

Part 3– EMS Core Measures Project

Charts and Tables for Clinical Core Measures Based on Retrospective Data from 2010 and 2011 Data Submissions from California Local EMS Agencies

Core Measures Reporting—Tables and Charts

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Important Notes:

The data, tables, and charts do not reflect the quality of care by Local EMS Agency. This information represents only the ability of local EMS data systems to produce core measure reports from retrospective data.

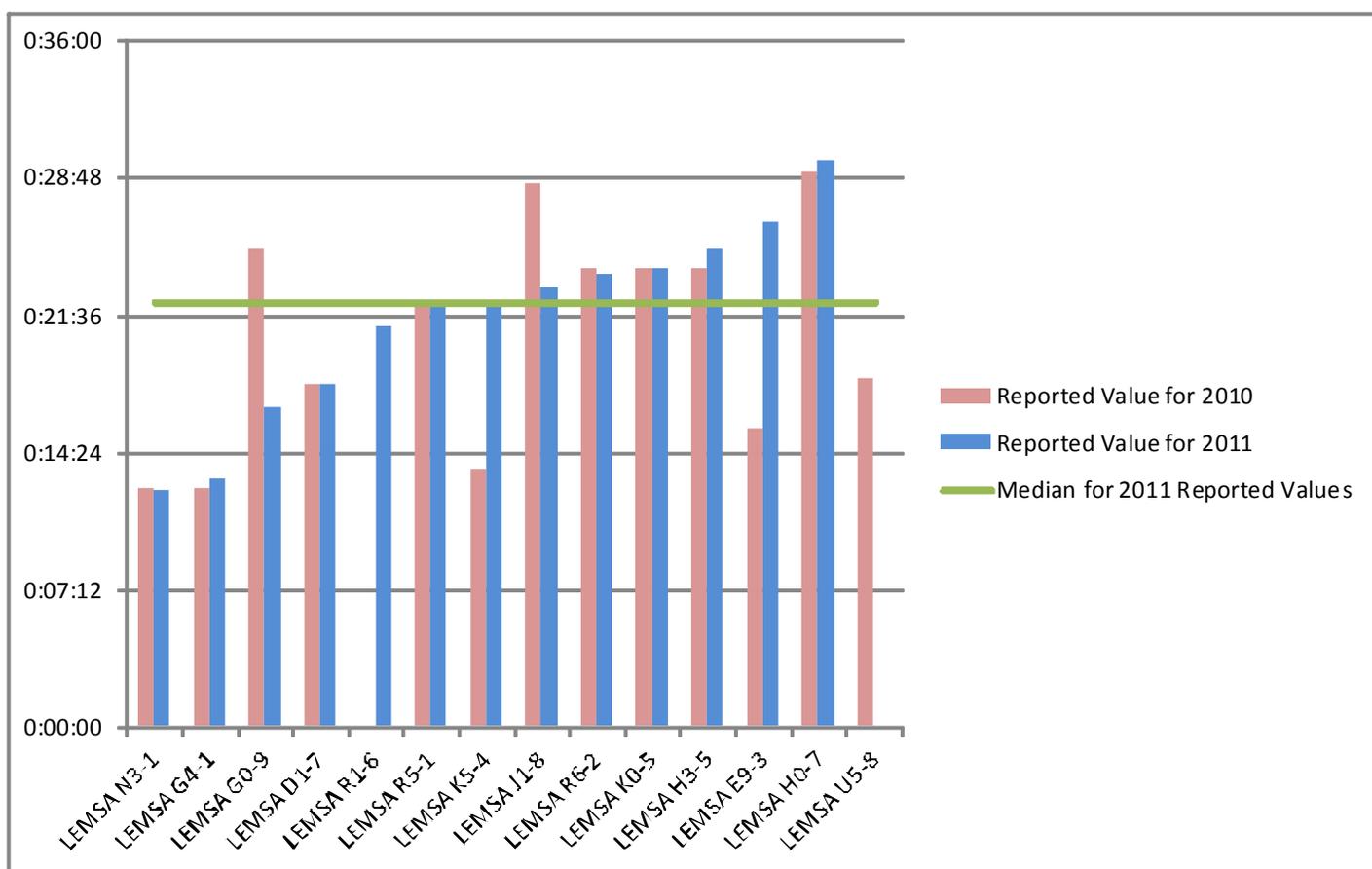
The [California EMS System Core Quality Measures, EMSA 166, Appendix E](#) defines the collection criteria and references the specific definitions and references that serve as the basis for each measure. This serves as a companion and source document to the measure information contained in this report.

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 limits the reliance of the aggregate values. As a result, the local EMS agency information has been blinded for this first trial year of data reporting.

Scene Time for Severely Injured Trauma Patients (TRA-1)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA N3-1	0:12:29		0:12:26	
LEMSA G4-1	0:12:29	42	0:13:00	433
LEMSA G0-9	0:25:00	4	0:16:42	8
LEMSA D1-7	0:18:00	4796	0:18:00	4704
LEMSA R1-6			0:21:00	14
LEMSA R5-1	0:22:00	645	0:22:00	689
LEMSA K5-4	0:13:32	1	0:22:16	11
LEMSA J1-8	0:28:30	640	0:23:00	
LEMSA R6-2	0:23:59	553	0:23:43	507
LEMSA K0-5	0:24:00	118	0:24:04	273
LEMSA H3-5	0:24:00	305	0:25:00	293
LEMSA E9-3	0:15:38	5	0:26:27	12
LEMSA H0-7	0:29:05	26	0:29:43	19
LEMSA U5-8	0:18:15	29		

Of the 14 LEMSAs reporting this information, the median scene time by an ambulance for severely injured trauma patients was approximately 22 minutes. Typically, LEMSAs protocols in California encourage paramedics to transport severely injured trauma patients from the scene in 10 minutes or less for patients that do not require extrication. Further examination of this measure is warranted, including methodology, documentation, and validation.



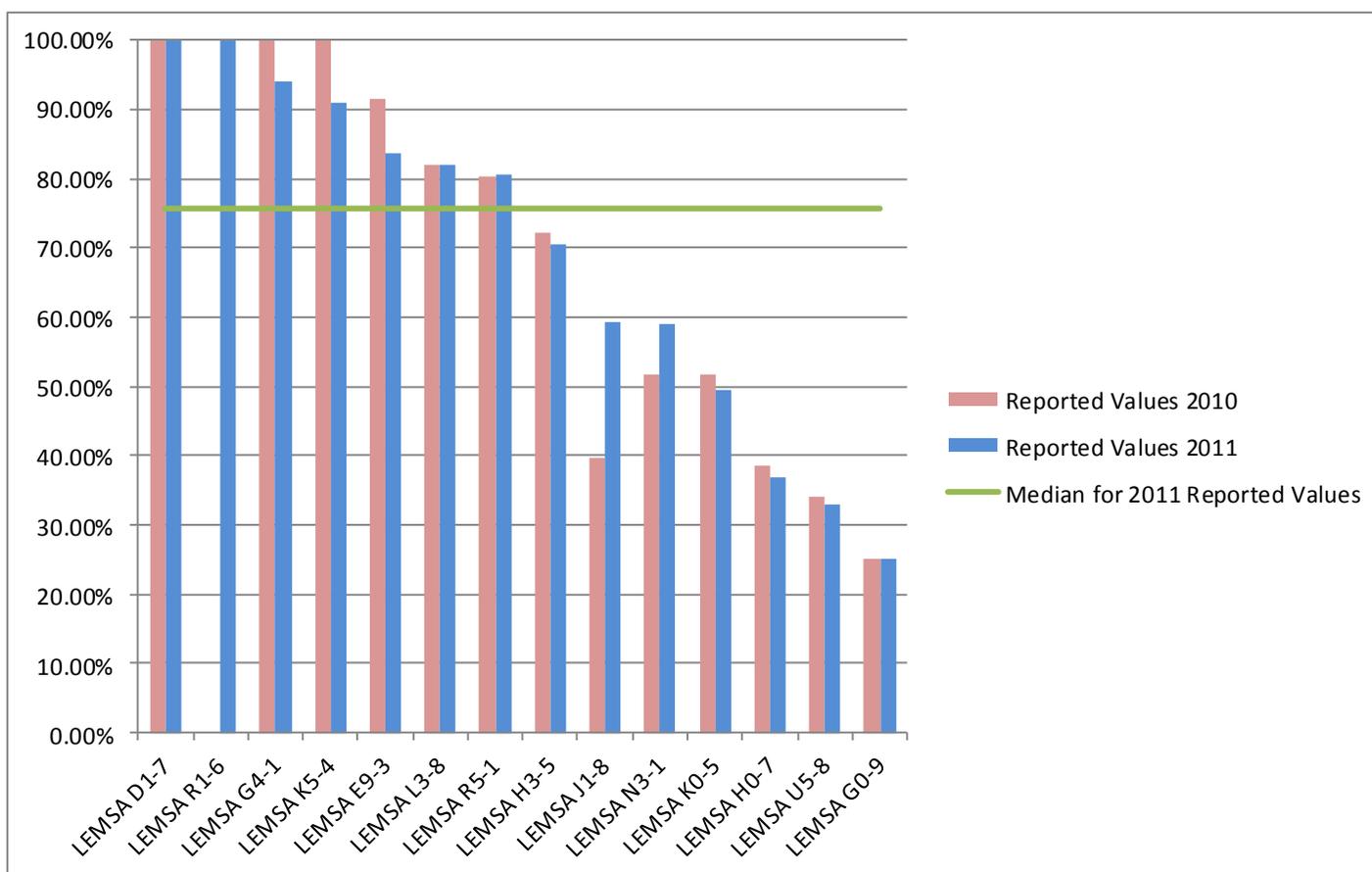
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Direct Transport to Trauma Center for Severely Injured Trauma Patients (TRA-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA D1-7	100.00%	4796	100%	4704
LEMSA R1-6			100%	48
LEMSA G4-1	100.00%	42	94%	433
LEMSA K5-4	100%	1	91%	11
LEMSA E9-3	91.60%	36	83.60%	61
LEMSA L3-8	82.00%	277	82%	313
LEMSA R5-1	80.34%	1002	80.63%	2142
LEMSA H3-5	72.13%	305	70.65%	293
LEMSA J1-8	39.69%	640	59.18%	245
LEMSA N3-1	51.77%	1130	58.98%	1180
LEMSA K0-5	51.69%	118	49.45%	273
LEMSA H0-7	38.46%	26	36.84%	19
LEMSA U5-8	34%	29	33%	45
LEMSA G0-9	25.00%	4	25%	8

Of the 14 LEMSAs reporting this information, the median number of patients able to be transported directly to a trauma center was 75%. Direct transport to trauma centers for severely injured trauma patients will vary by geography and availability of resources in a given area. Generally, LEMSAs with a higher level of direct transport are in urban areas with a nearby trauma center. Currently, 100% of the LEMSAs have an organized trauma system.

Definitions varied due to variability in definitions for a severely injured trauma patient and the revised trauma score (derived from Glasgow Coma Score, Initial Systolic Blood Pressure, and Respiratory Rate).

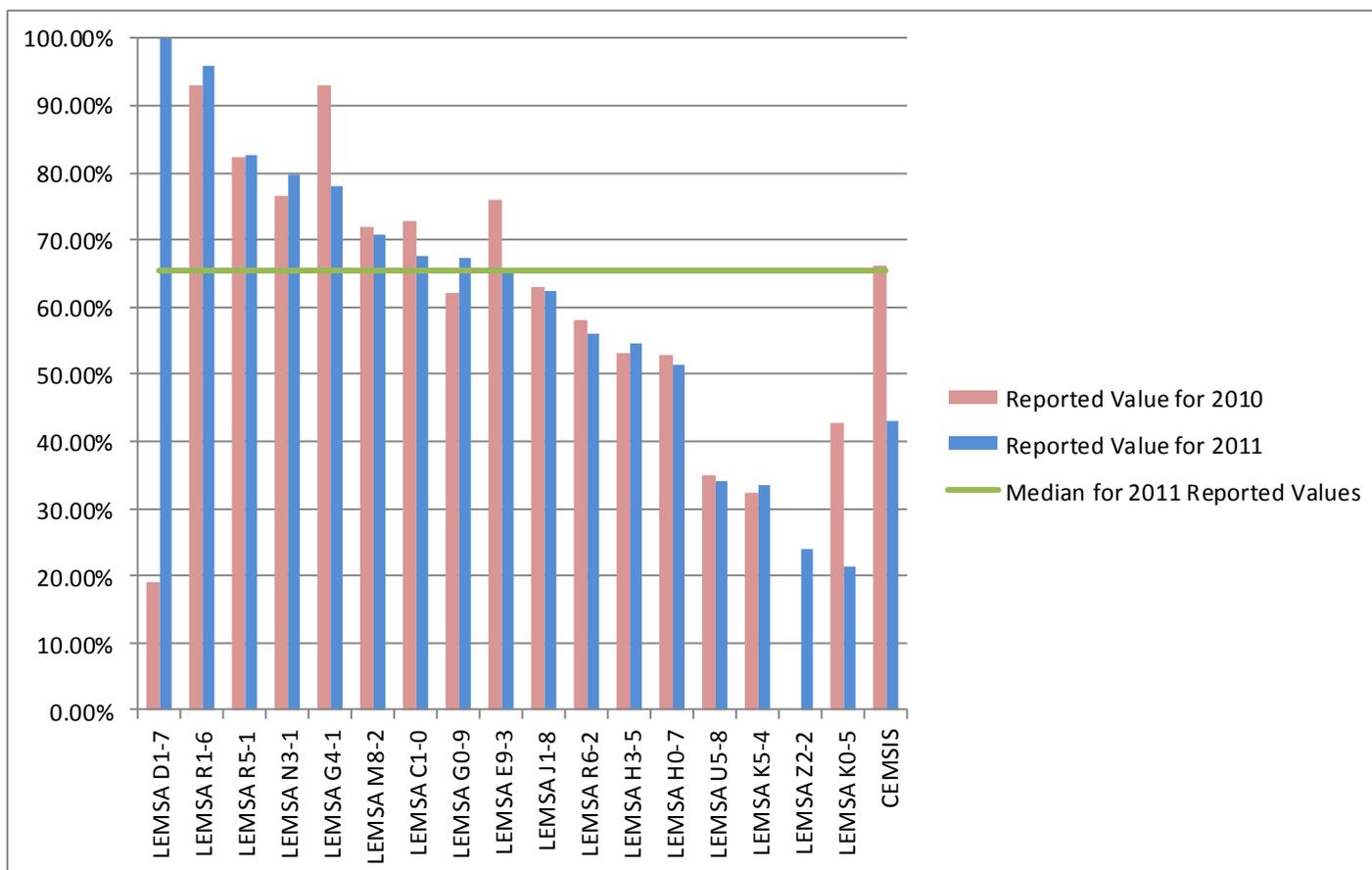


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Aspirin Administration for Chest Pain/Discomfort Rate (ACS-1)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA D1-7	19.00%	2329	100%	771
LEMSA R1-6	93.00%	284	96%	290
LEMSA R5-1	82.41%	5417	82.55%	10903
LEMSA N3-1	76.68%	3311	79.63%	3407
LEMSA G4-1	93.00%	58	78%	2900
LEMSA M8-2	72.00%	854	70.90%	795
LEMSA C1-0	72.80%	404	67.50%	351
LEMSA G0-9	62.02%	287	67.15%	481
LEMSA E9-3	76.03%	121	65.44%	136
LEMSA J1-8	63.06%	28305	62.51%	22569
LEMSA R6-2	58%	5616	56%	4796
LEMSA H3-5	53.20%	10911	54.71%	10720
LEMSA H0-7	52.89%	1382	51.36%	1431
LEMSA U5-8	35%	766	34%	1370
LEMSA K5-4	32.20%	149	33.47%	2781
LEMSA Z2-2			24%	155
LEMSA K0-5	42.63%	5655	21.21%	11566
CEMSIS	66.00%	22572	43.00%	5288

Of the 17 LEMSAs reporting this information, the median number of receiving aspirin in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 65%. Factors for a low number 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.

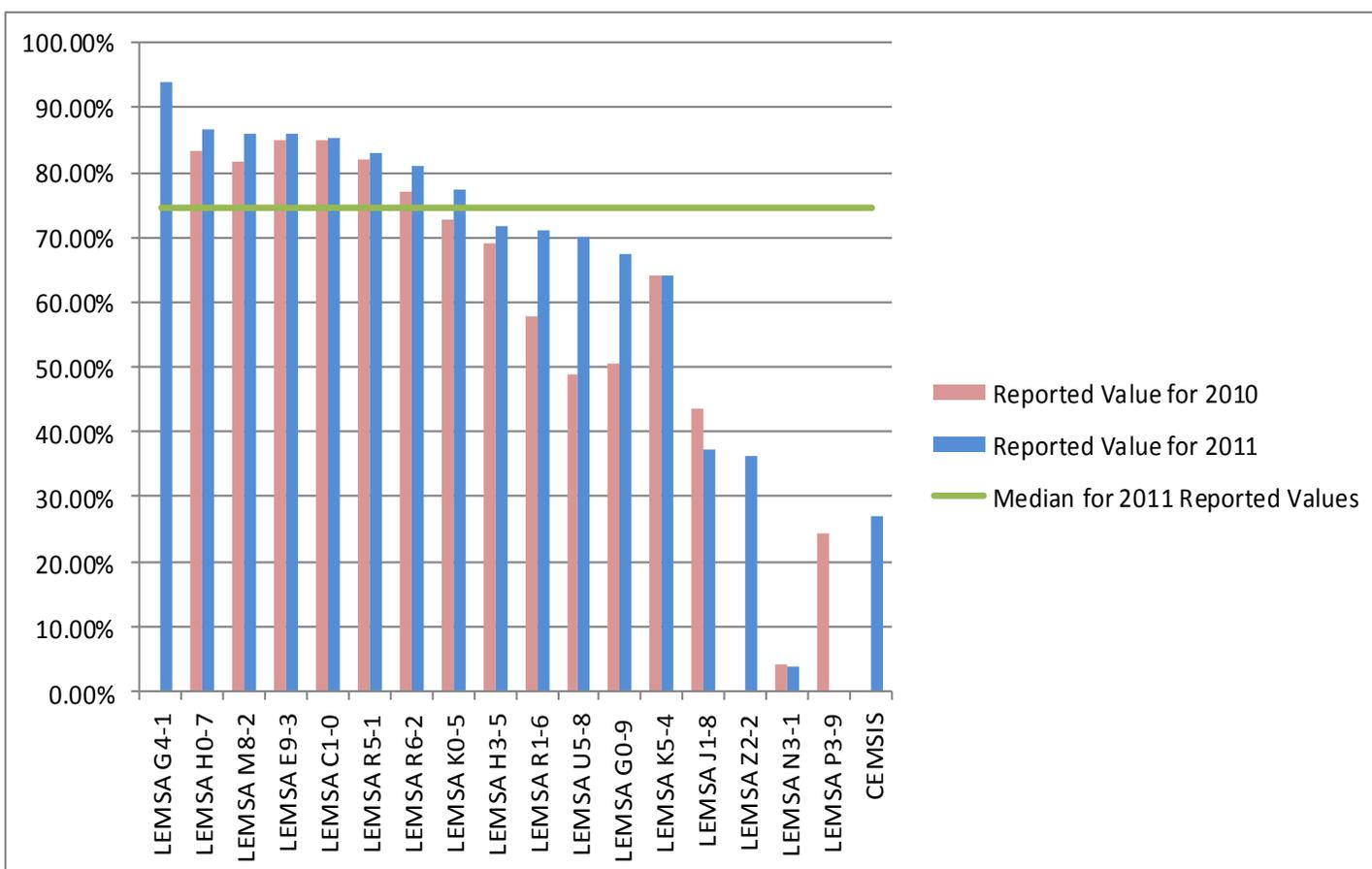


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12 Lead ECG Performance (ACS-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA G4-1	0.00%	58	94%	2900
LEMSA H0-7	83.36%	1382	86.65%	1431
LEMSA M8-2	81.80%	859	86.06%	794
LEMSA E9-3	85.12%	121	86.02%	136
LEMSA C1-0	85.10%	404	85.20%	351
LEMSA R5-1	81.91%	5417	82.99%	10903
LEMSA R6-2	77%	5616	81%	4796
LEMSA K0-5	72.79%	5655	77.24%	11566
LEMSA H3-5	69.16%	10911	71.80%	10720
LEMSA R1-6	58.00%	284	71%	290
LEMSA U5-8	49%	767	70%	1373
LEMSA G0-9	50.52%	287	67.36%	481
LEMSA K5-4	64%	149	64%	2781
LEMSA J1-8	43.64%	28305	37.40%	22569
LEMSA Z2-2			36.40%	44
LEMSA N3-1	3.99%	3311	3.64%	4088
LEMSA P3-9	24.40%	41		
CEMSIS	0.00%	22572	27.00%	5288

Of the 17 LEMSAs reporting this information, the median number of patients receiving 12-Lead ECG in the field for complaints of chest pain or discomfort suggestive of cardiac origin was 73%. The results were fairly consistent. Factors for a low percentage of application include problems with documentation or 12-lead ECGs administered by first responder paramedics.

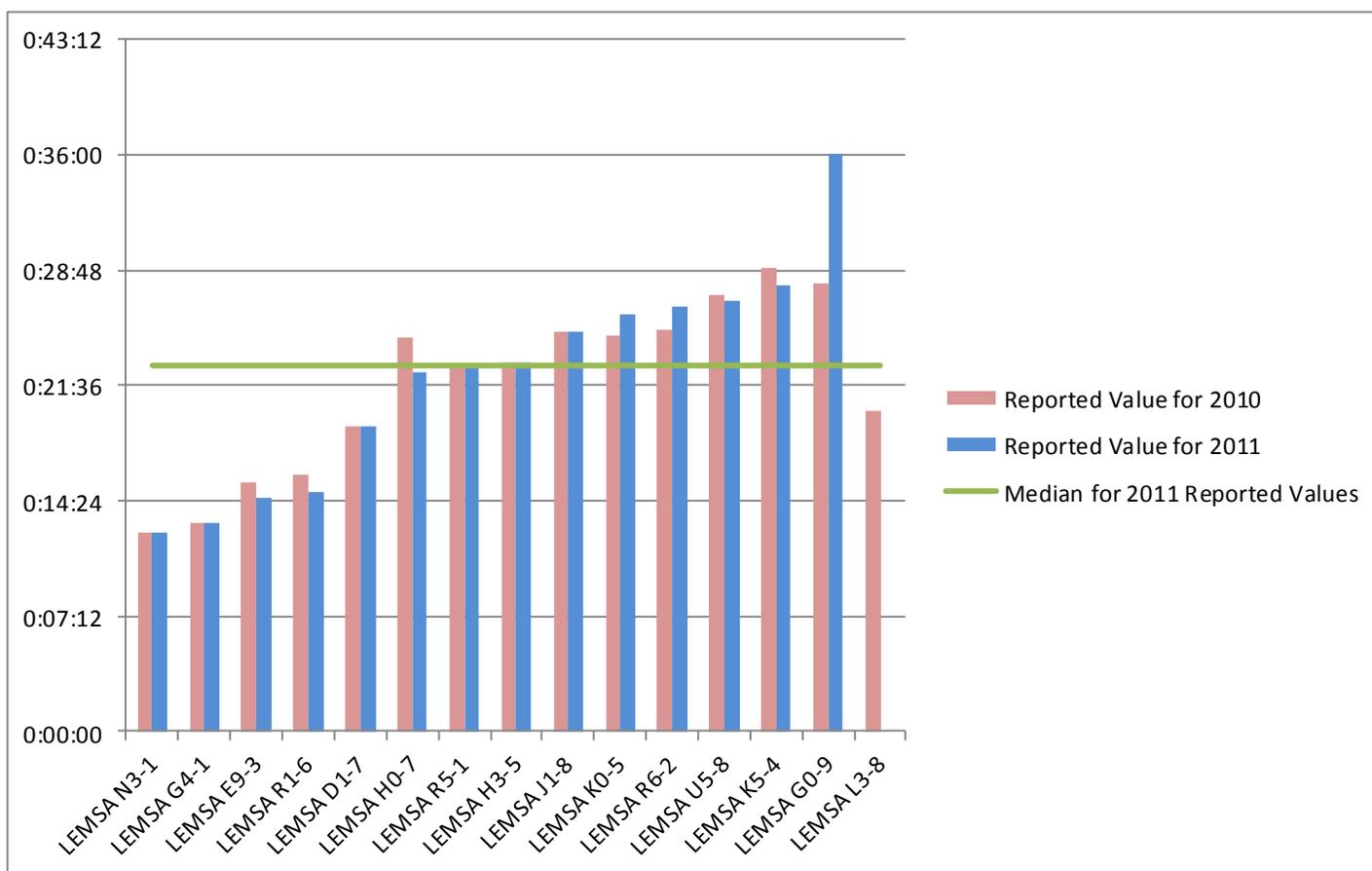


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Scene Time for Suspected Heart Attack Patients (ACS-3)

	RV for	Denom.	RV for	Denom.
LEMSA N3-1	0:12:23		0:12:22	
LEMSA G4-1	0:13:00	114	0:13:00	403
LEMSA E9-3	0:15:36	121	0:14:38	136
LEMSA R1-6	0:16:00	17	0:15:00	19
LEMSA D1-7	0:19:00	90	0:19:00	771
LEMSA H0-7	0:24:33	66	0:22:23	55
LEMSA R5-1	0:22:57	5220	0:22:47	5504
LEMSA H3-5	0:23:00	289	0:23:00	300
LEMSA J1-8	0:25:00	1080	0:25:00	
LEMSA K0-5	0:24:45	157	0:26:00	465
LEMSA R6-2	0:25:06	432	0:26:34	372
LEMSA U5-8	0:27:17	37	0:26:54	91
LEMSA K5-4	0:28:56	11	0:27:50	120
LEMSA G0-9	0:28:00	32	0:36:00	65
LEMSA L3-8	0:20:00	61		

Of the 15 LEMSAs reporting this information, the median scene time by an ambulance for suspected heart attack patients with ST elevation on EKG was approximately 22 minutes. Typically LEMSA protocols encourage paramedics to transport STEMI patients from the scene in 15 minutes or less for patients. Further examination of this measure are warranted, including methodology, documentation, and validation.



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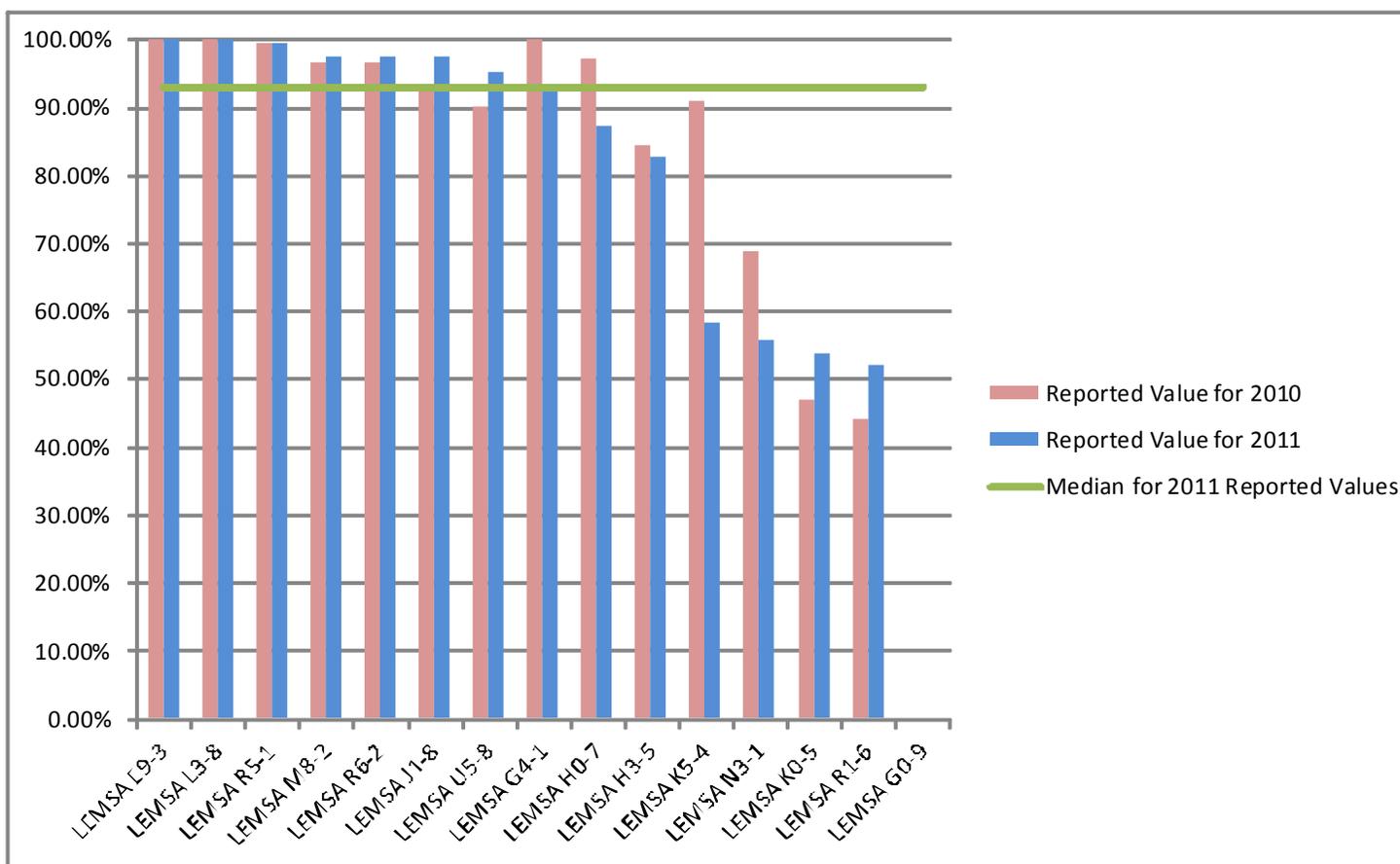
Direct Transport to PCI Center for Suspected Acute Coronary Syndrome Patients Meeting Criteria (ACS-5)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA E9-3	100.00%	8	100%	15
LEMSA L3-8	100.00%	61	100%	104
LEMSA R5-1	99.25%	266	99.26%	679
LEMSA M8-2	96.60%	29	97.50%	80
LEMSA R6-2	96.40%	448	97.30%	382
LEMSA J1-8	92.49%	1252	97.28%	991
LEMSA U5-8	90%	73	95%	106
LEMSA G4-1	100.00%	114	93%	403
LEMSA H0-7	96.97%	66	87.27%	55
LEMSA H3-5	84.21%	665	82.65%	680
LEMSA K5-4	91%	11	58.20%	223
LEMSA N3-1	68.61%	2475	55.54%	3383
LEMSA K0-5	46.82%	267	53.75%	653
LEMSA R1-6	44.00%	9	52%	19
LEMSA G0-9			0%	0

Of the 15 LEMSAs reporting this information, the median number of patients appropriately transported directly to a STEMI center was 90%. Generally, LEMSAs with a higher level of direct transport are urban areas with a STEMI system in place. STEMI systems have been under local development for the past 5 years. However, at the time of this data collection, STEMI systems may not have been activated in the LEMSA. Currently, 88% of the LEMSAs have a STEMI system.

Direct transport of patients to a STEMI centers with PCI capability will vary by geography, and availability of resources in a given area. Lower values would be expected in a rural area which may not have an established STEMI system or local resources.

Another factor for this to measure is how the time interval is measured.

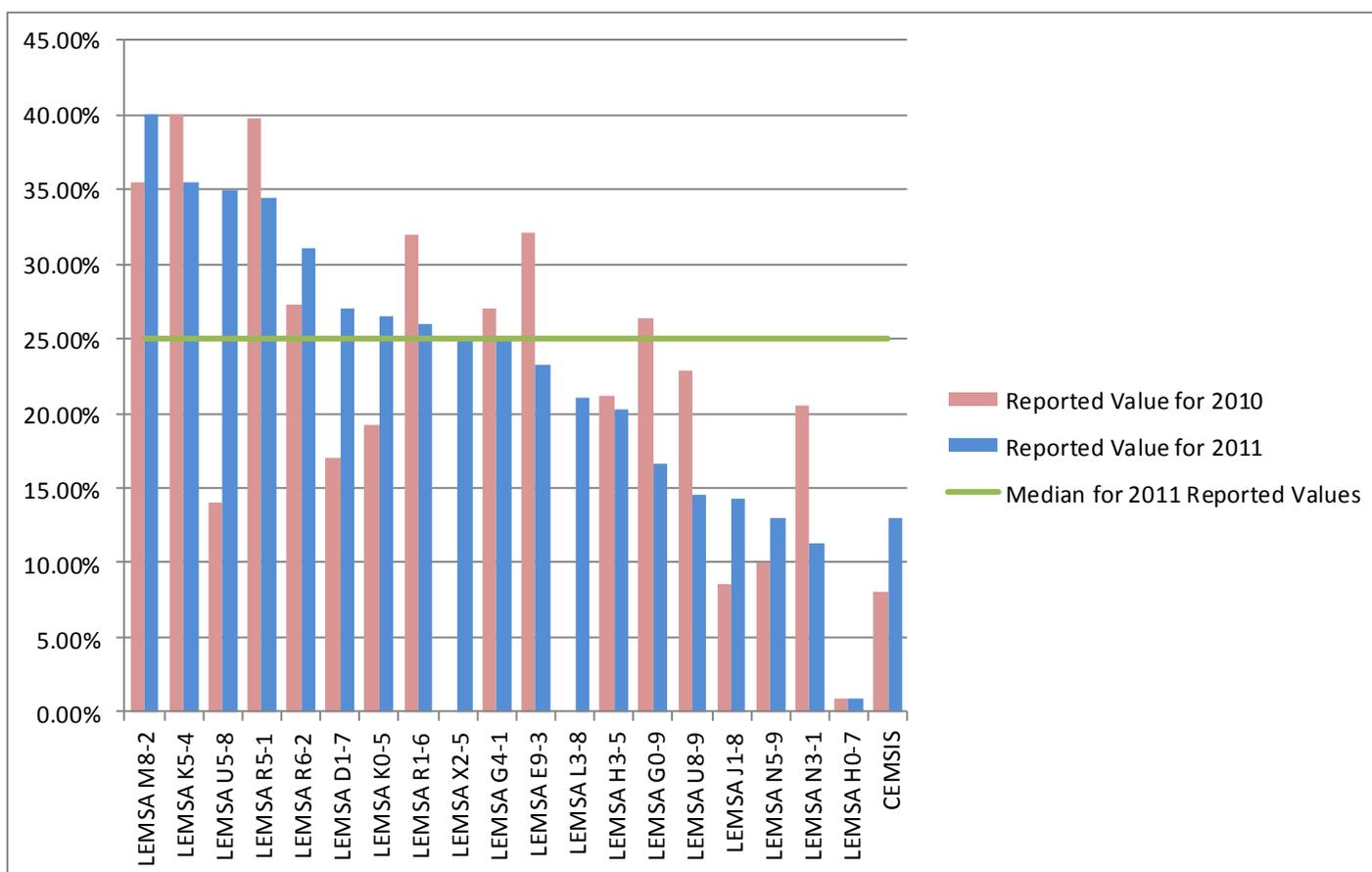


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Out-of-Hospital Cardiac Arrests Return to Spontaneous Circulation (CAR-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA M8-2	35.50%	141	40%	165
LEMSA K5-4	40%	10	35.42%	271
LEMSA U5-8	14%	50	35%	100
LEMSA R5-1	39.73%	297	34.47%	470
LEMSA R6-2	27.30%	909	31%	871
LEMSA D1-7	17.00%	435	27%	569
LEMSA K0-5	19.19%	198	26.46%	378
LEMSA R1-6	32.00%	22	26%	47
LEMSA X2-5			25%	4
LEMSA G4-1	27.00%	26	25%	188
LEMSA E9-3	32.07%	53	23.21%	56
LEMSA L3-8			21%	181
LEMSA H3-5	21.20%	1099	20.28%	1080
LEMSA G0-9	26.32%	19	16.67%	54
LEMSA U8-9	22.89%	83	14.53%	117
LEMSA J1-8	8.52%	7326	14.31%	4242
LEMSA N5-9	10.00%	290	13%	223
LEMSA N3-1	20.52%	536	11.32%	813
LEMSA H0-7	0.93%	215	0.95%	211
CEMSIS	8.00%	583	13.00%	393

Of the 19 LEMSAs reporting this information, the median number of patients that had a return of spontaneous circulation in the field after a cardiac arrest from all causes was 25%. This measure was the most widely collected by local EMS agencies. This outcome measure is also dependent upon multiple factors that vary considerably by community, including early access to get help, bystander CPR, automated external defibrillation use, and response times by first responders and ALS providers.

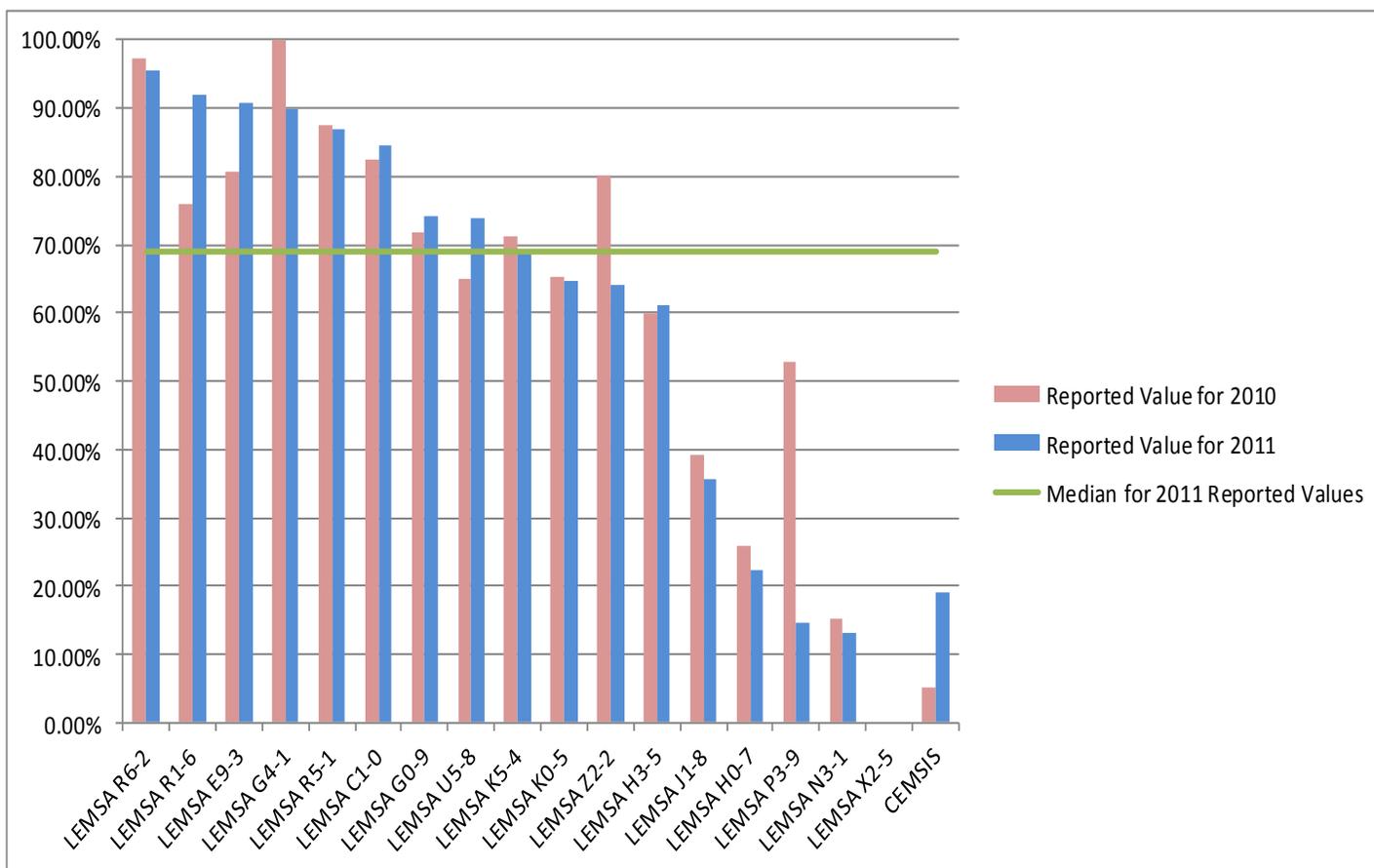


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Glucose Testing for Suspected Stroke Patients (STR-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA R6-2	97.40%	851	95.40%	766
LEMSA R1-6	76.00%	106	92%	85
LEMSA E9-3	80.59%	134	90.64%	139
LEMSA G4-1	100.00%	11	90%	969
LEMSA R5-1	87.35%	1676	86.77%	3461
LEMSA C1-0	82.50%	189	84.60%	169
LEMSA G0-9	71.93%	114	74.31%	253
LEMSA U5-8	65%	342	74%	622
LEMSA K5-4	71.10%	90	69.00%	1427
LEMSA K0-5	65.20%	1862	64.64%	3391
LEMSA Z2-2	80.00%	50	64.00%	86
LEMSA H3-5	59.87%	1991	61.01%	1885
LEMSA J1-8	39.18%	6028	35.50%	3549
LEMSA H0-7	25.84%	209	22.22%	216
LEMSA P3-9	52.80%	252	14.50%	358
LEMSA N3-1	15.10%	8115	13.03%	9001
LEMSA X2-5			0.00%	37
CEMSIS	5.00%	4668	19.00%	1657

Of the 17 LEMSAs reporting this information, the median number of patients receiving glucose testing in the field for a possible stroke was slightly below 70%. Factors include problems with documentation or glucose testing performed by first responder paramedics, but not reflected in the patient care record by the ambulance transport service.

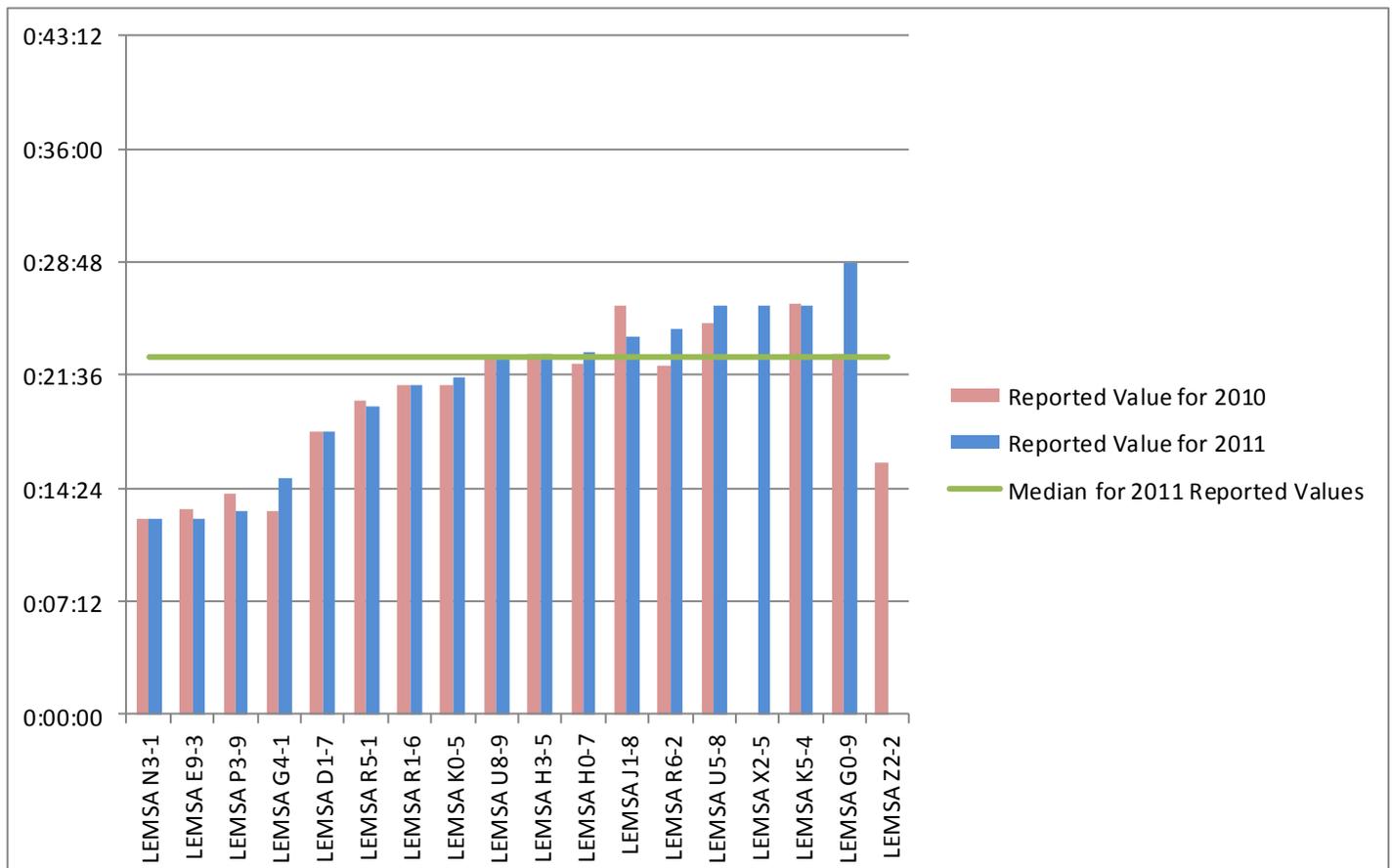


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Scene Time for Suspected Stroke Patients (STR-3)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA N3-1	0:12:25		0:12:24	
LEMSA E9-3	0:13:03	134	0:12:28	139
LEMSA P3-9	0:14:00	251	0:13:00	8
LEMSA G4-1	0:13:00	11	0:15:00	885
LEMSA D1-7	0:18:00	1038	0:18:00	1084
LEMSA R5-1	0:19:58	3794	0:19:34	5364
LEMSA R1-6	0:21:00	106	0:21:00	85
LEMSA K0-5	0:21:01	1392	0:21:29	2445
LEMSA U8-9	0:22:49	381	0:22:47	865
LEMSA H3-5	0:23:00	1322	0:23:00	1246
LEMSA H0-7	0:22:19	209	0:23:06	216
LEMSA J1-8	0:26:00	6028	0:24:00	
LEMSA R6-2	0:22:11	433	0:24:34	386
LEMSA U5-8	0:24:57	250	0:26:00	514
LEMSA X2-5			0:26:00	27
LEMSA K5-4	0:26:07	69	0:26:02	928
LEMSA G0-9	0:23:00	107	0:28:48	243
LEMSA Z2-2	0:16:00	50		

Of the 18 LEMSAs reporting this information, the median scene time by an ambulance for suspected stroke patients was approximately 22 minutes. Typically, LEMSAs protocols in California encourage paramedics to transport Stroke patients from the scene in 15 minutes or less. Further examination of this measure is warranted, including methodology, documentation, and validation.



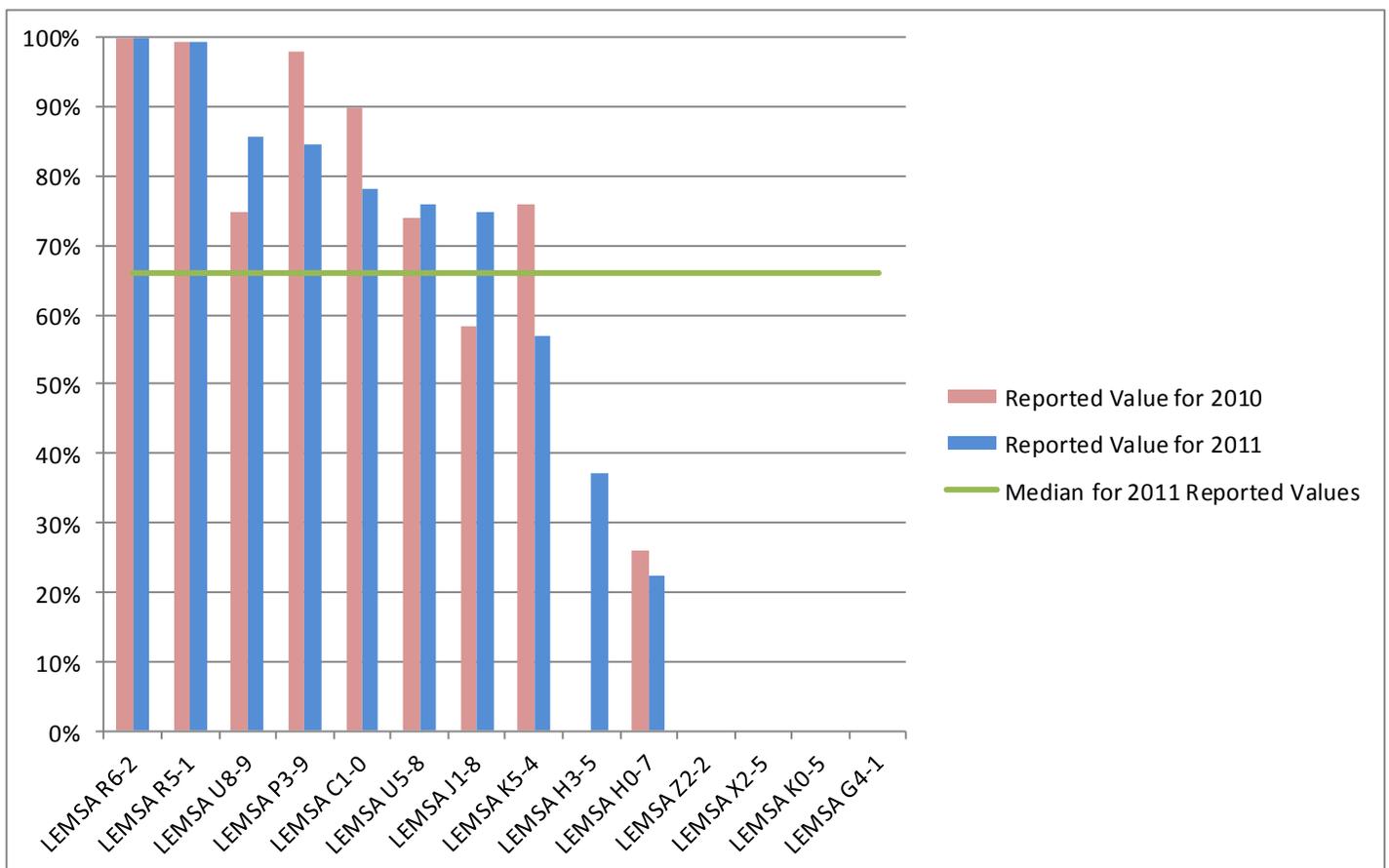
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Direct Transport To Stroke Center for Suspected Stroke Patients Meeting Criteria (STR-5)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA R6-2	100%	148	100%	126
LEMSA R5-1	99.33%	1650	99.29%	3386
LEMSA U8-9	74.95%	487	85.63%	974
LEMSA P3-9	98.00%	252	84.60%	358
LEMSA C1-0	89.90%	189	78.10%	169
LEMSA U5-8	74%	324	76%	604
LEMSA J1-8	58.27%	6037	74.83%	3579
LEMSA K5-4	76%	90	57%	1427
LEMSA H3-5			37.02%	181
LEMSA H0-7	25.84%	209	22.22%	216
LEMSA Z2-2	0.00%	50	0%	86
LEMSA X2-5			0%	37
LEMSA K0-5	0.00%	1862	0.00%	3391
LEMSA G4-1			0%	

Of the 14 LEMSAs reporting this information, the median number of patients transported directly to a Stroke center was 65%. Generally, LEMSAs with a higher level of direct transport are urban areas with a Stroke system in place. However, at the time of this data collection, Stroke systems may not have been activated in the LEMSA. At the present time, only 47% of the LEMSAs have established a Stroke System.

Direct transport of patients to a Stroke centers will vary by geography and availability of resources in a given area. Lower values are in expected rural areas that may not have an established Stroke system or local health care.

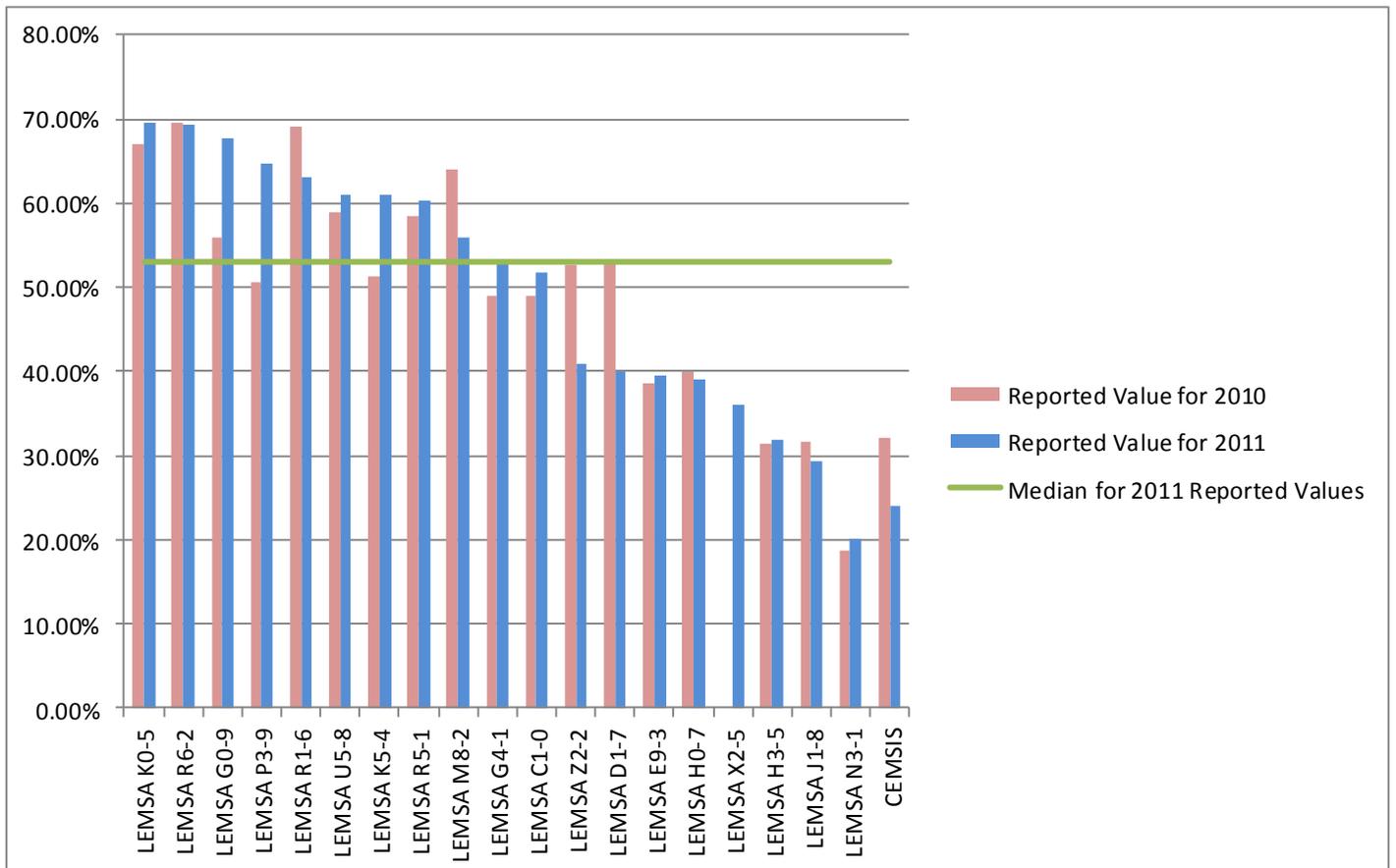


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Beta2 Agonist Administration (RES-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA K0-5	67.02%	1531	69.50%	2984
LEMSA R6-2	69.50%	2896	69.40%	2314
LEMSA G0-9	55.87%	358	67.68%	755
LEMSA P3-9	50.60%	77	64.70%	34
LEMSA R1-6	69.00%	179	63%	141
LEMSA U5-8	59%	277	61%	407
LEMSA K5-4	51.40%	35	61%	768
LEMSA R5-1	58.35%	3037	60.34%	6037
LEMSA M8-2	64.00%	563	56%	564
LEMSA G4-1	49.00%	82	53%	1397
LEMSA C1-0	48.90%	305	51.80%	332
LEMSA Z2-2	52.70%	55	40.90%	93
LEMSA D1-7	53.00%	1836	40%	2162
LEMSA E9-3	38.59%	342	39.41%	378
LEMSA H0-7	39.91%	1551	39.07%	1628
LEMSA X2-5			36%	112
LEMSA H3-5	31.48%	4200	31.88%	3429
LEMSA J1-8	31.68%	35396	29.27%	27416
LEMSA N3-1	18.65%	13882	20%	14702
CEMSIS	32.00%	23878	24%	3688

Of the 19 LEMSAs reporting this information, the median number of patients receiving Beta-2 Agonist/bronchodilator for bronchospasm in adults (age 14 or older) was 52%. After review of the results of this indicator, future changes are recommended to refine the patient inclusion criteria.

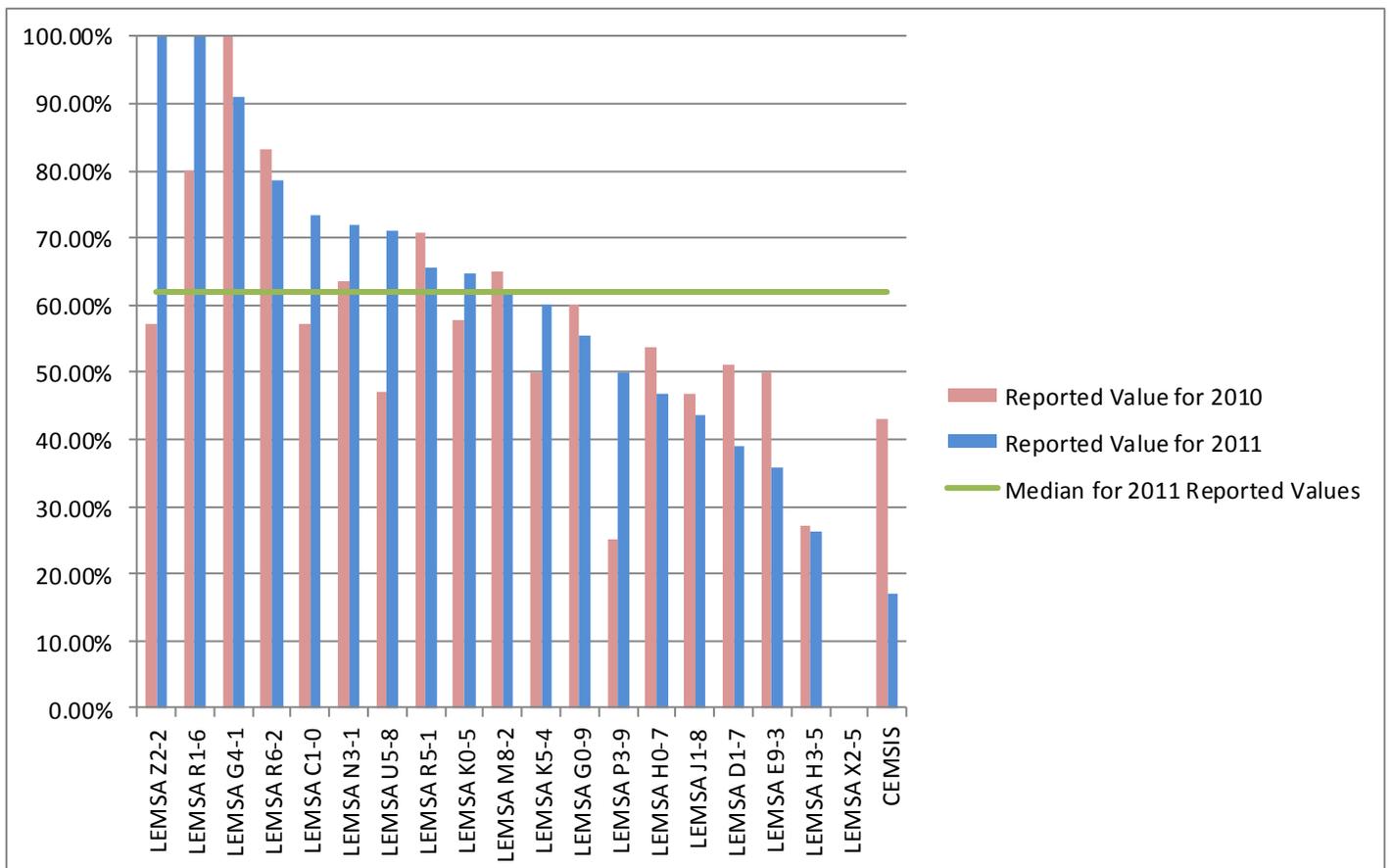


Multiple factors impact the validity and analysis of these retrospective data, including but not limited to incomplete documentation, documentation not reflective of services provided prior to ambulance arrival, inconsistent data dictionary definitions between local jurisdictions, geographic resource disparities, and inability to collect hospital outcome data. This retrospective data has not been validated. These limitations caution against comparison between jurisdictions and limits the reliance of the aggregate values. As a result, the local EMS agency information has been blinded for this first trial year of data reporting.

Pediatric Asthma Patients Receiving Bronchodilators (PED-1)

	RV for	Denom.	RV for	Denom.
LEMSA Z2-2	57.10%	7	100.00%	2
LEMSA R1-6	80.00%	5	100%	3
LEMSA G4-1	100.00%	9	91%	82
LEMSA R6-2	83.30%	54	78.70%	47
LEMSA C1-0	57.10%	14	73.30%	15
LEMSA N3-1	63.64%	99	71.91%	89
LEMSA U5-8	47%	17	71%	31
LEMSA R5-1	70.83%	168	65.63%	323
LEMSA K0-5	57.67%	163	64.76%	227
LEMSA M8-2	65.00%	31	62%	29
LEMSA K5-4	50%	2	60%	55
LEMSA G0-9	60.00%	10	55.55%	18
LEMSA P3-9	25.00%	8	50.00%	4
LEMSA H0-7	53.74%	147	46.83%	126
LEMSA J1-8	46.78%	1941	43.52%	1450
LEMSA D1-7	51.00%	76	39%	64
LEMSA E9-3	50.00%	34	35.71%	42
LEMSA H3-5	27.03%	518	26.30%	384
LEMSA X2-5			0%	2
CEMSIS	43.00%	1506	17.00%	231

Of the 19 LEMSAs reporting this information, the median number of pediatric patients receiving bronchodilators for asthma was 62%. After review of the results of this indicator, examination of this measure is recommended to ensure proper patient inclusion and documentation.

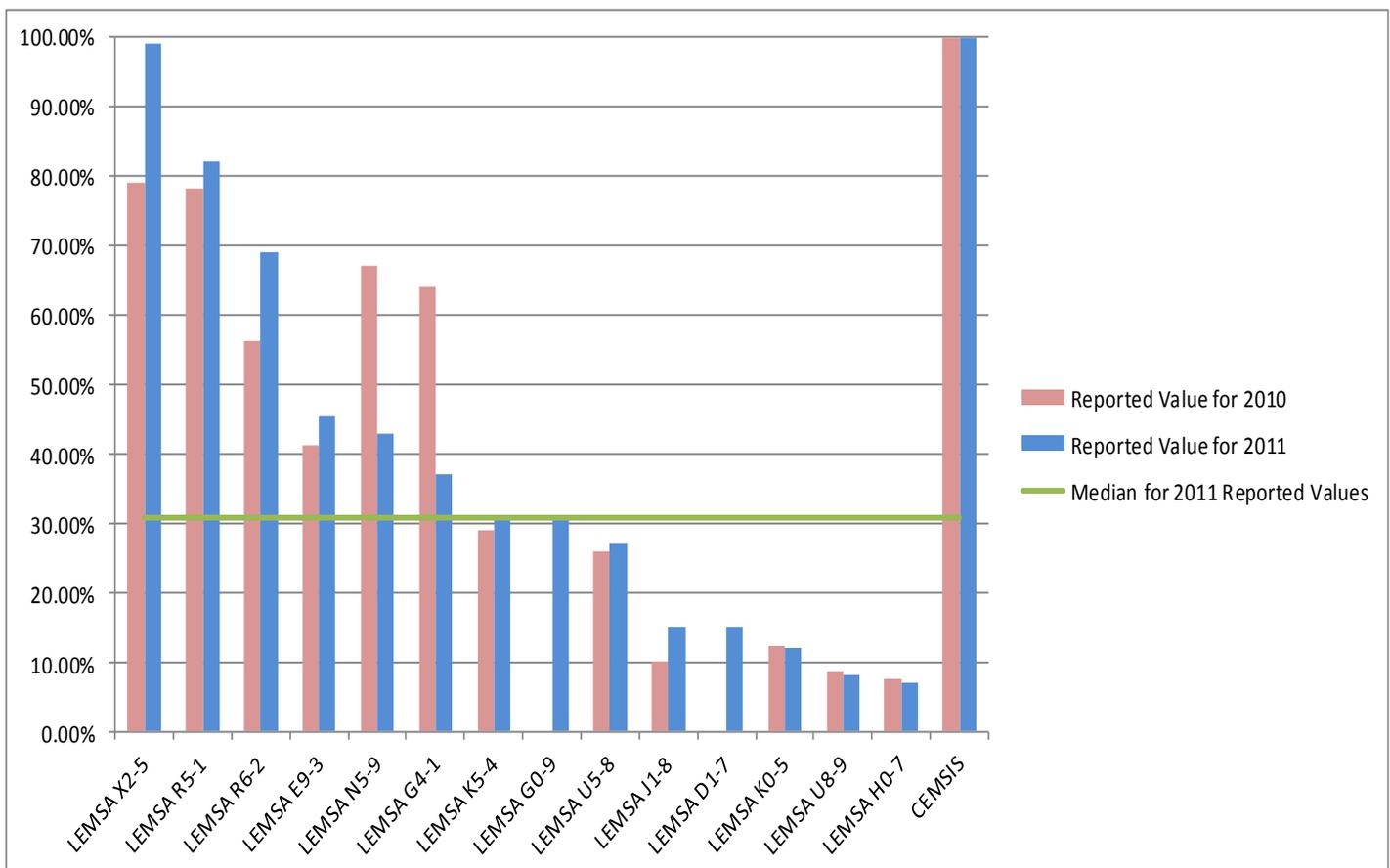


Multiple factors impact the validity and analysis of these retrospective data, including but not limited to incomplete documentation, documentation not reflective of services provided prior to ambulance arrival, inconsistent data dictionary definitions between local jurisdictions, geographic resource disparities, and inability to collect hospital outcome data. This retrospective data has not been validated. These limitations caution against comparison between jurisdictions and limits the reliance of the aggregate values. As a result, the local EMS agency information has been blinded for this first trial year of data reporting.

Pain Intervention (PAI-1)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA X2-5	79.00%	1157	99%	180
LEMSA R5-1	78.11%	1448	82.03%	2593
LEMSA R6-2	56.20%	7606	69.10%	6187
LEMSA E9-3	41.36%	573	45.31%	587
LEMSA N5-9	67.00%	30	43%	30
LEMSA G4-1	64.00%	22	37%	1865
LEMSA K5-4	29%	222	31%	3613
LEMSA G0-9			30.81%	2113
LEMSA U5-8	26%	819	27%	1343
LEMSA J1-8	10.19%	15270	15.08%	14755
LEMSA D1-7			15%	9756
LEMSA K0-5	12.29%	5637	12.01%	11790
LEMSA U8-9	8.83%	5744	8.27%	8124
LEMSA H0-7	7.52%	1596	6.94%	1268
CEMSIS	100.00%	11578	100.00%	9104

Of the 14 LEMSAs reporting this information, the median percentage of patients receiving intervention for any pain (Reported as 7 or greater on a 10 point pain scale) was 31%. Pain intervention was defined as any analgesic medication or accepted procedure to reduce pain. There is wide variation in the results. The lack of a pain scale (data friendly) could be a barrier to collection of this item. Based upon these results, a review of pain intervention and documentation in the field should be done. A review of the criteria in the core measure is also important.

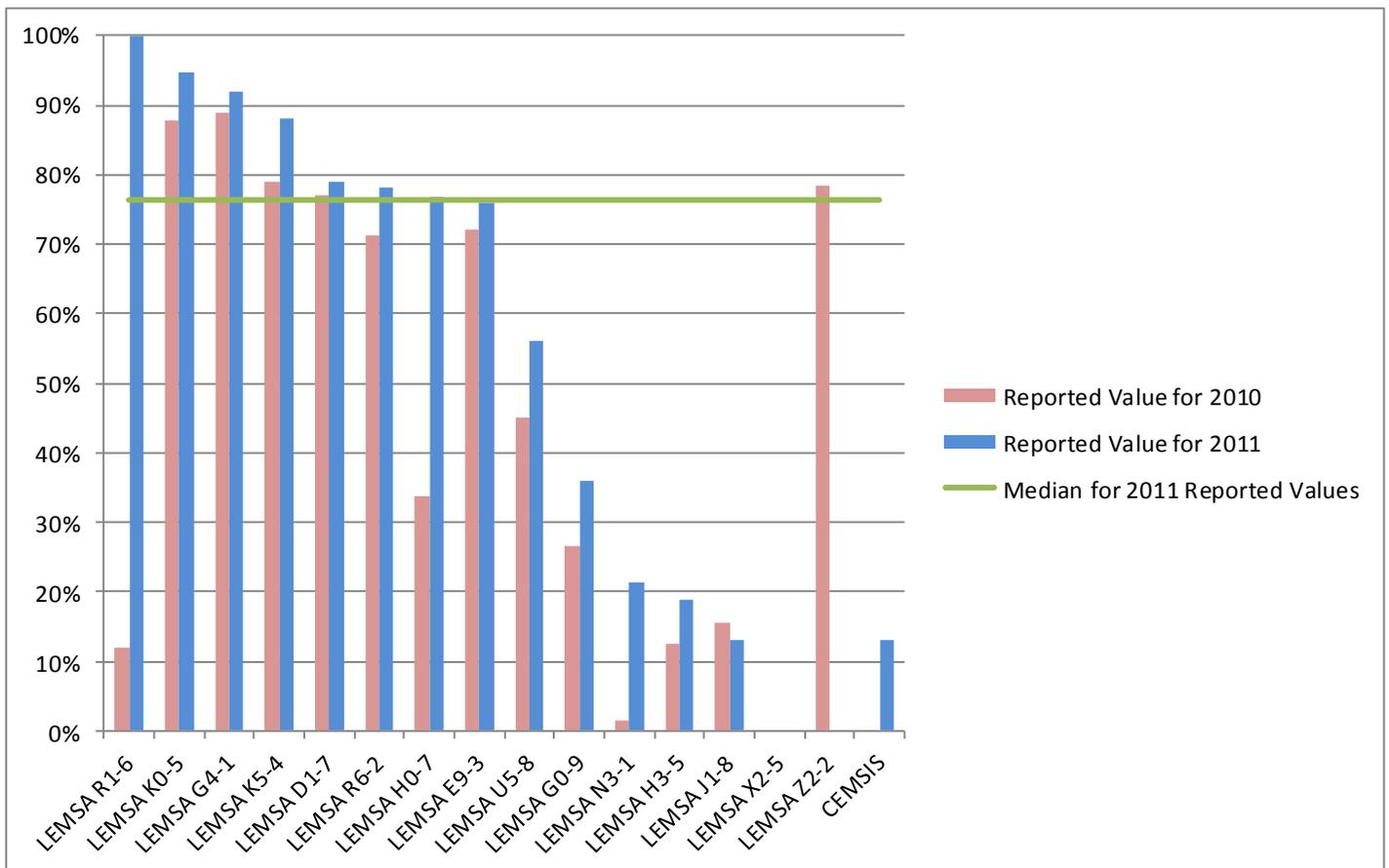


Multiple factors impact the validity and analysis of these retrospective data, including but not limited to incomplete documentation, documentation not reflective of services provided prior to ambulance arrival, inconsistent data dictionary definitions between local jurisdictions, geographic resource disparities, and inability to collect hospital outcome data. This retrospective data has not been validated. These limitations caution against comparison between jurisdictions and limits the reliance of the aggregate values. As a result, the local EMS agency information has been blinded for this first trial year of data reporting.

Endotracheal Intubation Success Rate (SKL-1)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA P3-9	85.90%	85	89.80%	88
LEMSA G4-1	87.00%	31	88%	353
LEMSA J1-8	60.89%	2227	84.05%	2031
LEMSA K0-5	68.37%	547	82.90%	1123
LEMSA H0-7	76.92%	247	82.04%	206
LEMSA R6-2	84.10%	519	80%	486
LEMSA U5-8	65%	85	80%	170
LEMSA H3-5	81.03%	1318	79.97%	1368
LEMSA K5-4	73%	26	78.30%	509
LEMSA M8-2	79.00%	160	77%	160
LEMSA Z2-2			75.60%	119
LEMSA E9-3	72.00%	150	74.11%	170
LEMSA R1-6	69%	42	70%	30
LEMSA X2-5			67%	3
LEMSA C1-0	72.50%	91	66.70%	102
LEMSA N3-1	68.38%	604	63.35%	603
LEMSA G0-9	81.40%	86	56.82%	176
LEMSA D1-7	50.00%	722	41%	578
CEMSIS	29.00%	2280	49%	1491

Of the 18 LEMSAs reporting this information, the median percentage of successful endotracheal intubations (within 2 attempts) was 78%. The results of this measure were consistent with results from the literature of 80-90%, depending upon the methodology. Refinement of this measure with documentation and continued evaluation of this skill is warranted.



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 limits the reliance of the aggregate values. As a result, the local EMS agency information has been blinded for this first trial year of data reporting.

End-Tidal CO₂ Performed on Any Successful Endotracheal Intubation (SKL-2)

	RV for 2010	Denom. 2010	RV for 2011	Denom. 2011
LEMSA R1-6	12%	42	100%	21
LEMSA K0-5	87.70%	374	94.74%	931
LEMSA G4-1	89.00%	27	92%	312
LEMSA K5-4	79%	19	88%	399
LEMSA D1-7	77.00%	358	79%	239
LEMSA R6-2	71.30%	436	78.10%	393
LEMSA H0-7	33.60%	247	76.70%	206
LEMSA E9-3	72.00%	150	75.88%	170
LEMSA U5-8	45%	55	56%	136
LEMSA G0-9	26.67%	60	35.87%	92
LEMSA N3-1	1.45%	413	21.20%	382
LEMSA H3-5	12.45%	1068	18.84%	1094
LEMSA J1-8	15.46%	1494	12.97%	1750
LEMSA X2-5			0%	2
LEMSA Z2-2	78.40%			
CEMSIS	0.00%	654	13.00%	776

Of the 15 LEMSAs reporting this information, the median percentage of End-Tidal CO₂ monitoring with wave form capnography after any successful endotracheal intubations was 77%. Following clinical best practices, this indicator should be 100%. In some LEMSAs, it is possible that end-tidal CO₂ monitoring using wave form capnography may not have been implemented during the years in question. Future collection and analysis of this measure is necessary.

