California Emergency Department Diversion Project

Report One

A Report to the
California HealthCare Foundation

California ED Diversion Project

Prepared by The Abaris Group
March 19, 2007

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Supported by the California HealthCare Foundation, based in Oakland, California.

California ED Diversion Project

Executive Summary

The California Emergency Department (ED) Diversion Project is being conducted by The Abaris Group and funded by the California Healthcare Foundation. The project's goals are to measure and publicly report the extent of ambulance diversion resulting from ED saturation by local emergency medical service (LEMS) region and their hospitals, identify best practices to minimize diversion, and help to implement best practices in communities that have had less success in resolving their emergency medical service (EMS) diversion problems.

Ambulance diversion is a major issue in California. Statewide, hospital EDs were closed to ambulances 11.0 percent of the time during 2005. Four LEMS regions had the most diversion hours, they were diverting 22.6 percent of the time. This equates to one out of every five ambulance patients being potentially transported to an alternate hospital during 2005. EMS diversion impacts patient care resources and drives potential continuity issues as the patient's physician may not have hospital privileges at the alternate receiving hospital and that hospital probably does not have the patient's medical records. Diverting at one ED may also artificially create diversion at neighboring EDs. This was the case in a recent study, in which researchers found that the closure of a hospital or ED increases diversion for surrounding hospitals.[1] Additional ambulance unit hours and other EMS costs are realized due to longer transport times. EMS diversion also increases the overall cost of healthcare when patients cannot be transported to hospitals within their health plans.

Los Angeles, Ventura, Inland Counties, San Diego[2], San Francisco, and San Mateo EMS Regions have the highest number of diversion hours per hospital ED treatment station. While four of these regions reduced diversion hours in 2006 on their own, it is unclear if this trend will continue. These regions might benefit from additional analysis as well as new tools and resources that have been proven effective at decreasing ambulance diversion in other EMS regions.

Nine of the 31 EMS regions in California have approached the issue by removing the ability for hospitals to divert patients altogether. While this does solve the diversion problem, it may shift the burden elsewhere such as lengthening ambulance patient off-load times. Ambulance providers in two of these regions are experiencing delays in off-load times at the ED resulting in increased unit hours to maintain response times for 9-1-1 calls. Hospitals must augment nursing hours throughout the facility to meet legally-required nurse-to-patient ratios during artificial spikes in demand caused by other hospitals diverting or force the ambulance crew to stay with the patient until a nurse is available, further increasing the EMS system costs.

Other EMS regions in California have been successful in reducing diversion hours through a series of best practices. Contra Costa, Alameda, Santa Clara, and Riverside Counties have implemented effective diversion strategies. Their solutions do not eliminate diversion completely, but implement more stringent standards for when hospitals can divert patients and for how long. In conjunction, some of the hospitals within these EMS regions have developed ED and inpatient throughput strategies that dramatically improve their ability to handle overall ED visits and ambulance patients. These best practices may be applicable to the California regions experiencing high ambulance diversion rates.

[1] Sun BC, Mohants SA, Weiss R, Tadeo R, Hasbrouck M, Keonig W, Meyer C, and Asch S. "Effects of Hospital Closures and Hospital Characteristics on Emergency Department Ambulance Diversion in LA." *Annals of Emergency Medicine*. February 2006.

[2] During 2002, San Diego County implemented a "home hospital" policy where a managed care patient is transported to their payer contracted hospital irrespective of the hospital's diversion status. Thus, diversion hours may overstate the total diversion problem as each diverted ED may still receive ambulance patients.

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The Project

The California Emergency Department (ED) Diversion Project is being conducted by The Abaris Group and funded by the California Healthcare Foundation. The project's goals are to measure and publicly report the extent of ambulance diversion resulting from ED saturation by local emergency medical service (LEMS) region and their hospitals, identify best practices to minimize diversion, and help to implement best practices in communities that have had less success in resolving their EMS diversion problems.

This two-year project has four major phases:

1. Initial research and reporting
2. Identification of best practices and policies
3. Implementation of best practices
4. End of project reporting

The project has formed an advisory committee of local and state EMS agencies, ED physicians and nurses, and various hospital and hospital association representatives. Their role will be to meet periodically and provide advice and guidance to the project.

The Abaris Group has contacted each LEMS agency throughout the state to acquire data and information on the current ED diversion problems. Nine selected EMS regions and a sample of their hospitals will receive a more detailed site visit with some of these moving on to a facilitated collaborative change process during year two of the project.

Research Purpose

This report completes the first phase of the study which was to gather data from all California EMS agencies on the current extent of ED saturation and EMS diversion and on LEMS agency policies.

- Average ambulance off-load times[3] (the time it takes to off load a patient at the hospital)
- Hours at "level zero" (no 9-1-1 ambulances available)

Methodology

There are 31 EMS agencies spanning the 58 counties in California as some agencies, particularly in rural areas, represent more than one county. Each LEMS agency was contacted to determine the state of ambulance diversion for its region. Copies of the LEMS agency diversion policies were also collected and studied. To determine EMS and diversion trends, LEMS agencies provided at least three years of EMS transports and hours of diversion (2003 through 2005) as well as 2006 data to the extent they were available. If data, such as the number of 9-1-1 transports was unavailable, estimates were made using generally accepted utilization ratios based on the region's population (see Attachment 1 for methodology detail). Hospital demographic information and population data were collected from the California Office of Statewide Health Planning Department (OSHPD) and the California Department of Finance. In addition to data collected, each LEMS agency was asked about their diversion issues, needs and progress made if diversion was a problem for their region.

Scope

LEMS agencies were asked for data that is typically tracked or readily available. This included:

- Number of 9-1-1 generated EMS transports
- Number of diversion hours per hospital

[3] Note; Most LEMS agencies do not collect EMS unit off-load times so data on the total time from the EMS unit's arrival. To time back in service was used as a surrogate to off-load times.

Additional data was requested from agencies related to the impact of diversion, outcomes, and costs:

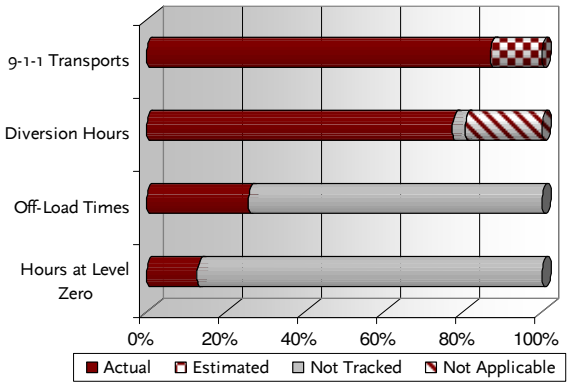
- Number and type of patients diverted
- Impact, if any, on patient outcomes due to diversion
- Cost to EMS/fire transport agencies related to diversion

The questions posed to LEMS agency staff were directed more to their opinions on the impact or lack of impact of EMS diversion for their region, what best practices had been implemented, and, if the agency had eliminated ED diversion, what impact did it have on the region, EMS providers, hospitals, and their patients.

Results

All EMS agencies participated in the project, but the data tracked by each agency varied greatly (Table 1). Most regions collect 9-1-1 transport volume (87.1 percent) and hospital diversion hours (77.4 percent). However, few

Table 1 - Data Tracked by EMS Agencies



EMS regions gather off-load times (25.8 percent) or the number of hours at level zero (12.9 percent). One positive trend is that more regions are now collecting this relevant data or requiring their transport providers to do so than in previous years (e.g., 2003) for the project. This can only improve the overall accuracy of the project in the future.

Statewide Trends

California's population grew by 3.4 percent from 2003 to 2006, increasing from 35,989,609 to 37,193,736. EMS transports in California increased 8.4 percent from 2003 to 2006. According to data provided by each EMS agency, there were 1,666,776 EMS transports in 2003, compared with 1,806,270 in 2006. At the same time, ED visits have actually decreased by about 4.7 percent, from 9,795,790 in 2003 to 9,333,578 in 2005. Total diversion hours decreased substantially during this time period. In 2003, California hospitals were on diversion for a total of 293,769 hours. By 2006, hospitals were on diversion for 193,090, a 34.3 percent decrease from 2003. The most substantial decrease happened from 2005 to 2006, when diversion decreased 29.9 percent during this one-year period.

Although the diversion problem does seem to be improving statewide, there is still variability among the regions. Eleven EMS regions reduced their ambulance diversion from 2003 to 2006. Each of these regions realized a reduction of anywhere from 5.7 percent to 72.9 percent. There were three EMS regions with zero hours of ambulance diversion in 2003 that began experiencing diversion in 2006. An

Statewide Trends, 2003-2006	
Variables	Percent Change
Population	3.3%
ED Volume*	-4.7%
EMS Transports	8.4%
Diversion Hours**	-34.2%

*Percent change 2003-2005

**Takes into account only those 21 regions for which accurate data is available all four years

additional 10 regions saw an increase in diversion hours during the 2003 to 2006 time period. The largest percentage change was a county that experienced an increase from 381 diversion hours in 2003 to 1,674 hours in 2006, an increase of 339.4 percent.

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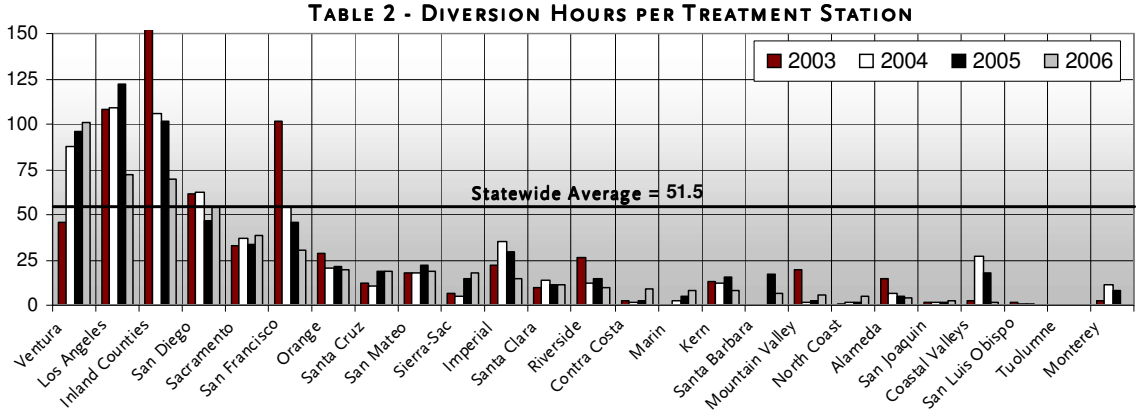
Diversion Hours

Table 2 demonstrates that diversion hours varied greatly throughout California (for complete data by region, see Attachments 2 through 5). In order to make an accurate comparison between regions, ratios were calculated to assist with the analysis. These included ED utilization per population, ED visits per ED treatment station, diversion hours per population, diversion hours per EMS transport, diversion hours per ED treatment station, and diversion hours per hospital. Ultimately, diversion hours per ED treatment station provided the best side-by-side comparison of the EMS regions controlling for ED capacity and patient volume.

Table 2 - Diversion Hours per Treatment Station

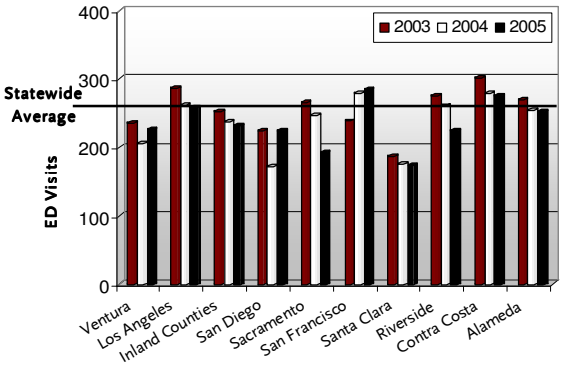


Ventura had the highest 2006 diversion hours per ED treatment station followed by the Los Angeles, Inland Counties (Inyo, Mono, and San Bernardino Counties), San Diego, Sacramento and San Francisco EMS regions. Except for Ventura and Sacramento, the rest of the high diversion regions have shown a noticeable reduction over the last four years, potentially due to implementing new procedures and best practices from other regions. More detailed analysis may be required to determine if this positive trend will continue or if additional resources will be necessary to continue the reduction in diversion hours.

Los Angeles and San Diego EMS agencies also measure the impact of diversion by tracking patients transported to an alternate hospital due to ED diversion. From 2003 to 2005, Los Angeles diverted 57,000 patients and San Diego diverted 12,000 patients to hospital other than their first choice. In contrast to the high ratio of diversion hours per ED treatment station, Santa Clara, Riverside, Contra Costa, and Alameda Counties have some of the lowest diversion hours when compared to hospital treatment stations available. There were EMS regions with lower diversion hour ratios, but they are located in rural counties where diversion is minimal or non-existent due to a lack of hospitals and do not provide a meaningful comparison.

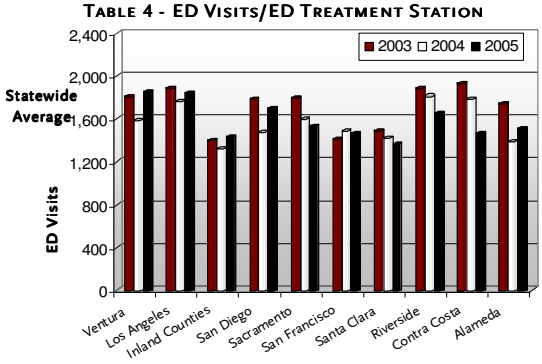
The ten regions identified above were further analyzed for possible explanations of the disparity. For example, a lack of ED treatment stations or greater than average ED utilization could explain higher diversion hours. The ED utilization per 1,000 people and number of visits per ED treatment station were calculated for each EMS region (see Tables 3 and 4).

Table 3 - ED Utilization per 1,000 population



There did not appear to be any relationship between regions with higher or lower diversion rates with these variables. The identified

Table 4 - ED Visits/ED Treatment Station



diversion hours per ED treatment station were no more likely to have above average ED utilization than low diversion regions.

EMS Agency Diversion Policies

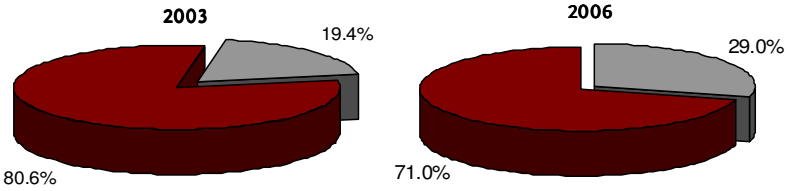
Diversion policies and procedures vary widely among California EMS regions (for a detailed comparison see Attachments 6 and 7). In general, most local EMS agency policies require hospitals to report diversion status through a radio or computer network, such as ReddiNet or EMSystems, as well as notify the local EMS agency and ambulance dispatch center(s). Most regions also require their hospitals to have an internal diversion policy and more than half of the regions must get the hospital administrator-on-duty to approve the diversion status before going on diversion. Fifteen EMS agencies (or 48.4 percent) limit the number of consecutive diversion hours allowed for each hospital and, if all hospitals in a region or subregion are on divert, 14 regions (or 45.2 percent) require all hospitals to reopen immediately. A little less than half of the regional policies include a requirement to notify other receiving facilities of the diversion and mandate that hospitals have a plan to resolve the diversion. Other components seen in a few of the diversion policies included LEMS agency system monitoring, hospital diversion as only a "recommendation", a maximum number of hours per day or month that a hospital is allowed to be on diversion, regions were also compared to the statewide averages and no parallels were evident. EMS regions with high
and requiring EMS-on-duty manager approval before permitting hospital diversion.

Comparing the diversion policies in low and high diversion EMS regions provided a few items of note. Only one of the four highest diversion hour regions notifies the ambulance dispatch center(s) or the EMS agency, a component of all best practice EMS regions. Other diversion policy components in EMS systems with minimal diversion hours include requiring the hospital to have a plan to resolve diversion, system monitoring by the EMS agency, and notifying the remaining receiving hospitals of the region's diversion status.

No Divert EMS Regions

Table 5 illustrates that over the last four years, the number of EMS regions with policies that prohibit ED diversion has risen.

Table 5 - EMS Regions with no diversion policies



By 2006, 9 EMS agencies (or 29.4 percent) implemented specific policies to prevent ambulance diversion[4]. This does not include many rural EMS regions that have very limited or no diversion due to the distance between receiving hospitals making diversion geographically impossible.

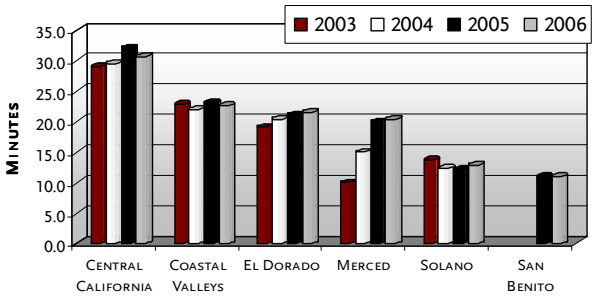
EMS Regions with No Divert Policy

- Central California
- Coastal Valleys
- Contra Costa
- El Dorado
- Merced
- Monterey
- North Coast
- San Benito
- Solano

[4] The Sierra-Sacramento EMS Agency has announced that as of April 2007 they will no longer permit EMS diversion for Placer County hospitals.

The majority of "no-divert" regions still permit hospitals to divert patients for equipment failure, such as a disabled CT scanner or an internal disaster. Over two-thirds of the no-divert regions (or 66.7 percent) are tracking off-load times to watch for delays. However, the majority of these EMS agencies believe long ambulance patient off load times has not been a problem and, except for Merced and Solano Counties, the limited data available supports this assertion (Table 6).

Table 6 - Average Off-Load Times for Regions with No Divert Policy



In Merced County, the average time it takes to off-load a patient to the ED has doubled within the last two years. The Merced County EMS Agency director estimates that the local ambulance provider has had to add three to four ambulance unit hours per week to offset the impact of longer patient off-load times. Solano County tracks off-load times that exceed 30 minutes, which are increasing and now represent 10.0 percent of all transports.

The "no-divert" regions believe that the no-divert policy allows patients to be transported to their hospital of choice and eliminates the adversarial relationship between neighboring hospitals. However, hospitals located in EMS regions that have a no-divert policy find themselves in a difficult situation. On one hand, they are required to accept all ambulance patients and, on the other hand, California nurse staffing ratios require only a specific number of patients per registered nurse. Ultimately, these opposing standards could delay ED treatment to the patients.

Data Notes

While all EMS regions participated in the data and policy analysis, not all data was available from each individual LEMS agency and other sources were used as needed to provide as accurate a depiction as possible. Some regions track information differently requiring the data to be adjusted as needed to allow regional comparability. These assumptions and estimations are provided below.

9-1-1 Transports

For regions that were unable to provide what they felt were accurate transport numbers, two methods were used to estimate their volume. When no information was available, The Abaris Group used an EMS transport utilization rate of 46.5 transports annually per 1,000 population which is the statewide average. This average was derived through the data collected from the rest of the California EMS regions. If one or more years were tracked by the agency, a transport growth rate was estimated based on the growth for that region's population. One county measures 9-1-1 responses instead of transports. Thus, an average of 31.1 non-transports per 100 responses was used to estimate 9-1-1 generated EMS transports[5].

Hospital Diversion Hours

For the purposes of this project, hospital diversion status was calculated using ED saturation or internal disaster hours only. This may understate the total diversion problem in some regions that allow for stratified diverts, (e.g., ICU/CCU divert, CT divert, neuro divert, etc.). If the EMS region did not track hospital diversion hours, the data reported to OSHPD was used as a substitute. However, the OSHPD annual questionnaire does not break down the types of diversion and this estimate could overstate diversion hours. For example, OSHPD diversion hours and EMS agency diversion hours differed by as much as 150 percent. Therefore, using OSHPD diversion data for all regions was not an acceptable option.

To determine the statewide diversion impact for 2005, the average diversion hours per hospital, 939, was divided by 8,760, the total hours of ED operation per year, for a result of 11 percent. The same method was utilized to calculate the impact within the four regions with the highest diversion hours per treatment station. Hospitals in these regions were on divert an average of 22 percent of the time. Regions with no-divert policies were excluded from the statewide average.

[5] Williams, David M. "2006 JEMS 200-City Survey." *JEMS*. February 2007.

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Attachment 2: EMS Diversion by Region – 2006

EMS Region	Population (per CA DFA)	ED Volume (per OSHPD)	Hospitals (OSHPD)	ED Treatment Stations (OSHPD)	EMS Transports (per EMS Agency)	Diversion Hours (per OSHPD)	Diversion Hours (per EMS Agency)	ED Utilization/ 1,000 Population	ED Visits/ ED Treatment Station	Diversion Hours/ 1,000 Population	Diversion Hours/ EMS Transport	Diversion Hours/ Hospital	Diversion Hours/ ED Treatment Station
Ventura	817,346	OSHPD Data Not Available	8	107	31,872	OSHPD Data Not Available	10,836	Not Available	Not Available	13.26	0.34	1,355	101
Los Angeles[1]	10,245,572		74	1,429	459,065		102,609			10.01	0.22	1,387	72
Inland Counties	2,023,941		19	322	103,566		22,318			11.03	0.22	1,175	69
San Diego[3]	3,066,820		18	402	142,791		21,771			7.10	0.15	1,210	54
Sacramento[1]	1,385,607		9	171	70,428		6,644			4.80	0.09	738	39
San Francisco	798,680		9	154	55,777		4,725			5.92	0.08	525	31
Orange[1]	3,072,336		26	491	53,371		9,821			3.20	0.18	378	20
Santa Cruz	262,351		2	36	10,588		686			2.61	0.06	343	19
San Mateo	724,104		8	112	26,703		2,079			2.87	0.08	260	19
Sierra-Sacramento	768,195		8	100	47,708		1,825			2.38	0.04	228	18
Imperial	166,585		2	36	10,670		518			3.11	0.05	259	14
Santa Clara	1,773,258		10	224	54,246		2,546			1.44	0.05	255	11
Riverside	2,004,608		14	263	114,946		2,573			1.28	0.02	184	10
Contra Costa	1,029,377		8	192	59,517		1,674			1.63	0.03	209	9
Marin[2]	235,341		3	45	13,093		126			0.54	0.01	42	3
Kern	779,689		10	124	39,863		1,020			1.31	0.03	102	8
Santa Barbara	421,625		5	59	26,294		402			0.95	0.02	80	7
Mountain Valley	617,671		7	110	77,688		622			1.01	0.01	89	6
Northern California	640,791		18	129	42,500		593			0.93	0.01	33	5
Alameda[1]	1,501,303		13	251	83,882		1,073			0.71	0.01	83	4
San Joaquin	666,265		7	74	48,120		196			0.29	0.00	28	3
Coastal Valleys	704,818		13	149	36,694		238			0.34	0.01	18	2
San Luis Obispo[1]	263,242		4	46	13,843		18			0.07	0.00	5	0
Tuolumne	58,231		2	20	4,765		1			0.02	0.00	1	0
Central California	1,612,258		17	310	83,927		n/a			n/a	n/a	n/a	n/a
El Dorado	176,204		2	27	8,991		n/a			n/a	n/a	n/a	n/a
Merced	246,751		2	26	13,026		n/a			n/a	n/a	n/a	n/a
Monterey[1]	424,842		4	54	19,755		n/a			n/a	n/a	n/a	n/a
North Coast	225,827		7	55	19,048		n/a			n/a	n/a	n/a	n/a
San Benito	57,627		1	6	2,049		n/a			n/a	n/a	n/a	n/a
Solano	422,848		4	71	21,774		n/a			n/a	n/a	n/a	n/a
Total/Average	**37,194,113**		**334**	**5,595**	**1,796,560**		**194,914**			**5.24**	**0.11**	**584**	**35**

[1] EMS Transports estimated based on typical 9-1-1 utilization by population

Source: CA Office of Statewide Health Planning, CA DFA, interviews with each EMS agency

[2] Diversion hours include all types (e.g. ED Sat, CT Failure, Neuro, Trauma)

[3] During 2002, San Diego County implemented a "home hospital" policy where a managed care patient is transported to their payer contracted hospital irrespective of the hospital's diversion status. Thus, diversion hours may overstate the total diversion problem as each diverted ED may still receive ambulance patients.

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Attachment 3: EMS Diversion by Region – 2005

EMS Region	Population (per CA DFA)	ED Volume (per OSHPD)	Hospitals (OSHPD)	ED Treatment Stations (OSHPD)	EMS Transports (per EMS Agency)	Diversion Hours (per OSHPD)	Diversion Hours (per EMS Agency)	ED Utilization/ 1,000 Population	ED Visits/ ED Treatment Station	Diversion Hours/ 1,000 Population	Diversion Hours/ EMS Transport	Diversion Hours/ Hospital	Diversion Hours/ ED Treatment Station
Los Angeles	10,166,417	2,630,065	74	1,429	459,065	157,620	174,952	259	1,840	17.21	0.38	2,364	122
Inland Counties	1,982,923	461,120	19	322	101,121	24,723	32,661	233	1,432	16.47	0.32	1,719	101
Ventura	810,763	183,428	7	99	29,442	11,376	9,521	226	1,853	11.74	0.32	1,360	96
San Diego[4]	3,039,277	680,857	18	402	138,598	11,648	18,841	224	1,694	6.20	0.14	1,047	47
San Francisco	792,952	225,179	9	154	53,084	6,670	7,106	284	1,462	8.96	0.13	790	46
Sacramento	1,366,937	262,094	9	171	69,068	5,371	5,811	192	1,533	4.25	0.08	646	34
Imperial	161,621	79,141	2	36	10,670	1,975	1,073	490	2,198	6.64	0.10	537	30
San Mateo	719,655	182,278	8	112	26,009	2,287	2,458	253	1,627	3.42	0.09	307	22
Orange	3,047,054	724,435	26	491	53,426	10,369	10,608	238	1,475	3.48	0.20	408	22
Santa Cruz	260,339	64,800	2	36	10,149	1,726	689	249	1,800	2.65	0.07	345	19
Coastal Valleys	700,962	201,612	13	149	37,118	2,088	2,747	288	1,353	3.92	0.07	211	18
Santa Barbara	417,988	128,041	5	59	19,905	8	1,004	306	2,170	2.40	0.05	201	17
Kern	757,882	211,731	10	124	35,830	543	1,905	279	1,708	2.51	0.05	190	15
Sierra-Sacramento	752,080	186,680	8	100	49,989	1,338	1,516	248	1,867	2.02	0.03	190	15
Riverside	1,924,881	433,062	14	263	110,898	1,072	3,847	225	1,647	2.00	0.03	275	15
Santa Clara	1,752,653	305,690	10	224	57,293	1,723	2,638	174	1,365	1.51	0.05	264	12
Monterey[1,2]	423,754	118,579	4	54	19,705	428	n/t	280	2,196	1.01	0.02	107	8
Alameda	1,500,228	378,447	13	251	82,141	524	1,319	252	1,508	0.88	0.02	101	5
Marin	251,820	72,178	3	45	12,734	167	204	287	1,604	0.81	0.02	68	5
Contra Costa	1,019,101	280,237	8	192	54,568	388	506	275	1,460	0.50	0.01	63	3
Mountain Valley	607,604	208,187	7	110	73,944	422	253	343	1,893	0.42	0.00	36	2
San Joaquin[1]	655,319	134,166	7	74	44,752	131	n/t	205	1,813	0.20	0.00	19	2
Northern California[2,3]	634,913	220,454	18	129	42,075	9,054	196	347	1,709	0.31	0.00	11	2
San Luis Obispo	261,310	90,411	4	46	14,857	186	48	346	1,965	0.18	0.00	12	1
Tuolumne	57,639	31,740	2	20	4,232	0	4	551	1,587	0.07	0.00	2	0
Central California	1,581,208	508,297		310	79,107	115	n/a	321	1,640	n/a	n/a	n/a	n/a
El Dorado	173,511	45,039		27	8,850	0	n/a	260	1,668	n/a	n/a	n/a	n/a
Merced	241,464	48,539		26	12,662	0	n/a	201	1,867	n/a	n/a	n/a	n/a
North Coast	224,854	113,428	7	55	18,750	0	n/a	504	2,062	n/a	n/a	n/a	n/a
San Benito	57,350	14,592		6	1,865	0	n/a	254	2,432	n/a	n/a	n/a	n/a
Solano	420,307	109,071		71	17,251	0	n/a	260	1,536	n/a	n/a	n/a	n/a
Total/Average	**36,764,766**	**9,333,578**	**307**	**5,587**	**1,749,158**	**251,952**	**279,907**	**254**	**1,671**	**7.61**	**0.16**	**912**	**50**

[1] Diversion Hours estimated by OSHPD Data

[2] EMS Transports estimated based on typical 9-1-1 utilization by population

[3] Diversion Hours estimated from 2003-2004 diversion hours

[4]During 2002, San Diego County implemented a "home hospital" policy where a managed care patient is transported to their payer contracted hospital irrespective of the hospital's diversion status. Thus, diversion hours may overstate the total diversion problem as each diverted ED may still receive ambulance patients.

Source: CA Office of Statewide Health Planning, CA DFA, interviews with each EMS agency

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Attachment 4: EMS Diversion by Region – 2004

EMS Region	Population (per CA DFA)	ED Volume (per OSHPD)	Hospitals (OSHPD)	ED Treatment Stations (OSHPD)	EMS Transports (per EMS Agency)	Diversion Hours (per OSHPD)	Diversion Hours (per EMS Agency)	ED Utilization/ 1,000 Population	ED Visits/ ED Treatment Station	Diversion Hours/ 1,000 Population	Diversion Hours/ EMS Transport	Diversion Hours/ Hospital	Diversion Hours/ ED Treatment Station
Los Angeles	10,130,668	2,658,919	80	1,512	419,644	144,272	165,026	262	1,759	16.29	0.39	2,063	109
Inland Counties	1,958,696	466,912	20	352	97,944	26,269	37,114	238	1,326	18.95	0.38	1,856	105
Ventura	808,425	166,371	8	105	28,417	13,265	9,257	206	1,584	11.45	0.33	1,157	88
San Diego[3]	3,027,703	520,859	16	352	133,902	16,686	22,063	172	1,480	7.29	0.16	1,379	63
San Francisco	791,797	220,235	9	148	48,103	6,604	8,015	278	1,488	10.12	0.17	891	54
Sacramento	1,357,300	335,871	9	211	65,704	7,576	7,785	247	1,592	5.74	0.12	865	37
Imperial	159,332	68,880	2	36	10,455	2,083	1,276	432	1,913	8.01	0.12	638	35
Coastal Valleys	699,489	163,171	11	110	34,927	798	2,990	233	1,483	4.27	0.09	272	27
Orange	3,036,002	747,031	28	530	52,301	11,482	10,767	246	1,409	3.55	0.21	385	20
San Mateo	717,710	176,967	8	120	22,949	2,030	2,160	247	1,475	3.01	0.09	270	18
Santa Clara	1,743,585	306,481	11	216	54,246	2,397	3,077	176	1,419	1.76	0.06	280	14
Kern	746,351	171,670	9	110	34,124	519	1,368	230	1,561	1.83	0.04	152	12
Riverside	1,845,524	481,754	15	266	112,796	1,586	3,216	261	1,811	1.74	0.03	214	12
Monterey[1,2]	424,047	119,248	4	54	19,641	603	n/t	281	2,208	1.42	0.03	151	11
Santa Cruz	259,542	81,404	2	36	10,325	892	371	314	2,261	1.43	0.04	186	10
Alameda	1,497,251	381,701	13	275	75,424	1,505	1,764	255	1,388	1.18	0.02	136	6
Sierra-Sacramento	742,970	211,243	8	125	45,597	615	623	284	1,690	0.84	0.01	78	5
Marin[1]	251,154	68,947	3	45	10,733	98	n/t	275	1,532	0.39	0.01	33	2
Mountain Valley	601,555	213,635	7	123	70,200	246	207	355	1,737	0.34	0.00	30	2
Northern California[2]	631,456	235,292	20	153	41,654	926	251	373	1,538	0.40	n/a	13	2
Contra Costa	1,013,280	283,104	8	159	49,314	253	257	279	1,781	0.25	0.01	32	2
San Joaquin[1]	646,971	179,606	7	102	41,619	134	n/t	278	1,761	0.21	0.00	19	1
San Luis Obispo	260,267	89,707	4	46	14,512	44	48	345	1,950	0.18	0.00	12	1
Santa Barbara[1]	416,777	78,900	4	47	19,181	3	n/t	189	1,679	0.01	0.00	1	0
Tuolumne	57,114	30,946	2	20	4,412	0	0	542	1,547	0.00	0.00	0	0
Central California	1,565,272	394,962	13	245	72,501	157	n/a	252	1,612	n/a	n/a	n/a	n/a
El Dorado	171,745	45,300	2	27	8,769	0	n/a	264	1,678	n/a	n/a	n/a	n/a
Merced	238,455	46,357	2	26	11,558	0	n/a	194	1,783	n/a	n/a	n/a	n/a
North Coast[1]	224,470	100,356	7	55	19,481	0	n/a	447	1,825	n/a	n/a	n/a	n/a
San Benito	57,246	14,046	1	6	1,853	0	n/a	245	2,341	n/a	n/a	n/a	n/a
Solano	419,270	104,984	4	61	16,162	0	n/a	250	1,721	n/a	n/a	n/a	n/a
Total/Average	**36,501,424**	**9,164,859**	**337**	**5,673**	**1,648,448**	**241,043**	**277,635**	**251**	**1,616**	**7.61**	**0.17**	**824**	**49**

[1] Diversion Hours estimated by OSHPD Data

Source: CA Office of Statewide Health Planning, CA DFA, interviews with each EMS agency

[2] EMS Transports estimated based on typical 9-1-1 utilization by population

[3]During 2002, San Diego County implemented a "home hospital" policy where a managed care patient is transported to their payer contracted hospital irrespective of the hospital's diversion status. Thus, diversion hours may overstate the total diversion problem as each diverted ED may still receive ambulance patients.

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California ED Diversion Project

Attachment 5: EMS Diversion by Region – 2003

EMS Region	Population (per CA DFA)	ED Volume (per OSHPD)	Hospitals (OSHPD)	ED Treatment Stations (OSHPD)	EMS Transports (per EMS Agency)	Diversion Hours (per OSHPD)	Diversion Hours (per EMS Agency)	ED Utilization/ 1,000 Population	ED Visits/ ED Treatment Station	Diversion Hours/ 1,000 Population	Diversion Hours/ EMS Transport	Diversion Hours/ Hospital	Diversion Hours/ ED Treatment Station
Inland Counties	1,902,148	479,368	19	342	94,767	36,314	52,387	252	1,402	27.54	0.55	2,757	153
Los Angeles	10,047,407	2,887,922	84	1,535	438,010	143,900	166,159	287	1,881	16.54	0.38	1,978	108
San Francisco	791,977	188,894	8	134	46,152	6,852	13,582	239	1,410	17.15	0.29	1,698	101
San Diego	2,995,551	670,814	18	375	131,762	16,891	23,084	224	1,789	7.71	0.18	1,282	62
Ventura[1]	799,689	189,146	8	105	27,894	4,819	n/t	237	1,801	6.03	0.17	602	46
Sacramento	1,332,907	352,973	9	197	66,348	6,374	6,380	265	1,792	4.79	0.10	709	32
Orange	3,004,371	749,543	27	504	51,902	14,011	14,561	249	1,487	4.85	0.28	539	29
Riverside	1,766,831	486,344	15	258	110,735	3,231	6,712	275	1,885	3.80	0.06	447	26
Imperial	154,747	67,296	2	36	9,555	1,754	806	435	1,869	5.21	0.08	403	22
Mountain Valley	589,670	219,477	7	117	66,456	1,115	2,295	372	1,876	3.89	0.03	328	20
San Mateo	717,492	187,162	8	107	22,468	1,244	1,948	261	1,749	2.72	0.09	244	18
Alameda	1,493,534	403,396	12	232	78,660	1,251	3,496	270	1,739	2.34	0.04	291	15
Kern	720,888	180,474	10	114	32,758	2,258	1,532	250	1,583	2.13	0.05	153	13
Santa Cruz	258,505	65,024	2	39	10,133	1,044	479	252	1,667	1.85	0.05	240	12
Santa Clara	1,732,262	323,002	11	217	55,930	1,849	2,084	186	1,488	1.20	0.04	189	10
Sierra-Sacramento	720,782	221,889	8	124	41,773	639	766	308	1,789	1.06	0.02	96	6
Contra Costa	1,002,816	302,636	8	157	48,958	369	381	302	1,928	0.38	0.01	48	2
Coastal Valleys[1]	693,396	168,441	11	100	32,439	229	n/t	243	1,684	0.33	0.01	21	2
Monterey[1,2]	421,270	126,745	4	54	19,448	119	n/t	301	2,347	0.28	0.01	30	2
San Joaquin[1]	626,784	153,722	6	83	38,706	153	153	245	1,852	0.24	0.00	26	2
San Luis Obispo[1]	256,598	89,185	4	44	14,258	56	57	348	2,027	0.22	0.00	14	1
Northern California[2]	619,641	268,481	21	160	41,238	459	141	433	1,678	0.23	0.00	7	1
Marin[1]	251,142	67,134	3	45	11,868	0	n/t	267	1,492	0.00	0.00	0	0
Santa Barbara[1]	413,756	137,950	5	63	16,820	0	0	333	2,190	0.00	0.00	0	0
Tuolumne	56,838	31,800	2	13	4,085	0	0	559	2,446	0.00	0.00	0	0
Central California	1,526,228	455,605	16	249	70,253	1,542	n/a	299	1,830	n/a	n/a	n/a	n/a
El Dorado	168,798	47,725	2	27	8,637	0	n/a	283	1,768	n/a	n/a	n/a	n/a
Merced	231,080	49,926	3	40	8,665	540	n/a	216	1,248	n/a	n/a	n/a	n/a
North Coast[1]	220,233	97,439	7	55	18,913	0	n/a	442	1,772	n/a	n/a	n/a	n/a
San Benito[2]	56,863	15,621	1	6	1,840	0	n/a	275	2,604	n/a	n/a	n/a	n/a
Solano[1]	415,405	110,656	4	58	15,980	0	n/a	266	1,908	n/a	n/a	n/a	n/a
Total/Average	**35,989,609**	**9,795,790**	**345**	**5,590**	**1,637,411**	**247,013**	**297,003**	**272**	**1,752**	**8.25**	**0.18**	**861**	**53**

[1] Diversion Hours estimated by OSHPD Data

[2] EMS Transports estimated based on typical 9-1-1 utilization by population

Source: CA Office of Statewide Health Planning, CA DFA, interviews with each EMS agency

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California ED Diversion Project

Attachment 6: Regional Comparison of EMS Agency Diversion Policies

The following table summarizes the diversion policy for each EMS Region. Some regions have since gone to a policy of "no diversion," however these were the policies in place during the time period corresponding with the collected data.

	Diversion Requirements	Alameda	Central California*	Coastal Valleys*	Contra Costa*	Imperial	Inland Counties	Kern	Los Angeles	Marin	Mountain Valley	Northern California	Orange	Riverside	Sacramento	San Diego	San Francisco	San Joaquin	San Luis Obispo	San Mateo	Santa Barbara	Santa Clara	Santa Cruz	Sierra-Sacramento [7]	Tuolumne	Ventura
1	"No diversion" policy		X	X																						
2	System-wide divert policy.	X	X	X[1]	X	X	X	X	X	X	X[1]	X	X	X	X	X	X	X	X	X	X	X	X	X[7]		X
3	Hospital is required to have an internal diversion policy.	X	X		X		X		X	X		X		X	X		X	X	X	X	X	X	X	X	X	X
4	Hospital's internal diversion policy is approved by the EMS Agency.				X		X			X								X				X				X
5	Diversion requires approval from hospital administrator or designee.	X		X	X	X	X		X	X		X	X	X	X			X			X	X		X	X	X
6	Hospital is required to have a plan to resolve diversion.	X			X				X	X		X			X		X	X		X	X	X		X		
7	Each diversion requires the approval of the EMS Agency.				X			X	X																	
8	Policy allows for the EMS Agency to conduct unannounced site visits.						X	X	X			X	X	X		X	X	X			X	X				X
9	General principle: "if all are closed, all are open"					X	X			X	X	X	X	X		X	X	X		X			X		X	X
10	General principle: "round robin" when all hospitals are on diversion							X																		
11	General principle: "if more than three hospitals are on diversion, all are open for 60 minutes" (example only)																X					X				
12	General principle: hospitals are grouped geographically to respond to diversion													X								X				
13	General principle: hospital "service area" is recognized															X										X
14	Diversion is generally considered a "request".	X			X		X	X	X				X			X		X				X				
15	Diversion is reported via phone/fax	X						X		X	X										X					
16	Diversion status reported by computer/ReddiNet/radio	X	X	X	X		X	X	X	X	X[2]	X[2]	X	X	X	X	X	X[2]	X	X[2]	X	X[2]	X[2]	X	X	X
17	Diversion is documented via forms/logs	X			X	X		X	X	X		X	X		X		X	X	X	X	X			X		
18	System monitoring conducted by EMS Agency	X	X					X		X	X	X	X	X			X	X		X	X	X			X	
19	Routine diversion poll conducted every hour										X															
20	Routine diversion poll conducted every 2 hours							X											X							
21	Routine diversion poll conducted every 4 hours																									
22	Routine diversion poll conducted every 8 hours											X														
23	Once on diversion, mandatory updates required every 2 hours	X								X	X												X			
24	Once on diversion, mandatory updates required every 4 hours																				X					
25	Once on diversion, mandatory updates required every 6 hours		X																							
26	Once on diversion, bed inventory conducted to reassess diversion		X														X									
27	Maximum allowable hours of diversion per day	X												X				X		X						

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Attachment 6: Regional Comparison of EMS Agency Diversion Policies, Cont.

	Diversion Requirements	Alameda	Central California*	Coastal Valleys*	Contra Costa*	Imperial	Inland Counties	Kern	Los Angeles	Marin	Mountain Valley	Northern California	Orange	Riverside	Sacramento	San Diego	San Francisco	San Joaquin	San Luis Obispo	San Mateo	Santa Barbara	Santa Clara	Santa Cruz	Sierra-Sacramento [7]	Tuolumne	Ventura
28	Maximum allowable hours of diversion per month										X									X		X		X		
29	Maximum allowable hours per diversion event			X	X		X		X		X	X	X	X	X			X	X	X		X		X		
30	Maximum hospitals allowed to be on diversion				X			X		X								X	X		X	X				
31	EMS Agency is notified of each diversion	X	X	X	X			X	X	X	X	X	X	X			X	X	X		X			X	X	
32	Control facility is notified of each diversion (dispatch)							X			X						X	X				X				
33	Central dispatch/fire departments/ambulance provider is notified of each diversion	X	X	X	X	X		X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	
34	Base hospital is notified of each diversion		X[3]	X		X		X	X				X		X	X	X	X			X	X				
35	Receiving hospitals are notified of each diversion	X		X	X			X		X		X	X	X	X		X	X	X			X	X		X	
36	Diversion applicable to BLS							X		X						X	X									X
37	Diversion applicable to ALS	X						X	X	X			X	X			X			X		X[4]				X
38	Diversion applicable to CCT							X		X																
39	Diversion applicable to "direct admits"									X																
	DIVERSION CATEGORIES																									
40	General	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
41	Case-by-case		X																				X			
42	ED saturation	X				X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
43	Internal disaster/physical plant casualty	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X		X
44	Trauma	X	X[5]	X		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X				
45	CT scan	X	X		X	X	X		X	X	X		X	X	X	X		X	X		X	X		X		X
46	Neurosurgery									X			X	X	X	X						X		X		X
47	ICU/no critical care beds/critical patient overload	X									X										X		X[6]			X
48	No diversion of specific patients (i.e., extremis, specialty care)	X				X	X	X		X		X	X	X	X	X	X		X	X	X	X	X			X
49	Diversion applicable to work action/staffing problems																									
50	Maximum transport times are identified when patients are diverted								X							X										
51	Maximum transport times for diverted trauma patients (minutes)						30		30					45												

Footnotes
* Region recently stopped diversion
1 For trauma only
2 Use EMSystem
3 For case-by-case diversion
4 Optional
5 Requires approval
6 Happens when there is not enough space within the hospital to admit patients
7 Going to "no divert" policy 6/1/07

Diversion not permitted in:
Coastal Valleys (effective 4/06)
Contra Costa (effective 12/06)
Central California (effective 1/03)
El Dorado (two hospitals in region)
Merced (effective 2003)
Monterey (effective 11/05)
North Coast (effective 2003)
San Benito (one hospital in region)
Solano (effective 2001)

EMS regions with minimal diversion
EMS regions with improving levels of diversion
EMS regions with high levels of diversion

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