patient-level data

Improvements

While the number of LEMSAs (28 of 33) that submitted core measure values to EMSA decreased from the prior year, the number of measures reported by participating LEMSAs **remained the same or increased** (see Chart 2 "Histogram").

The following 9 (nine) measures experienced an increase in their median reported value from the previous year:

- TRA-1
- ACS-2
- CAR-2
- CAR-3
- CAR-4
- STR-2
- STR-5
- PAI-1
- SKL-2

Independent, 3rd Party Project Evaluation

Supported by a grant from the California Health Care Foundation, the EMS Authority contracted with the University of California Davis Institute for Population Health Improvement (UC Davis IPHI) to conduct an independent review of the California EMS Core Quality Measures Project. The report can be accessed at: http://www.emsa.ca.gov/Media/Default/PDF/UCDavisCoreMeasureProjectEvaluation.pdf

One of the most concerning observations was that few LEMSAs used these measures for quality improvement, which is their primary purpose. Data quality cannot account for all low values. LEMSAs that question the validity of their measure should sample records for a field audit. It is also simple to check with a LEMSA that is apparently high-performing to compare both their search algorithm and their clinical protocols.

The findings and recommendations by UC Davis IPHI will be assessed by EMSA and the Core Measures Task Force, to determine best approaches for project enhancement, providing value to stakeholders, and meeting California's commitment to statewide EMS as outlined in Title 22, Division 9, Chapter 12.

Tables, Charts and Graphs Generated from Core Measure Reports

LEMSAs Reporting Data for Any Core Measures (Table 1):

Table 1 shows which LEMSAs submitted core measures data for years 2009-2016. For 2016 reporting year, 28/33 LEMSAs reported at least one measure. If a LEMSA submitted a value for any of the 17 clinical measures or the three Response and Transport measures found in *California EMS System Core Quality Measures, EMSA 166, Appendix E*, the cell associated with that data year is populated with an "X" and shaded green. For LEMSAs that did not submit any core measure information to EMSA, the cell for that corresponding year appears white.

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

Table 2 shows the total number of LEMSAs that reported a value for the specific clinical measure, the aggregate denominator total (number of patient records) of all responses, the percent of LEMSAs that submitted a value for each measure (submission rate), the average and median reported value for each measure. This table includes information from each reporting period 2012- 2016.

Frequency Histogram of LEMSA Number of Responses to Clinical Measures (n=17) for 2012-2016 (Chart 1) and LEMSA Response Count to 17 Clinical Measure for 2016 Data (Chart 2)

The histogram shows the number of clinical measure results reported by each LEMSA grouped as follows: 17-15, 14-12, 11-9, 8-6, 5-3, 2-0 measures reported. Each of the 33 LEMSAs is tallied in one of these groups based on how many clinical measures they reported. Chart 2 also illustrates the number of clinical measures each LEMSA reported, organized by LEMSA alphabetically. Out of the seventeen clinical measures, 28 of 33 LEMSAs (84%) were able to report at least nine measures, based on their 2016 data.

Clinical Measure Results:

This report includes the LEMSA responses to the clinical measures as they were reported to EMSA. Each measure includes a graph based on the reported value provided by each LEMSA and the median value for all submissions (Part 1 of 2). On the following page ("Part 2 of 2"), the report provides a table of the LEMSA response count for each measure, the population denominator for the measure, submission rate for the measure, average reported value, and median value for all responses for that measure. The table is populated directly from the values provided to EMSA by the LEMSAs. If a LEMSA was unable to report a measurement or denominator value, the cell in that row contains no value and is shaded grey. The median values for the prior year's reporting are found in the top right corner of the page, and a yellow box features some comments and evaluation on the measure and responses.

Table 1 LEMSAs Reporting Data for Any Core Measure Core Measure Reporting by LEMSA

	2009	2010	2011	2012	2013	2014	2015	2016
Alameda County EMS		Х	Х	Х	Х	Х	Х	Х
Central California EMS	Х	Х	Х	Х	Х	Х	Х	Х
Coastal Valleys EMS				Х	Х	Х	Х	Х
Contra Costa County EMS		Х	Х	Х	Х	Х	Х	Х
El Dorado County EMS				Х	Х	Х		
Imperial County EMS								
Inland Counties EMS	Х	Х	Х	Х	Х	Х	Х	Х
Kern County EMS		Х	Х		Х	Х	Х	Х
Los Angeles County EMS	Х	Х	Х	Х	Х	Х	Х	Х
Marin County EMS		Х	Х		Х	Х	Х	Х
Merced County EMS	Х	Х	Х	Х	Х	Х	Х	Х
Monterey County EMS		Х	Х	Х	Х	Х	Х	Х
Mountain Valley EMS		Х	Х	Х	Х	Х	Х	Х
Napa County EMS					Х	Х	Х	Х
North Coast EMS		Х	Х	Х	Х	Х	Х	Х
Northern California EMS	Х	Х	Х	Х	Х	Х	Х	Х
Orange County EMS					Х	Х	Х	Х
Riverside County EMS		Х	Х	Х	Х	Х	Х	Х
Sacramento County EMS		Х	Х	Х	Х	Х		
San Benito County EMS					Х	X	Х	Х
San Diego County EMS		Х	Х	Х	Х	X	Х	Х
San Francisco EMS	Х	Х	Х	Х	Х	X	Х	Х
San Joaquin County EMS				Х	Χ	X	Х	Х
San Luis Obispo County EMS		Х	Х		Х	Х	Х	Х
San Mateo County EMS		Х	Х	Х	Х	Х	Х	Х
Santa Barbara County EMS	Х	Х	Х		Х	Х	Х	Х
Santa Clara County EMS	Х	Х	Х	Х	Х	Х	Х	Х
Santa Cruz County EMS	Х	Х	Х		Х	Х	Х	Х
Sierra-Sacramento Valley EMS	Х	Х	Х	Х	Х	Х	Х	Х
Solano County EMS				Х	Х	Х		
Tuolumne County EMS		Х	Х	Х	Х	Х	Х	
Ventura County EMS		Х	Х	Х	Х	Х	Х	Х
Yolo County EMS					Х	Х	Х	Х
Totals Measure Responses (including RSTs and 2015 Measures)	10	24	24	23	32	32	29	28

X=Reported At Least 1 Measure

No Measures Submitted

Table 2 Aggregated Values across all LEMSAs of Clinical Measures Response Count*, Denominator Total, Submission Rate, Average and Median Value

Submission Rate (n=22) 51.52% 51.52% 66.67% 66.67% 66.63% 71.24% 0.2360 93.64% 0.3	2012																	
Denominator Total 14918 12185 90238 75642 11528	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
Submission Rate (n-32) 51,52% 51,52% 66,67% 66,67% 66,67% 60,61% 63,64% 33,34% 30,30% 66,67% 66,02% 62,14% 50,64% 60,24% 60,	Response Count	17	17	22	22	20	21	21	11	10	22	20	16	21	20	16	21	20
Measure	Denominator Total	14918	12185	90238	75642	11523	11598	10023	7991	7446	33872	34197	20822	52807	2829	135417	9130	6100
Decision Color C	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%
2013 **Measure ID** **TRA-1** **TRA-2** **ACS-1** **ACS-2** **ACS-3** **ACS	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%
Measure ID	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%
Measure ID	25 Total Submissions cor	nsidered in	this table															
Response Count 23 25 27 28 28 27 27 12 11 27 26 20 27 27 19 25	2013																	
Denominator Total 16382 9481 108544 118811 13587 11316 16525 14242 14026 34364 31196 23389 62830 5254 131130 11930 11930 1308	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
Denominator Total 16382 9481 108544 118811 13587 11316 16525 14242 14026 34364 31196 23389 62830 5254 131130 11930 11930 1308	Response Count	23	25	27	28	28	27	27	12	11	27	26	20	27	27	19	25	22
Submission Rate (n=33) 69.70% 75.76% 81.82% 84.85% 84.85% 84.85% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 81.82% 85.96% 85.	•						11316	16825	14242	14026	34364	31196			5254	131130		10032
Median	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%	1	75.76%	66.67%
2014 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 Perport Strain S		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%
Neasure ID	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%
Measure ID	31 Total Submissions cor	nsidered in	this table															
Measure ID																		
Response Count 28 27 31 31 29 28 30 12 12 31 30 21 29 29 22 30	2014																	
Denominator Total 59496 108682 111161 109520 9396 7826 16759 8773 9637 32810 31483 25478 79440 5453 117381 9898 7650 7826 7	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
Submission Rate (n=33) 8.4.85% 81.82% 93.94% 93.94% 87.88% 84.85% 90.91% 36.36% 36.36% 93.94% 90.91% 63.64% 87.88% 87.88% 66.67% 90.91% 87.8 Average 0.24:21 61.90% 65.55% 81.48% 0.21:122 87.82% 27.68% 27.00% 9.26% 80.09% 0.21:120 74.55% 60.47% 54.34% 41.65% 71.68% 74.66% 74	Response Count	28	27	31	31	29	28	30	12	12	31	30	21	29	29	22	30	29
Average 0:24:21 61.90% 66.55% 81.48% 0:21:22 87.82% 27.68% 27.00% 9.26% 80.09% 0:21:20 74.55% 60.47% 54.34% 41.65% 71.68% 74.66 Median 0:24:30 81.02% 63.00% 87.86% 0:21:37 96.86% 24.54% 23.50% 8.51% 89.80% 0:20:43 93.00% 67.69% 60.62% 39.00% 72.87% 91.0 31 Total Submissions considered in this table 2015 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 Submission Rate (n=33) 81.82% 78.79% 66.60% 85.81% 0:23:07 95.85% 27.49% 19.41% 10.75% 92.90% 0:20:29 88.70% 37.21% 29.00% 32.40% 73.37% 88.2 Submission Rostered in this table 2016 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 SUBmission Rate (n=33) 81.82% 78.79% 87.88	Denominator Total	59496	108682	111161	109520	9396	7826	16759	8773	9637	32810	31483	25478	79440	5453	117381	9898	7605
Median	Submission Rate (n=33)	84.85%	81.82%	93.94%	93.94%	87.88%	84.85%	90.91%	36.36%	36.36%	93.94%	90.91%	63.64%	87.88%	87.88%	66.67%	90.91%	87.88%
2015 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 27 26 29 29 27 28 29 10 10 29 26 22 27 27 25 28 29 Denominator Total 14036 19456 98274 101450 18553 13703 16385 4820 4580 30254 25155 26212 116267 8614 251438 9629 7 Submission Rate (n=33) 81.82% 78.79% 87.88% 87.88% 81.82% 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 81.82% 75.76% 84.85% 84.8 Average 0.23:49 70.04% 66.28% 80.97% 0.22:27 81.83% 27.78% 26.10% 14.64% 84.91% 0.20:24 69.34% 45.88% 43.51% 39.51% 72.73% 75.7 Median 0.23:44 83.37% 66.00% 85.81% 0.23:07 95.85% 27.49% 19.41% 10.75% 92.90% 0.20:29 88.70% 37.21% 29.00% 32.40% 73.37% 88.2 29 Total Submissions considered in this table 2016 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 28 28 28 28 28 27 28 10 9 28 28 23 26 26 26 27 27 29 29 66.50mission Rate (n=33) 81.82% 78.79% 87.88% 87.88% 81.82% 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 75.76% 84.85% 84.8 48.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 75.76% 84.85% 84.8 48.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 75.76% 84.85% 84.8 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 75.76% 84.85% 84.8 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 87.86% 84.85% 84.8 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 87.86% 84.85% 84.8 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 87.86% 84.85% 84.8 84.85% 87.88% 30.30% 30.30% 87.88% 78.79% 66.667% 81.82% 87.86% 84.85% 87.88% 87	Average	0:24:21	61.90%	66.55%	81.48%	0:21:22	87.82%	27.68%	27.00%	9.26%	80.09%	0:21:20	74.55%	60.47%	54.34%	41.65%	71.68%	74.60%
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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-1 SKL-2 Response Count 27 26 29 29 27 28 29 10 10 29 26 22 27 27 25 28 Denominator Total 14036 19456 98274 101450 18553 13703 16385 4820 4580 30254 25155 26212 116267 8614 251438 9629 77 Submission Rate (n=33) 81.82% 78.79% 84.85% 81.82% 87.88% 30.30% 37.88% 78.79% 66.67% 81.82% 48.82% 75.76% 84.85% 84.85% 87.88% 30.30% 87.88% 78.79% 66.67% 81.82% 43.51% 39.51% 72.73% 75.7 75.7 75.7 75.7 75.7 75.7 75.7 75.7 7	31 Total Submissions cor	nsidered in	this table															
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28 Total Submissions considered in this table		0		2211270		0.2.1.07	22.2370											22.23/6

^{*}Response Count is defined as the number of LEMSAs who submitted a reported value for the specific measure

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

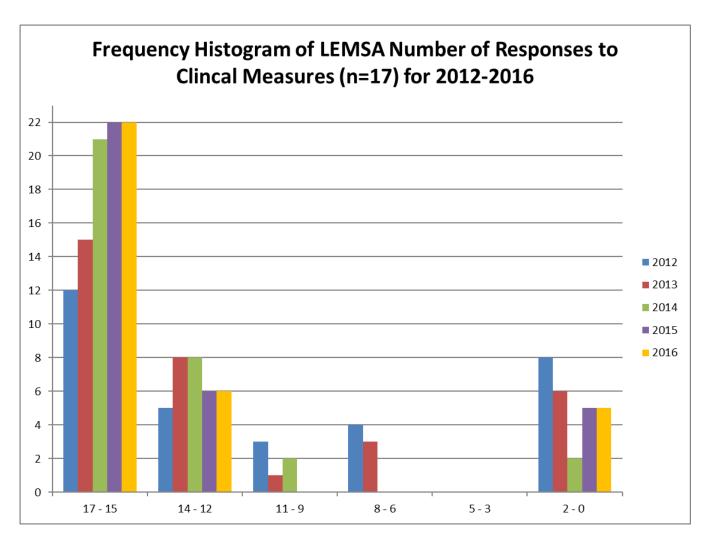
- 1. TRA-1 Scene time for trauma patients
- 2. TRA-2 Direct transport to designated trauma center for trauma patients meeting criteria
- 3. ACS-1 Aspirin administration for chest pain/discomfort rate
- 4. ACS-2 12 lead ECG performance
- 5. ACS-3 Scene time for suspected heart attack patients
- 6. ACS-5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

Measures with the lowest response rate include:

- 15. CAR-3 Out of hospital Cardiac Arrest Survival to Emergency Department Discharge
- 16. CAR-4 Out of hospital Cardiac Arrest Survival to Hospital Discharge
- 17. STR-5 Direct transport to stroke center for suspected acute stroke patients meeting criteria

Additional, non-clinical measures absent from this report include:

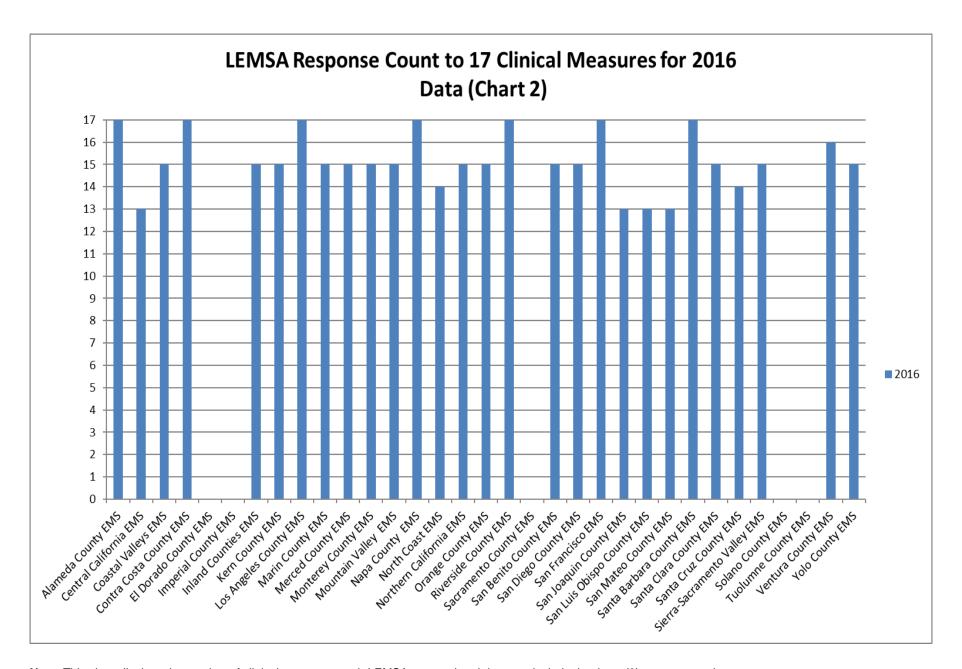
- 18. RST-1 Ambulance response time by ambulance zone (emergency)
- 19. RST-2 Ambulance response time by ambulance zone (non-emergency)
- 20. RST-3 Transport of patients to hospital



Count of LEMSA reporting a value noted in the calendar year

Count of Elimon respecting a value noted in the calculating a							
Number of							
Measures	2012	2013	2014	2015	2016		
17 - 15	12	15	21	21	22		
14 - 12	5	8	8	5	6		
11 - 9	3	1	2	2	0		
8 - 6	4	3	0	0	0		
5 - 3	0	0	0	0	0		
2 - 0	8	6	2	4	5		

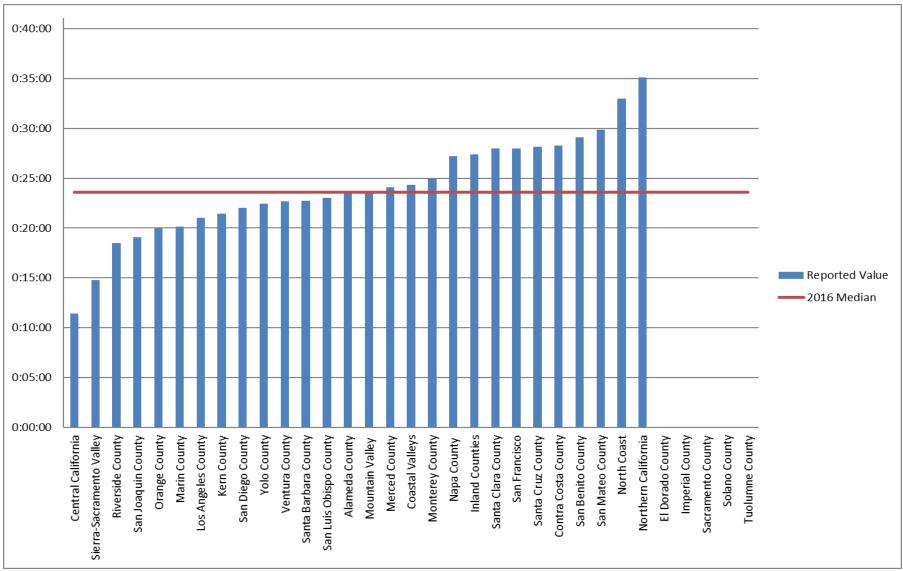
Note: For 2016, all 28 LEMSAs that reported data provided results for at least 13 measures. The others (represented in the 0-2 category) reported no core measure results. The ability to report these measures is an indicator of the capability of the LEMSA data system to report the retrospective clinical data, and may not represent a LEMSA's commitment to data collection or quality improvement.



Note: This chart displays the number of clinical measures each LEMSA reported and does not include the three (3) response and transport measures

Clinical Measure Responses

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

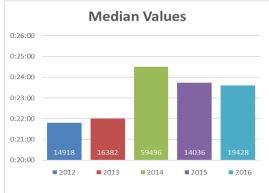


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http://www.emsa.ca.gov/ems_core_quality_measures_project

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

	2016 Value	2016 Denom.
Central California	0:11:26	1066
Sierra-Sacramento Valley	0:14:45	456
Riverside County	0:18:29	2174
San Joaquin County	0:19:04	590
Orange County	0:19:59	180
Marin County	0:20:07	68
Los Angeles County	0:21:00	1448
Kern County	0:21:28	347
San Diego County	0:22:00	4032
Yolo County	0:22:28	220
Ventura County	0:22:40	177
Santa Barbara County	0:22:43	164
San Luis Obispo County	0:23:00	73
Alameda County	0:23:33	
Mountain Valley	0:23:40	470
Merced County	0:24:04	284
Coastal Valleys	0:24:19	311
Monterey County	0:24:58	
Napa County	0:27:11	130
Inland Counties	0:27:24	1273
Santa Clara County	0:27:58	432
San Francisco	0:28:00	1004
Santa Cruz County	0:28:09	677
Contra Costa County	0:28:18	1207
San Benito County	0:29:06	49
San Mateo County	0:29:52	526
North Coast	0:33:00	1980
Northern California	0:35:06	90
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	TRA-1
Response Count	28
Denominator Total	19428
Submission Rate (n=33)	81.82%
Average	0:24:04
Median	0:23:37



Of the 28 LEMSAs reporting these data for 2016, the median scene time was 23 minutes, 37 seconds. Adjustments were made in 2014 to the Trauma measures to analyze a larger population of trauma patients. Changes to the trauma measures include the removal of the revised trauma score to shift from examining those severely injured trauma patients, to all trauma patients meeting the CDC Trauma Triage Criteria. This likely accounts for the increase in median time. Median value for this measure has been relatively stable over four years of reporting, varying by only 2-3 minutes.

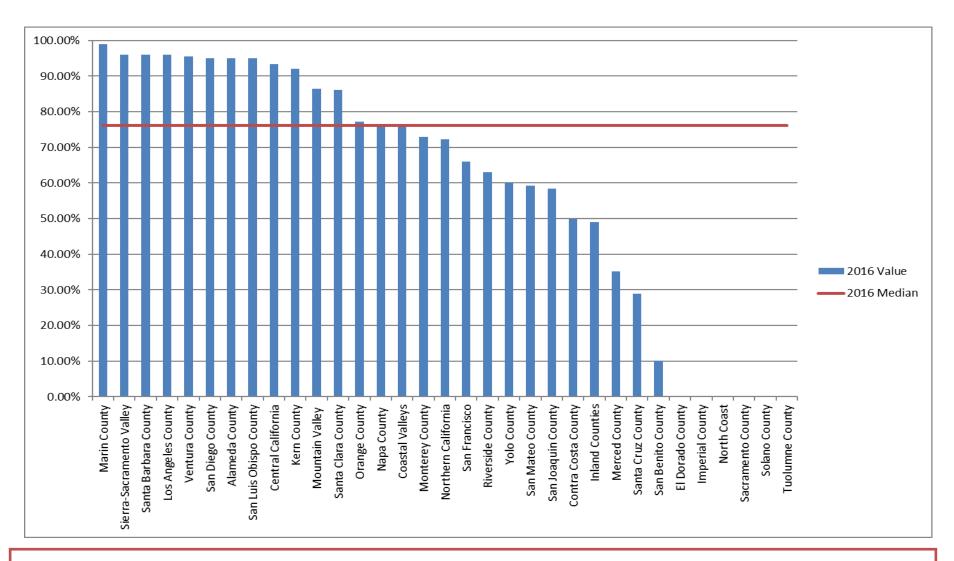
The common expectation is for short scene times, targeted at 15-20 minutes to remain within a "golden hour" for care in a hospital with surgical capability. The outcome benefit of rapid trauma response and scene time have both been challenged in the literature; however, there is definitely a group of trauma victims with major hemorrhage that benefit from rapid definitive surgical care. Reported scene times may be influenced by extrication. We would expect relatively little variation among LEMSAs on this measures.

Empty grey cells indicate no value reported

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TRA-2: Direct Transport to Designated Trauma Center for Trauma Patients Meeting Criteria

– Part 1 of 2

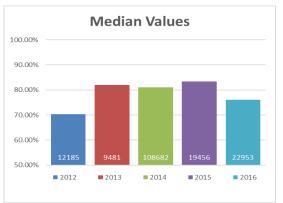


TRA-2: Direct Transport to Designated Trauma Center for Trauma Patients Meeting Criteria

– Part 2 of 2

	2016 Value	2016 Denom.
Marin County	99.00%	68
Sierra-Sacramento Valley	96.05%	456
Santa Barbara County	96.00%	164
Los Angeles County	95.97%	1490
Ventura County	95.50%	177
San Diego County	95.05%	9278
Alameda County	95.00%	198
San Luis Obispo County	95.00%	73
Central California	93.34%	1066
Kern County	92.00%	347
Mountain Valley	86.38%	470
Santa Clara County	86.11%	432
Orange County	77.20%	180
Napa County	76.15%	130
Coastal Valleys	75.88%	311
Monterey County	73.00%	
Northern California	72.22%	90
San Francisco	66.00%	1023
Riverside County	63.00%	2174
Yolo County	60.00%	220
San Mateo County	59.32%	526
San Joaquin County	58.40%	590
Contra Costa County	49.90%	1207
Inland Counties	49.00%	1273
Merced County	35.21%	284
Santa Cruz County	29.00%	677
San Benito County	10.20%	49
El Dorado County		
Imperial County		
North Coast		
Sacramento County		
Solano County		
Tuolumne County		

	Measure ID	TRA-2
8	Response Count	28
6 4	Denominator Total	22953
1	Submission Rate (n=33)	78.79%
7	Average	73.33%
	Median	76.15%
0		



Of the 28 LEMSAs reporting these data for 2016, the median of patients transported directly to a trauma center was 76.15%; This value decreased by has been very stable over the past three years.

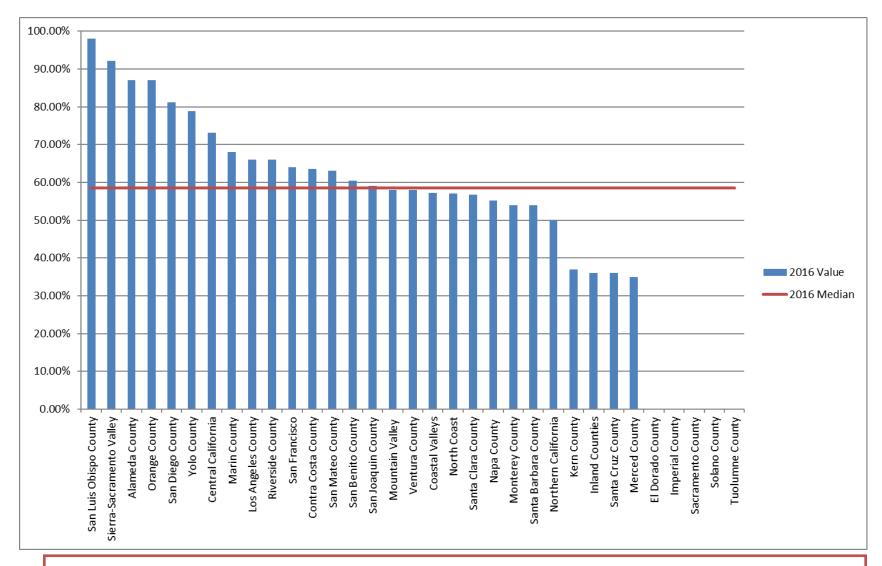
Low values would be expected in some rural areas with prolonged transport times to a trauma center or where transport to a non-trauma center may be appropriate. The measure does not distinguish among level of trauma center.

Empty grey cells indicate no value reported

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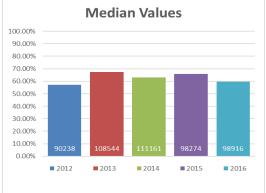
ACS-1: Aspirin Administration for Chest Pain/Discomfort Rate – Part 1 of 2



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

	2016 Value	2016 Denom.
San Luis Obispo County	98.00%	542
Sierra-Sacramento Valley	92.21%	4251
Alameda County	87.00%	3698
Orange County	87.00%	2150
San Diego County	81.20%	11058
Yolo County	78.81%	96
Central California	73.15%	5568
Marin County	68.00%	583
Los Angeles County	66.00%	16544
Riverside County	66.00%	9287
San Francisco	64.00%	2768
Contra Costa County	63.61%	3511
San Mateo County	63.08%	1877
San Benito County	60.44%	91
San Joaquin County	59.00%	2776
Mountain Valley	58.00%	1927
Ventura County	58.00%	1848
Coastal Valleys	57.27%	1142
North Coast	57.00%	1278
Santa Clara County	56.76%	3173
Napa County	55.18%	569
Monterey County	54.00%	
Santa Barbara County	54.00%	1123
Northern California	50.00%	512
Kern County	37.00%	4731
Inland Counties	36.00%	14476
Santa Cruz County	36.00%	901
Merced County	35.00%	2436
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	ACS-1
Response Count	28
Denominator Total	98916
Submission Rate (n=33)	87.88%
Average	62.56%
Median	59.72%



Of the 28 LEMSAs reporting these data for 2016, the median percentage of patients receiving aspirin in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 59.72% and has been very stable for the past few years.

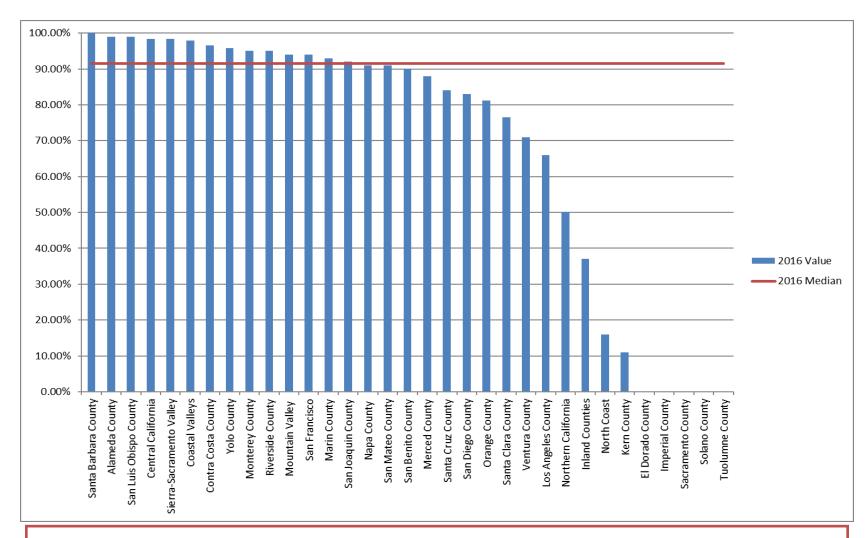
While the median should be close to 90%, factors for a low reported value include lack of documentation, or aspirin administered by the patient/family or first responder paramedics but not reflected in the patient care record by the ambulance transport service. Variation is also introduced by which chest pain patients are identified in the data search. The reported values ranged from 35-98%. The wide variation should not be attributed to performance should prompt evaluation of protocols and discussion with field providers.

Aspirin administration is the expected "standard of care" for chest pain and chest discomfort of cardiac origin and should be done for every suspected acute coronary syndrome patient. All 33 LEMSAs have aspirin administration in their protocol for management of suspected ACS patients.

Empty grey cells indicate no value reported

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ACS-2: Prehospital 12 lead ECG for Chest Pain/Discomfort of Suspected Cardiac Etiology Part 1 of 2



ACS-2: Prehospital 12 lead ECG for Chest Pain/Discomfort of Suspected Cardiac Etiology — Part 2 of 2

Santa Barbara County Alameda County	2016 Value 100.00%	2016 Denom.
•	100 00%	
Alameda County	100.0070	89
- ,	99.00%	3698
San Luis Obispo County	99.00%	542
Central California	98.31%	5568
Sierra-Sacramento Valley	98.31%	4251
Coastal Valleys	97.99%	1142
Contra Costa County	96.60%	3511
Yolo County	95.74%	774
Monterey County	95.00%	
Riverside County	95.00%	9287
Mountain Valley	94.00%	1927
San Francisco	94.00%	2767
Marin County	93.00%	583
San Joaquin County	92.00%	2776
Napa County	91.04%	569
San Mateo County	91.00%	1877
San Benito County	90.11%	91
Merced County	88.00%	2436
Santa Cruz County	84.00%	901
San Diego County	83.06%	11058
Orange County	81.20%	2185
Santa Clara County	76.49%	3173
Ventura County	71.00%	1846
Los Angeles County	66.00%	16544
Northern California	50.20%	512
Inland Counties	37.00%	14476
North Coast	16.00%	1278
Kern County	11.00%	4731
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	ACS-2
Response Count	28
Denominator Total	98592
Submission Rate (n=33)	87.88%
Average	81.57%
Median	91.52%



Of the 28 LEMSAs reporting these data for 2016, the median number of patients receiving 12-Lead ECG in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 91.52%.

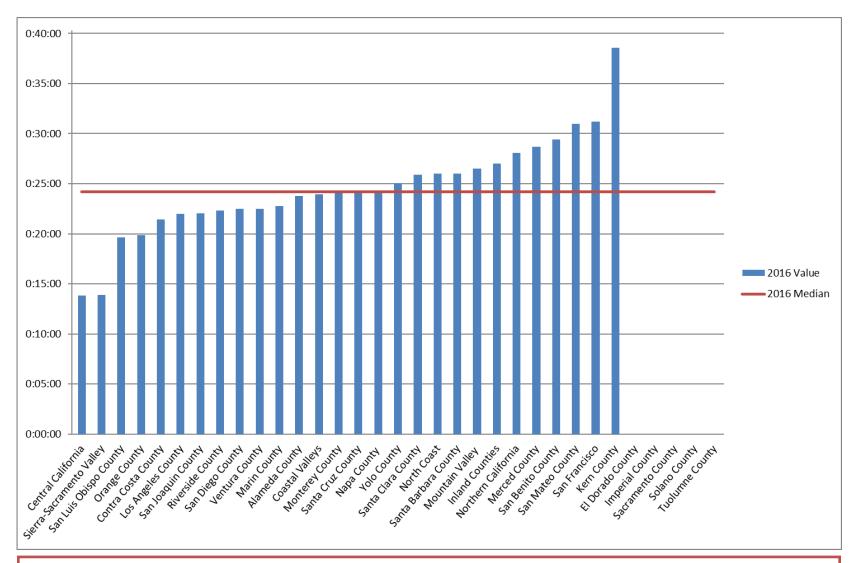
The reported values for this measure ranged greatly from 11-100%, but there was moderate consistency in this measure with most LEMSAs reporting 80-100% compliance. Low values more likely represent data and methodological issues rather than actual performance. This measure is of importance with the widespread development of STEMI centers. Field EKG for chest pain or cardiac concerns represents a patient-centered practice that is in line with national guidelines and recommendations. It is now standard of care to perform prehospital 12 lead ECG with interpretation in the field to identify STEMI patients. The draft STEMI regulations define "STEMI Patient" as one with characteristic symptoms of myocardial ischemia in association with persistent ST-Segment Elevation in ECG and that "The STEMI system policies shall address ... identification of STEMI patients through the use of pre-hospital 12-lead ECG..." The American Heart Association has stated that the national goal is for consistent recording and analysis of "in the field ECG." Thirty of 33 LEMSAs have developed STEMI systems and currently include field ECG in their management protocol.

Empty grey cells indicate no value reported

Contact Information:

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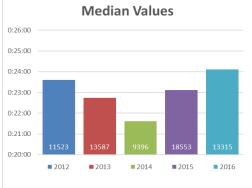
ACS-3: Scene Time for Suspected Heart Attack Patients – Part 1 of 2



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

	2016 Value	2016 Denom.
Central California	0:13:50	207
Sierra-Sacramento Valley	0:13:52	312
San Luis Obispo County	0:19:39	120
Orange County	0:19:51	138
Contra Costa County	0:21:27	3511
Los Angeles County	0:22:00	529
San Joaquin County	0:22:01	299
Riverside County	0:22:19	1418
San Diego County	0:22:30	551
Ventura County	0:22:31	154
Marin County	0:22:46	68
Alameda County	0:23:45	
Coastal Valleys	0:23:57	156
Monterey County	0:24:05	
Santa Cruz County	0:24:09	46
Napa County	0:24:12	88
Yolo County	0:25:02	117
Santa Clara County	0:25:54	224
North Coast	0:26:00	1560
Santa Barbara County	0:26:00	89
Mountain Valley	0:26:31	181
Inland Counties	0:27:02	739
Northern California	0:28:03	23
Merced County	0:28:41	2436
San Benito County	0:29:24	12
San Mateo County	0:31:00	257
San Francisco	0:31:13	63
Kern County	0:38:35	17
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	ACS-3
Response Count	28
Denominator Total	13315
Submission Rate (n=33)	81.82%
Average	0:24:22
Median	0:24:07



Of the 28 LEMSAs reporting these data for 2016, the median scene time by ground ambulance for suspected heart attack patients with ST elevation on ECG was approximately 24 minutes and 07 seconds, an increase of roughly 1 minute.

According to the American Heart Association, the national goal is for a scene time of 15 minutes, although given the evaluation and interventions needed for these patients, 15 minutes may be unrealistic.

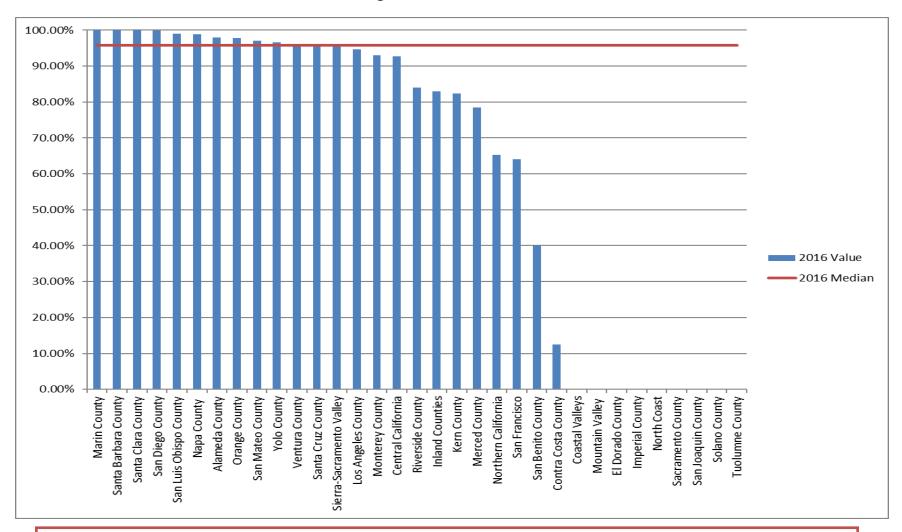
http://www.heart.org/HEARTORG/HealthcareResearch/MissionLifelineHomePage/EMS/EMS-Strategies-to-Achieve-Ideal UCM 312066 Article.jsp

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. LEMSAs with times above the mean should evaluate the provider procedures in the field to determine how to reduce the scene time.

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ACS-5: Direct Transport to Designated STEMI Receiving Center for Suspected Patients

Meeting Criteria – Part 1 of 2



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

	2016 Value	2016 Denom.
Marin County	100.00%	68
Santa Barbara County	100.00%	189
Santa Clara County	100.00%	224
San Diego County	99.86%	721
San Luis Obispo County	99.00%	120
Napa County	98.86%	88
Alameda County	98.00%	603
Orange County	97.80%	138
San Mateo County	97.00%	270
Yolo County	96.58%	117
Ventura County	96.10%	154
Santa Cruz County	96.00%	46
Sierra-Sacramento Valley	95.51%	312
Los Angeles County	94.66%	543
Monterey County	93.00%	
Central California	92.75%	207
Riverside County	84.00%	1418
Inland Counties	83.00%	739
Kern County	82.35%	17
Merced County	78.49%	2436
Northern California	65.22%	23
San Francisco	64.00%	217
San Benito County	40.00%	15
Contra Costa County	12.47%	3511
Coastal Valleys	0.00%	272
Mountain Valley	0.00%	206
El Dorado County		
Imperial County		
North Coast		
Sacramento County		
San Joaquin County		
Solano County		
Tuolumne County		

Measure ID	ACS-5
Response Count	27
Denominator Total	12654
Submission Rate (n=33)	84.85%
Average	79.41%
Median	95.09%



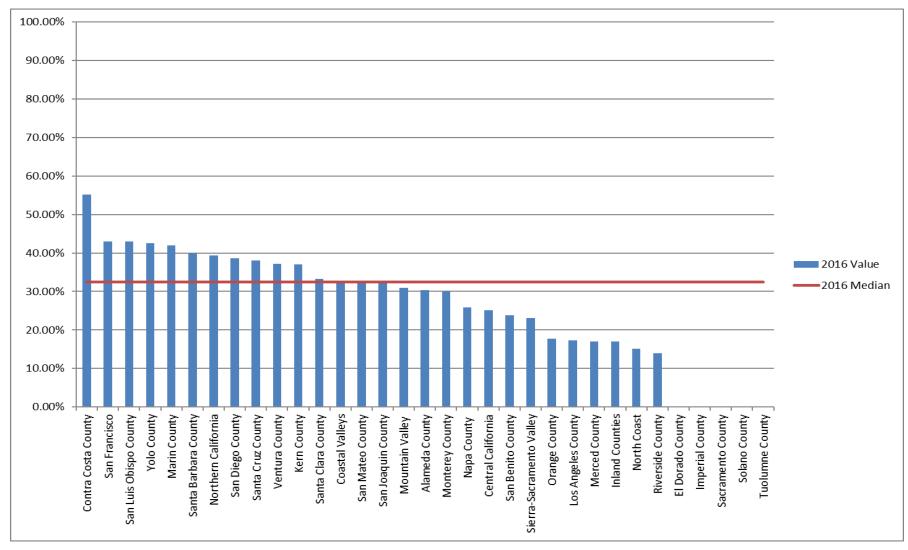
Of the 27 LEMSAs reporting these data for 2016, the median percentage of patients appropriately transported directly to a STEMI center was 95.09%, consistent with median in 2015.

Direct transport of patients to a STEMI centers with percutaneous coronary intervention (PCI) capability will vary by geography and availability of resources in a given area. Lower values would be expected in a rural area that may not have an established STEMI system or one that can be accessed rapidly in a neighboring LEMSA.

Several LEMSAs with measures below 90% have well-developed STEMI systems, implying poor data quality or potential protocol violations.

27 of 33 LEMSAs have STEMI Receiving Center.

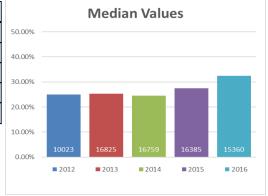
CAR-2: Out-Of-Hospital Cardiac Arrest Return of Spontaneous Circulation – Part 1 of 2



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

	2016 Value	2016 Denom.
Contra Costa County	55.20%	76
San Francisco	43.00%	312
San Luis Obispo County	43.00%	58
Yolo County	42.55%	94
Marin County	42.00%	85
Santa Barbara County	40.00%	208
Northern California	39.29%	84
San Diego County	38.64%	810
Santa Cruz County	38.00%	104
Ventura County	37.20%	272
Kern County	37.04%	135
Santa Clara County	33.27%	517
Coastal Valleys	32.67%	150
San Mateo County	32.57%	522
San Joaquin County	32.35%	479
Mountain Valley	30.94%	349
Alameda County	30.32%	1105
Monterey County	30.00%	
Napa County	25.81%	62
Central California	25.15%	1169
San Benito County	23.81%	21
Sierra-Sacramento Valley	23.16%	272
Orange County	17.80%	533
Los Angeles County	17.28%	4478
Merced County	17.06%	293
Inland Counties	17.00%	1778
North Coast	15.08%	179
Riverside County	14.00%	1215
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		
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Measure ID	CAR-2
Response Count	28
Denominator Total	15360
Submission Rate (n=33)	87.88%
Average	31.22%
Median	32.46%



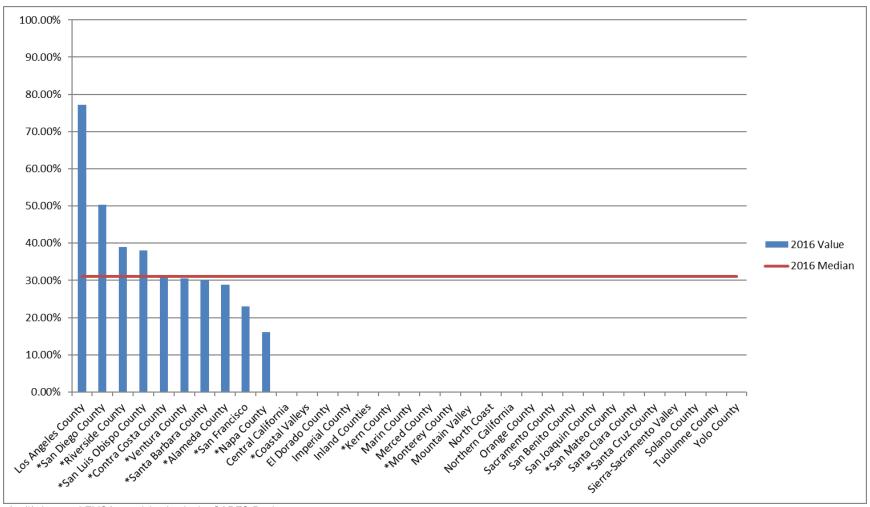
Of the 28 LEMSAs reporting these data for 2016, the median number of patients that had a return of spontaneous circulation in the field after a cardiac arrest from all causes was 32.46%, an increase from the prior year reporting.

Nationally, this rate varies considerably by state and by local agency. Most jurisdictions reported rates from 17-43%, which is credible. This outcome measure is dependent upon factors that vary considerably by community, including rapid public response, bystander CPR, community 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. Values vary widely, depending on multiple factors. Results for this measure should be benchmarked against the LEMSAs that participate in CARES registry data collection: for 2016 presumed cardiac etiology of OOHCA, sustained ROSC was achieved in 31% of patients in California and essentially the same nationwide.

Empty grey cells indicate no value reported

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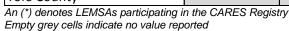
CAR-3: Out-Of-Hospital Cardiac Arrest Survival to Emergency Department Discharge –
Part 1 of 2



An (*) denotes LEMSAs participating in the CARES Registry

CAR-3: Out-Of-Hospital Cardiac Arrest Survival to Emergency Department Discharge – Part 2 of 2

	2016 Value	2016 Denom.
Los Angeles County	77.24%	3576
*San Diego County	50.39%	389
*Riverside County	39.00%	598
*San Luis Obispo County	38.00%	58
*Contra Costa County	31.50%	76
*Ventura County	30.50%	272
*Santa Barbara County	30.00%	208
*Alameda County	28.85%	960
*San Francisco	23.00%	493
*Napa County	16.13%	62
Central California		
*Coastal Valleys		
El Dorado County		
Imperial County		
Inland Counties		
*Kern County		
Marin County		
Merced County		
*Monterey County		
Mountain Valley		
North Coast		
Northern California		
Orange County		
Sacramento County		
San Benito County		
San Joaquin County		
*San Mateo County		
Santa Clara County		
*Santa Cruz County		
Sierra-Sacramento Valley		
Solano County		
Tuolumne County		
Yolo County		

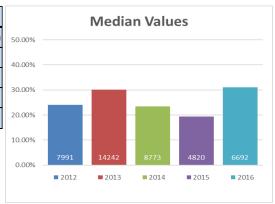


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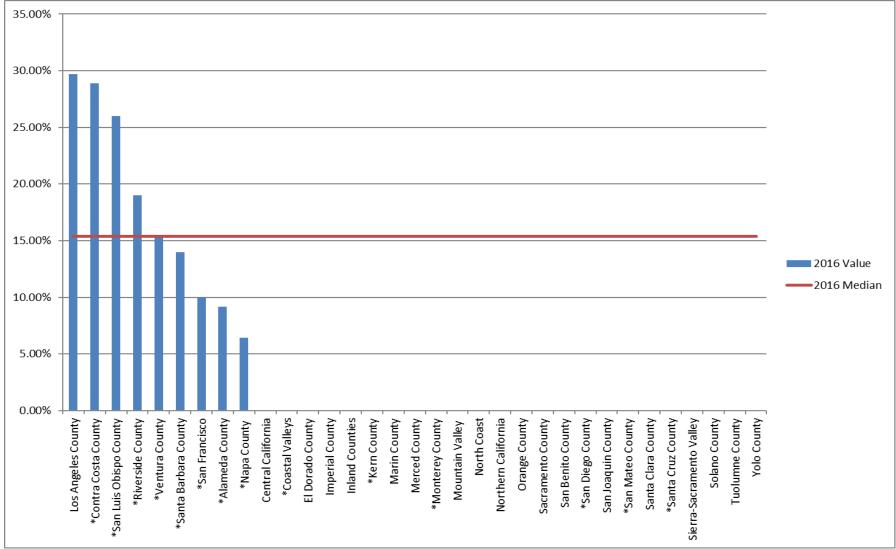
http://www.emsa.ca.gov/ems_core_quality_measures_project

Measure ID	CAR-3
Response Count	10
Denominator Total	6692
Submission Rate (n=33)	30.30%
Average	36.46%
Median	31.00%



Of the 10 LEMSAs reporting these data for 2016, the median number of patients that had survived a return hospital cardiac arrest to be admitted to the hospital was 31%. Obtaining hospital outcome data continues to be a challenge faced by many LEMSAs. Accurate measure of this outcome is an important future quality improvement goal and supports the need to develop exchange of health information with hospitals. Values vary widely, depending on multiple factors. The California summary data from the CARES registry for survival to hospital admission is 26.3% and the national value is 26.9%. Values for a particular system should be benchmarked to CARES data and used to track improvements.

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



An (*) denotes LEMSAs participating in the CARES Registry

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

	2016 Value	2016 Denom.
Los Angeles County	29.71%	2376
*Contra Costa County	28.90%	76
*San Luis Obispo County	26.00%	58
*Riverside County	19.00%	562
*Ventura County	15.40%	272
*Santa Barbara County	14.00%	208
*San Francisco	10.00%	493
*Alameda County	9.16%	960
*Napa County	6.45%	62
Central California		
*Coastal Valleys		
El Dorado County		
Imperial County		
Inland Counties		
*Kern County		
Marin County		
Merced County		
*Monterey County		
Mountain Valley		
North Coast		
Northern California		
Orange County		
Sacramento County		
San Benito County		
*San Diego County		
San Joaquin County		
*San Mateo County		
Santa Clara County		
*Santa Cruz County		
Sierra-Sacramento Valley		
Solano County		
Tuolumne County		
Yolo County		
An (*) denotes LEMSAs participating in	n the CARES Registry	

Measure ID	CAR-4
Response Count	9
Denominator Total	5067
Submission Rate (n=33)	30.30%
Average	17.62%
Median	15.40%



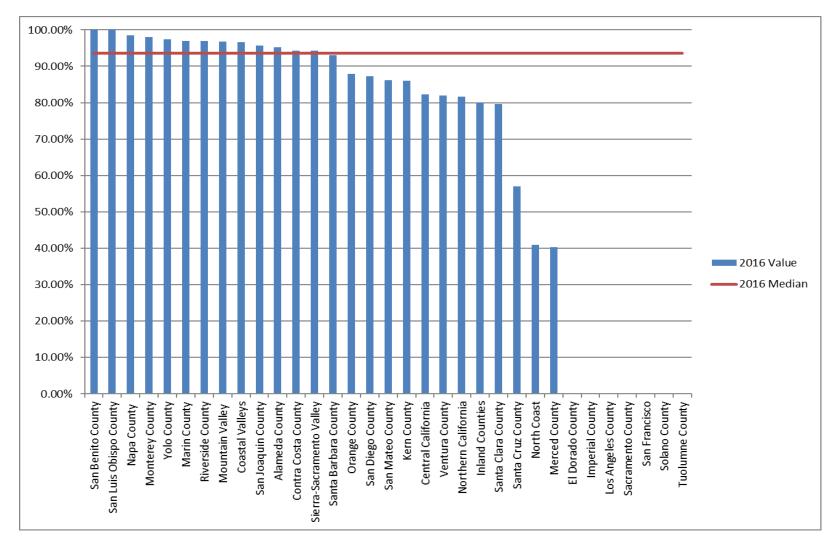
Of the 9 LEMSAs reporting these data for 2016, the median percentage of patients that had survived an out of hospital cardiac arrest and were discharged from the hospital was 15.40%. This measure yielded the lowest number of responses from LEMSAs because of the difficulties in obtaining hospital outcome data. Values vary widely, depending on multiple factors. Accurate measure of this outcome is an important future quality improvement goal and supports the need to develop exchange of health information with hospitals. The California summary data from the CARES registry show the hospital discharge rate for OOHCA at 10.5% with the national average of 10.3%. Values for a particular system should be used to track improvements. An important refinement to this measure is the functional status on discharge.

An (*) denotes LEMSAs participating in the CARES Registry Empty grey cells indicate no value reported

Contact Information:

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



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

	2016 Value	2016 Denom.
San Benito County	100.00%	54
San Luis Obispo County	100.00%	162
Napa County	98.43%	191
Monterey County	98.00%	
Yolo County	97.42%	271
Marin County	97.00%	173
Riverside County	97.00%	2741
Mountain Valley	96.80%	594
Coastal Valleys	96.58%	497
San Joaquin County	95.76%	851
Alameda County	95.28%	2141
San Francisco	95.00%	947
Contra Costa County	94.32%	1475
Sierra-Sacramento Valley	94.29%	963
Santa Barbara County	93.00%	391
Los Angeles County	90.13%	5035
Orange County	87.90%	797
San Diego County	87.22%	3043
San Mateo County	86.17%	839
Kern County	86.07%	1077
Central California	82.33%	1783
Ventura County	82.30%	288
Northern California	81.65%	109
Inland Counties	80.00%	2405
Santa Clara County	79.56%	1169
Santa Cruz County	57.00%	272
North Coast	41.00%	251
Merced County	40.38%	416
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	STR-2
Response Count	28
Denominator Total	28935
Submission Rate (n=33)	87.88%
Average	86.81%
Median	93.65%

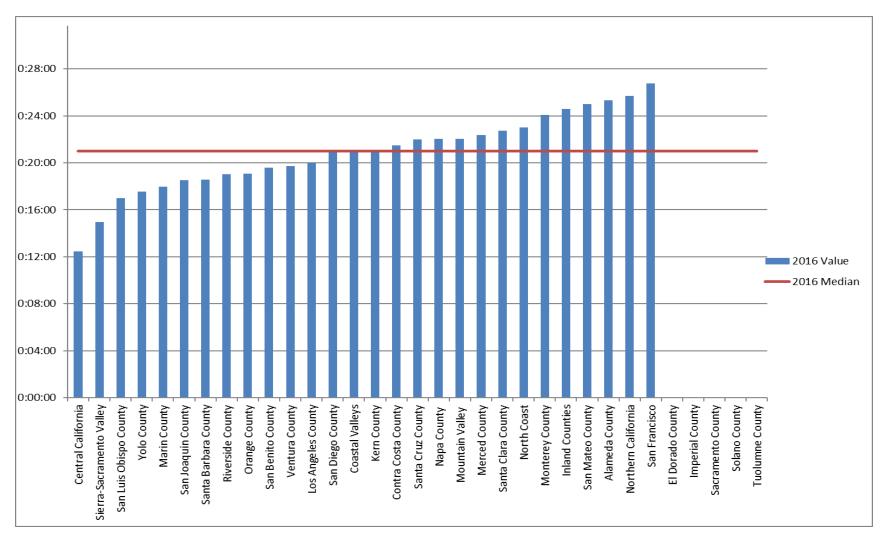


Of the 28 LEMSAs reporting these data for 2016, the median percentage of patients receiving glucose testing in the field for a possible stroke was 91.65%. This has increased steadily over the five years of reporting. Inconsistent low values likely reflect data issues but should be evaluated for adherence to protocol. Diabetic causes of neurologic symptoms are important to exclude prior to transporting to a stroke center and are part of stroke protocols. 32/33 LEMSAs have protocols that advise routine evaluation of blood sugar in suspected stroke patients. This is considered a national prehospital standard of care.

Empty grey cells indicate no value reported

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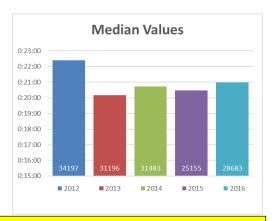
STR-3: Scene Time for Suspected Acute Stroke Patients – Part 1 of 2



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

	2016 Value	2016 Denom.
Central California	0:12:27	1783
Sierra-Sacramento Valley	0:14:58	963
San Luis Obispo County	0:17:00	162
Yolo County	0:17:34	268
Marin County	0:17:57	173
San Joaquin County	0:18:31	854
Santa Barbara County	0:18:33	391
Riverside County	0:19:03	2756
Orange County	0:19:05	748
San Benito County	0:19:36	54
Ventura County	0:19:43	313
Los Angeles County	0:20:00	4748
San Diego County	0:20:55	3043
Coastal Valleys	0:20:57	492
Kern County	0:21:00	1077
Contra Costa County	0:21:30	1475
Santa Cruz County	0:22:01	272
Napa County	0:22:02	190
Mountain Valley	0:22:03	588
Merced County	0:22:23	416
Santa Clara County	0:22:43	855
North Coast	0:23:00	1380
Monterey County	0:24:05	
Inland Counties	0:24:35	1865
San Mateo County	0:25:00	643
Alameda County	0:25:20	2141
Northern California	0:25:42	94
San Francisco	0:26:46	
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	STR-3
Response Count	28
Denominator Total	28683
Submission Rate (n=33)	78.79%
Average	0:20:52
Median	0:20:59



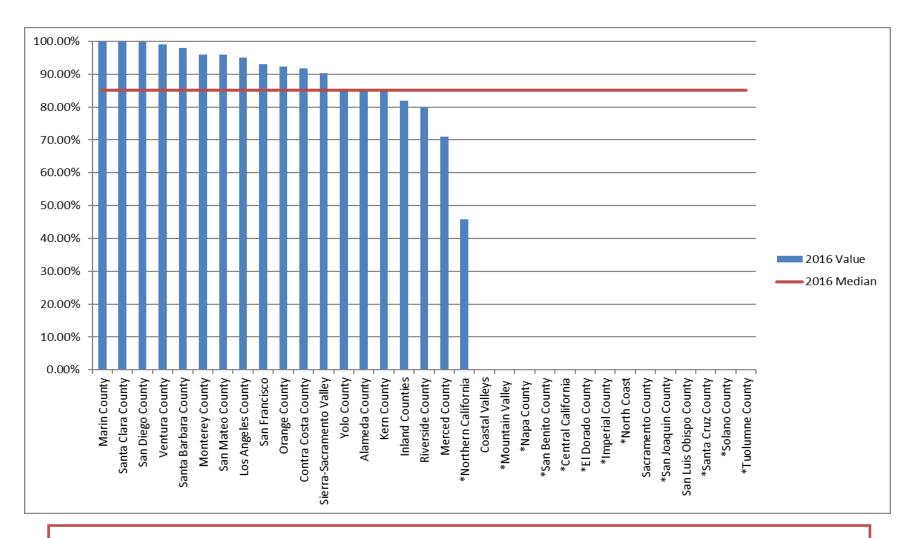
Of the 28 LEMSAs reporting these data for 2016, the median scene time by an ambulance for suspected stroke patients was approximately 20 minutes and 59 seconds, not significantly different from last year.

Times from all local jurisdictions reporting ranged between 12 and 27 minutes. Time targets 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 until thrombolytics can be administered or embolectomy can be performed. Shorter times to treatment have been definitively linked to better outcomes.

There are currently draft stroke regulations being finalized. In future reports, EMSA will be able to clearly identify the stroke systems statewide.

Empty grey cells indicate no value reported

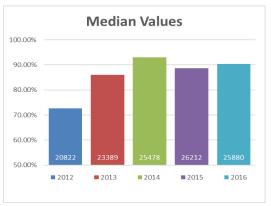
STR-5: Direct Transport to Stroke Center for Suspected Acute Stroke Patients Meeting Criteria – Part 1 of 2



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

	2016 Value	2016 Denom.
Marin County	100.00%	173
Santa Clara County	100.00%	855
San Diego County	99.75%	4457
Ventura County	99.00%	313
Santa Barbara County	98.00%	391
Monterey County	96.00%	
San Mateo County	96.00%	649
Los Angeles County	95.00%	4906
San Francisco	93.00%	948
Orange County	92.40%	797
Contra Costa County	91.80%	1475
Sierra-Sacramento Valley	90.34%	963
Yolo County	85.07%	268
Alameda County	85.00%	2141
Kern County	85.00%	1077
Inland Counties	82.00%	1865
Riverside County	80.00%	2756
Merced County	71.00%	416
*Northern California	45.74%	94
Coastal Valleys	0.00%	497
*Mountain Valley	0.00%	595
*Napa County	0.00%	190
*San Benito County	0.00%	54
*Central California		
*El Dorado County		
*Imperial County		
*North Coast		
Sacramento County		
*San Joaquin County		
San Luis Obispo County		
*Santa Cruz County		
*Solano County		
*Tuolumne County		

Measure ID	STR-5
Response Count	23
Denominator Total	25880
Submission Rate (n=33)	66.67%
Average	73.27%
Median	90.34%



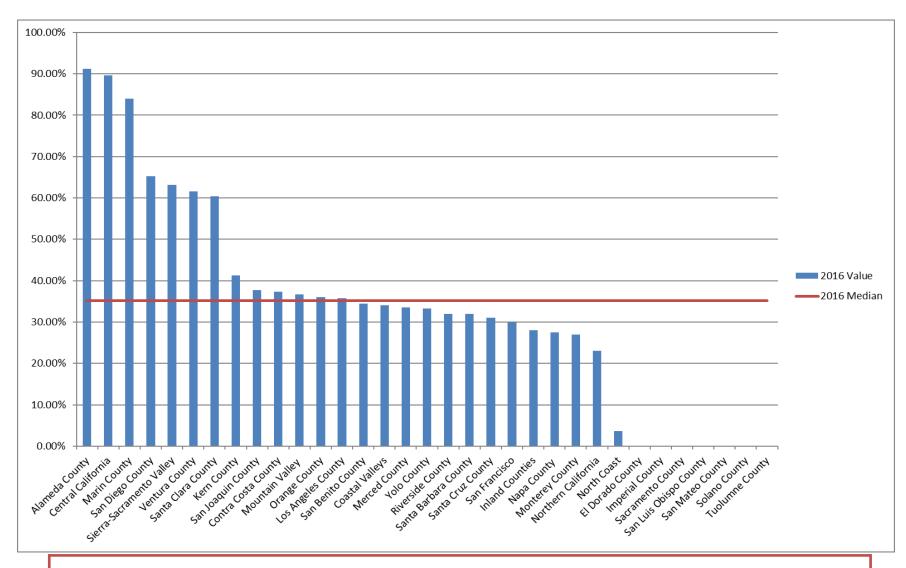
Of the 23 LEMSAs reporting these data for 2016, the median number of patients transported directly to a Stroke center by ground ambulance was 90.34%, a slight increase over the previous reporting year.

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. However, given the rapid expansion of stroke specialty care systems and facility designation, most EMS systems should have stroke patients transported at least to Primary Stroke Centers, if not Comprehensive centers.

There are currently draft stroke regulations in the process of being finalized. The goal in a stroke system is to transport 100% of stroke patients to a designated stroke center.

An (*) denotes LEMSAs without an established Stroke System Empty grey cells indicate no value reported

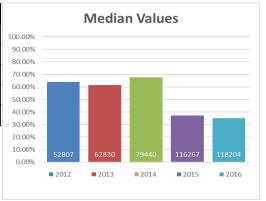
RES-2: Beta2 Agonist Administration for Adult Patients – Part 1 of 2



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

	2016 Value	2016 Denom.
Alameda County	91.22%	3121
Central California	89.68%	4998
Marin County	84.00%	176
San Diego County	65.19%	5975
Sierra-Sacramento Valley	63.16%	1824
Ventura County	61.60%	146
Santa Clara County	60.40%	1409
Kern County	41.24%	5749
San Joaquin County	37.77%	7108
Contra Costa County	37.36%	7722
Mountain Valley	36.67%	4691
Orange County	36.00%	4369
Los Angeles County	35.76%	21177
San Benito County	34.46%	148
Coastal Valleys	34.09%	2652
Merced County	33.56%	2810
Yolo County	33.25%	1606
Riverside County	32.00%	17755
Santa Barbara County	32.00%	1389
Santa Cruz County	31.00%	772
San Francisco	30.00%	2006
Inland Counties	28.00%	16222
Napa County	27.50%	1258
Monterey County	27.00%	
Northern California	23.09%	1416
North Coast	3.62%	1705
El Dorado County		
Imperial County		
Sacramento County		
San Luis Obispo County		
San Mateo County		
Solano County		
Tuolumne County		

Measure ID	RES-2
Response Count	26
Denominator Total	118204
Submission Rate (n=33)	81.82%
Average	42.68%
Median	35.11%



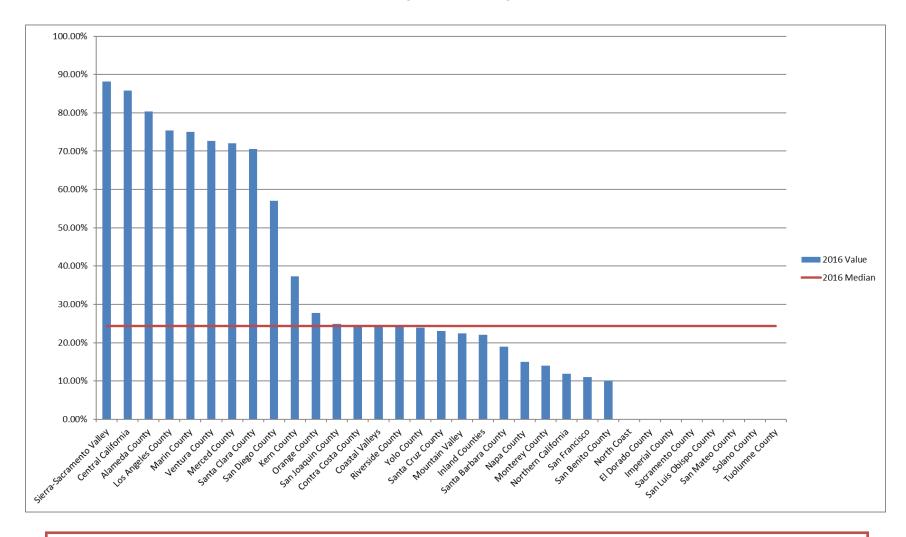
Of the 26 LEMSAs reporting these data for 2016, the median percentage of patients receiving a Beta-2 Agonist/bronchodilator for bronchospasm in adults (age 14 or older) was 35.11%.

The marked variability for this measure suggests challenges identifying the appropriate denominator of patients for whom a bronchodilator is indicated.

Treatment protocols for which adult patients should receive Beta2 agonists may vary and clinical differentiation is difficult. This measure is also not likely to indicate improved outcome, since not all adult wheezing is asthma or reversible small airway disease.

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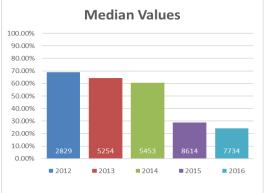
PED-1: Pediatric Patients With Wheezing Receiving Bronchodilators – Part 1 of 2



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

Sierra-Sacramento Valley Central California Alameda County Los Angeles County Marin County Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County Contra Costa County	88.21% 85.77% 80.31% 75.44% 75.00% 72.70% 71.98% 70.59% 57.02% 37.31% 27.80% 24.95%	2016 Denom. 195 274 127 509 8 11 182 51 342 480 198
Central California Alameda County Los Angeles County Marin County Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	85.77% 80.31% 75.44% 75.00% 72.70% 71.98% 70.59% 57.02% 37.31% 27.80%	274 127 509 8 11 182 51 342 480
Alameda County Los Angeles County Marin County Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	80.31% 75.44% 75.00% 72.70% 71.98% 70.59% 57.02% 37.31% 27.80%	127 509 8 11 182 51 342 480
Los Angeles County Marin County Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	75.44% 75.00% 72.70% 71.98% 70.59% 57.02% 37.31% 27.80%	509 8 11 182 51 342 480
Marin County Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	75.00% 72.70% 71.98% 70.59% 57.02% 37.31% 27.80%	8 11 182 51 342 480
Ventura County Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	72.70% 71.98% 70.59% 57.02% 37.31% 27.80%	11 182 51 342 480
Merced County Santa Clara County San Diego County Kern County Orange County San Joaquin County	71.98% 70.59% 57.02% 37.31% 27.80%	182 51 342 480
Santa Clara County San Diego County Kern County Orange County San Joaquin County	70.59% 57.02% 37.31% 27.80%	51 342 480
San Diego County Kern County Orange County San Joaquin County	57.02% 37.31% 27.80%	342 480
Kern County Orange County San Joaquin County	37.31% 27.80%	480
Orange County San Joaquin County	27.80%	
San Joaquin County		198
·	24.95%	
Contra Costa County		601
- /	24.50%	526
Coastal Valleys	24.10%	166
Riverside County	24.00%	1376
Yolo County	23.91%	184
Santa Cruz County	23.00%	35
Mountain Valley	22.48%	347
Inland Counties	22.00%	1606
Santa Barbara County	19.00%	53
Napa County	14.93%	67
Monterey County	14.00%	
Northern California	11.86%	59
San Francisco	11.00%	240
San Benito County	10.00%	20
North Coast	0.00%	77
El Dorado County		
Imperial County		
Sacramento County		
San Luis Obispo County		
San Mateo County		
Solano County		
Tuolumne County		

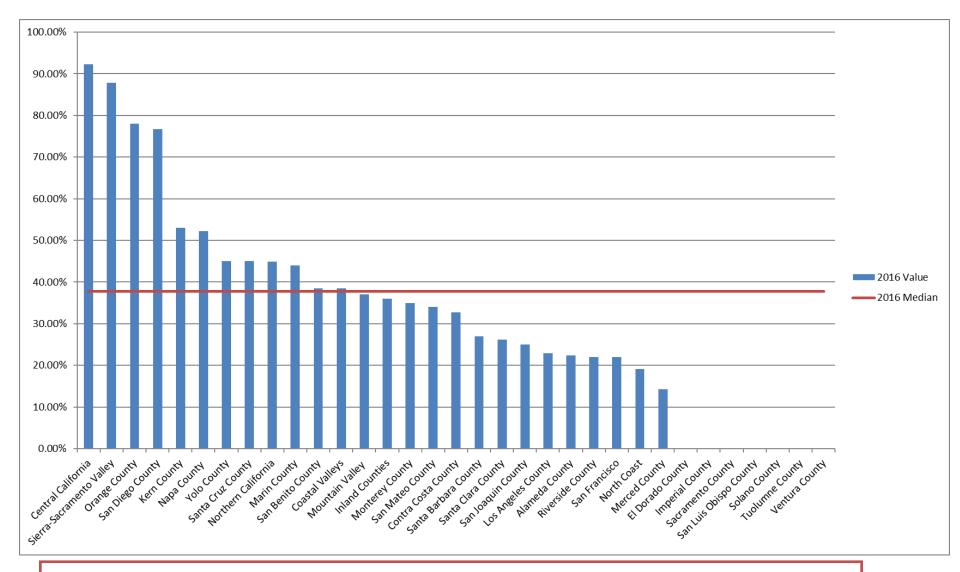
Measure ID	PED-1
Response Count	26
Denominator Total	7734
Submission Rate (n=33)	81.82%
Average	38.92%
Median	24.30%



Of the 29 LEMSAs reporting these data for 2016, the median number of pediatric patients receiving bronchodilators for asthma was 24.30%. The decrease over the last 5 years suggests methodological issues rather than performance. 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 etiology. It is not clear why the spectrum of results would be so variable. One reason may be multiple doses administered at the home prior to arrival of EMS or dose administered by first responders. Examination of this measure is recommended to ensure proper patient inclusion and documentation. Appropriate use of prehospital and emergency department bronchodilators can decrease hospital admission.

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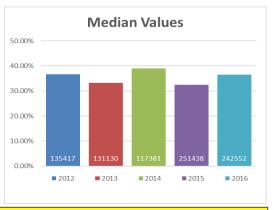
PAI-1: Pain Intervention – Part 1 of 2



PAI-1: Pain Intervention – Part 2 of 2

	2016 Value	2016 Denom.
Central California	92.25%	3433
Sierra-Sacramento Valley	87.87%	5135
Orange County	78.00%	50
San Diego County	76.76%	1252
Kern County	53.05%	17816
Napa County	52.17%	1725
Yolo County	45.03%	3120
Santa Cruz County	45.00%	798
Northern California	44.88%	1758
Marin County	44.00%	1768
San Benito County	38.50%	535
Coastal Valleys	38.48%	4592
Mountain Valley	37.04%	5243
Inland Counties	36.00%	19296
Monterey County	35.00%	
San Mateo County	34.00%	8154
Contra Costa County	32.70%	16103
Santa Barbara County	27.00%	2140
Santa Clara County	26.24%	6581
San Joaquin County	24.98%	13746
Los Angeles County	22.97%	34918
Alameda County	22.42%	31717
Riverside County	22.00%	38595
San Francisco	22.00%	17845
North Coast	19.13%	3324
Merced County	14.27%	2908
El Dorado County		
Imperial County		
Sacramento County		
San Luis Obispo County		
Solano County		
Tuolumne County		
Ventura County		

Measure ID	PAI-1
Response Count	26
Denominator Total	242552
Submission Rate (n=33)	75.76%
Average	41.22%
Median	36.52%



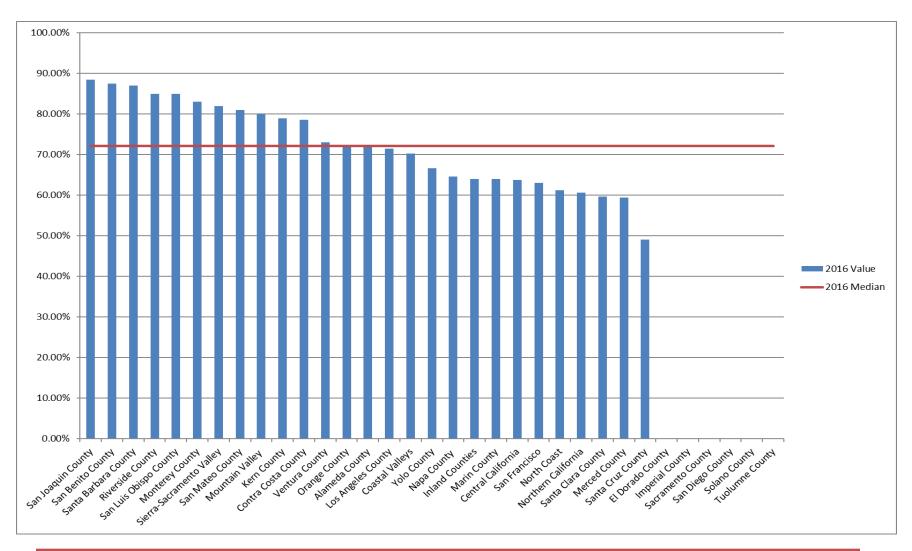
Of the 26 LEMSAs reporting these data for 2016, the median percentage of patients receiving intervention for any pain reported as 7 or greater on a 10-point pain scale was 36.52%. Pain intervention was defined as any analgesic medication or accepted procedure to reduce pain.

All paramedics have access to narcotics; however, protocols for use may vary significantly. Some may have received pain medication from first responders. The wide variation deserves closer investigation. Pain intervention is important for patient-centered care, and national quality goals focus on pain relief, despite the current opioid crisis. The median value for this measure should be cause for concern.

Consideration should be given to refining the denominator to specific traumatic or medical conditions.

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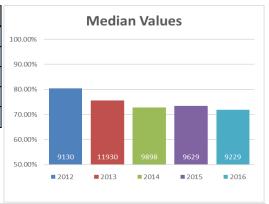
SKL-1: Endotracheal Intubation Success Rate – Part 1 of 2



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

	2016 Value	2016 Denom.
San Joaquin County	88.46%	338
San Benito County	87.50%	8
Santa Barbara County	87.00%	82
Riverside County	85.00%	1201
San Luis Obispo County	85.00%	74
Monterey County	83.00%	
Sierra-Sacramento Valley	81.91%	398
San Mateo County	81.00%	374
Mountain Valley	80.00%	125
Kern County	78.89%	595
Contra Costa County	78.60%	300
Ventura County	73.00%	63
Orange County	72.10%	315
Alameda County	71.96%	756
Los Angeles County	71.47%	1360
Coastal Valleys	70.21%	47
Yolo County	66.66%	18
Napa County	64.62%	65
Inland Counties	64.00%	1491
Marin County	64.00%	85
Central California	63.70%	460
San Francisco	63.00%	308
North Coast	61.25%	160
Northern California	60.61%	33
Santa Clara County	59.62%	208
Merced County	59.39%	293
Santa Cruz County	49.00%	72
El Dorado County		
Imperial County		
Sacramento County		
San Diego County		
Solano County		
Tuolumne County		

Measure ID	SKL-1
Response Count	27
Denominator Total	9229
Submission Rate (n=33)	84.85%
Average	72.26%
Median	71.96%

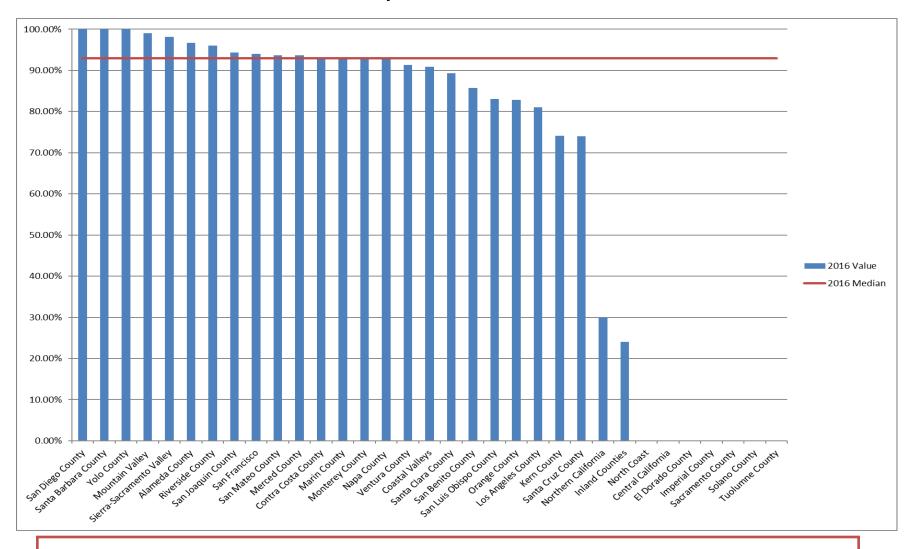


Of the 27 LEMSAs reporting these data for 2016, the median percentage of successful endotracheal intubations (within 2 attempts) was 71.96% Endotracheal intubation success rate by paramedics in the field vary widely from 49.00-88.46% with an average of 72.26%, depending on methods, population and protocol.

Other methods of airway management have recently been shown to be as effective as intubation. It is important to monitor this measure to verify skill maintenance, especially at a time when endotracheal intubation is being used less often.

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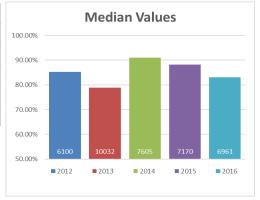
SKL-2: End-tidal CO2 Performed on any Successful Endotracheal Intubation – Part 1 of 2



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

	2016 Value	2016 Denom.
San Diego County	100.00%	197
Santa Barbara County	100.00%	71
Yolo County	100.00%	12
Mountain Valley	99.00%	100
Sierra-Sacramento Valley	98.16%	326
Alameda County	96.69%	544
Riverside County	96.00%	1025
San Joaquin County	94.31%	299
San Francisco	94.00%	352
San Mateo County	93.71%	302
Merced County	93.68%	174
Contra Costa County	93.20%	253
Marin County	93.00%	96
Monterey County	93.00%	
Napa County	92.86%	42
Ventura County	91.30%	46
Coastal Valleys	90.91%	33
Santa Clara County	89.34%	122
San Benito County	85.71%	7
San Luis Obispo County	83.00%	63
Orange County	82.80%	227
Los Angeles County	81.07%	972
Kern County	74.12%	595
Santa Cruz County	74.00%	35
Northern California	30.00%	20
Inland Counties	24.00%	950
North Coast	0.00%	98
Central California		
El Dorado County		
Imperial County		
Sacramento County		
Solano County		
Tuolumne County		

Measure ID	SKL-2
Response Count	27
Denominator Total	6961
Submission Rate (n=33)	84.85%
Average	83.11%
Median	93.00%



Of the 27 LEMSAs reporting these data for 2016, the median percentage of End-Tidal CO2 monitoring with waveform capnography after any successful endotracheal intubations was 93%. The value increased from last year, but has been variable over the five years of measurement. 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.

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