



The third question was “What ‘vision’ do you see for the EMS system?”

- Public awareness is missing. How do we educate the public? Is it EMS’s responsibility? It is a tough call.
- There is a need for a two-track system – one for mental health and another for medical patients.
- It is important to have a single, countywide standard for EMD throughout the County and to regionalize dispatch facilities.
- Mutual aid for EMS needs improvement. Fire mutual aid is great and the same is needed for EMS.
- One cannot only look at EMS discreetly because it is broken. Improved stakeholder education is needed. One must include elder services, social/mental health organizations in the broad level of care, since EMS is the default healthcare provider.
- Access to mental healthcare was described as “bad.”

Round Two Meetings

The Abaris Group conducted a second series of stakeholder meetings throughout Riverside County in order to give stakeholders a first-hand look at the evaluation’s initial data and to obtain interim evaluation input. The stakeholder meetings were held in July of 2013 in Riverside, Temecula, Palm Desert and Banning. There were a total of 115 stakeholders who attended this second round of meetings. Several Steering Committee members were in attendance at the different locations.

Each stakeholder meeting had a specific written agenda where attendees were introduced to the EMS evaluation taking place in Riverside County. The Abaris Group then gave an overview of the evaluation’s progress before going into the details and findings of the project. The overview included evaluation progress, data on demand and forecasts, capacity measures, current and predicted payer mix, observations and topic areas, and EOA options and comparisons. The presentation was immediately followed by a group discussion, which was stimulated by questions from The Abaris Group. Stakeholders had the opportunity to voice their opinions and ask questions on issues regarding the EMS system and the evaluation. During the second round of stakeholder meetings, attendees brought up many issues and questions.

After a group discussion, the next steps of the evaluation were presented and discussed by REMSA. It was noted that, at the conclusion of the project, the Board of Supervisors will determine options for the EMS delivery system and ambulance zoning. The Board is expected to make this determination by June 2014.

Other Stakeholder Input

Riverside County Fire Chief’s & EMS Officer’s Position Paper

In a May 13, 2013 EMS position paper for this evaluation, the Riverside County Fire Chiefs’ Association affirmed its support for fire-based pre-hospital EMS as a primary mission objective delivered by the fire departments of Riverside County.



Key topics discussed in their position paper included the need for:

- EMS medical director
- EMS communications and interfaces
- Regionalized medical control and direction
- Pre-hospital system improvement fee structure
- Designing an outcome/performance-based system
- EOA realignment and reevaluation
- Performance standards for the hospitals
- Use of basic life support (BLS) ambulance resources
- Local EMS agency (LEMSA) structure and funding

The County Fire Chiefs and EMS Officers indicated that they support this EMS evaluation and await the evaluation's outcome and look forward to being actively involved in the final design of EMS response and transport in Riverside County.

American Medical Response Input – July 2013

AMR indicated, through their submitted input document, they would prefer not soliciting outside bids but to use the Phase II portion of the project as a vehicle to negotiate system changes and upgrades as are warranted as identified in this evaluation.

Specifically, AMR recommends a process that would address desired system enhancements without introducing the uncertainty and expense of the RFP process. AMR believes that to “utilize the excellent work that was done through the third party EMS consultant” would assure that the current system is meeting or exceeding contractual requirements. Using this system evaluation as the framework, the County would be assured of a reliable and proven provider and can then focus on the system changes that will provide Riverside County with the enhancements that best meet the needs of all stakeholders. This collaborative process will allow for the inclusion of evidence-based enhancements while maintaining good fiscal policy by exercising cost-benefit discussions including the stakeholders that typically cannot be done through a traditional RFP process.

The amended contract would include annual system reviews to ensure that Riverside County meets its obligation under good public governance to assure that the provider of services is doing a good job and is meeting or exceeding expectations. For each year that the provider demonstrates compliance, it would be granted an additional year of services under the contract. In this manner, the contractor earns the right to the marketplace on an annual basis increasing the level of scrutiny.



Other Relevant Pending Policy

Assembly Bill 678 – Enhanced Public Ambulance Medi-Cal Payment Synopsis

In October 2011, the Governor of California signed Assembly Bill 678 (AB 678).² This legislation enables public agencies that provide ground emergency medical transportation services to receive supplemental payments for Medi-Cal patients transported. Public agencies include those “owned or operated” by the state, counties, cities, fire departments, and some districts. Because the bill states “own or operate,” there is a potential opportunity for any public agency that has a direct cost related to 9-1-1 ambulance service, such as purchasing ambulance transports from a private contractor, to take advantage of the supplemental reimbursement. The objective is to increase the payment relative to the actual cost of providing the service. Supplemental payments will not be available where the Centers for Medicare & Medicaid Services (CMS) has contracted with local or county entities to offer Medi-Cal HMO plans.

The California Department of Health Care Services (DHCS) has been working on the actual implementation details and submitted a final payment methodology plan to CMS on July 1, 2013. CMS has up to 90 days to approve or deny it; however, DHCS shared draft plans with CMS and refined the final version to expedite the process.

Once approved, eligible public agencies will receive supplemental reimbursement based on the average transport cost less any Medi-Cal payments, copayments, or related grant funding; this is defined as the uncompensated cost. Fifty percent of that amount will be paid by DHCS through CMS funding to remain revenue neutral to the State of California General Fund. The average transport cost is different for every provider and a beta committee of public agencies was formed to test different approaches to determine a cost report. This committee

attempted to include first responder EMS costs, although this was rejected by CMS and is not part of the final plan. The final cost reporting formula will not be shared publicly until CMS approves the plan. However, the cost report will require the use of audited financial data.

Supplemental Reimbursement Formula
Average transport cost times number of Medi-Cal transports
<i>Less: Medi-Cal payments</i>
<i>Medi-Cal copayments</i>
<u><i>Related grant funding</i></u>
Uncompensated cost

The financial benefit to public agencies is directly related to the Medi-Cal transports provided. DHCS has estimated the amount of supplemental reimbursement this will offer at \$160 million for fiscal year 2013/14 (covers retroactive payments to 2010, approximately \$39.1 million annualized). These estimates will change based on cost report data that will be requested after CMS approves the plan. This program is retroactive to January 30, 2010 and there will be an initial influx of revenue. New 9-1-1 ambulance public agency providers would be eligible for the supplemental reimbursement based on the AB 678 language.

² http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0651-0700/ab_678_bill_20111002_chaptered.pdf



AB 678 Details

- Approved October 2011, retroactive to 1/30/2010
- For the period being claimed, an eligible provider must be
- A provider of ground emergency medical transportation services
- Enrolled as a Medi-Cal provider
- Owned or operated by the state, a city, county, city and county, fire protection district, special district, community services district, healthcare district, or a federally recognized Indian tribe
- Supplemental reimbursement equals the federal financial participation based on the payment methodology approved by CMS, but cannot exceed 100 percent of the actual costs
- Revenue neutral to the California State General Fund
- Has the potential to affect cost reimbursement to three fire ambulance providers in Riverside County (Idyllwild Fire Protection District, Riverside County Fire Department and Cathedral City Fire Department)



Healthcare and the Emergency Medical Services Environment

Healthcare is undergoing unprecedented changes and will continue to undergo these changes for the next ten years with a particular emphasis on the next three to five years. The healthcare paradigm is changing and, while the population is aging, most care is expected to be provided in outpatient settings. Those patients who are admitted to the hospital will be of higher acuity. This shift has driven the growth of specialty hospital centers. Hospital admissions have already begun to drop in the state and the country and increasingly in the future, hospital admissions will likely be sicker patients who cannot be cared for in outpatient settings.

Health Reform, the Patient Protection and Affordable Care Act (PPACA or ACA, referred to as “Health Reform” in this report) as well as other anticipated healthcare changes offer an unprecedented opportunity to *rethink, revitalize and reform* Riverside County’s EMS delivery system.^{3,4} The healthcare delivery system of the future will emphasize accountability and value over the current paradigm, which is primarily based on payments for services delivered. Many of these concepts are being applied to EMS services, are being tested, and validated throughout the nation.

These factors and others plus a stronger role for technology will lead to fewer but higher-acuity hospital admissions. Hospitals and their physician providers are under increased pressure to lower unnecessary utilization and are now under payment incentives to reduce unnecessary and expensive services. Value and outcomes-based payment models that are not merely paying for the delivery of services but looking for the “value” of these services have not included EMS delivery services to date.

To absorb the expected influx of up to 250,000 newly insured Riverside County residents anticipated under Health Reform beginning in 2014, the community must address the reality that EMS delivery services will be increasingly vulnerable to economic and other forces. In addition, they will be too expensive and likely inadequate to meet the changing needs of a “value-driven” delivery system for the future of Riverside County.⁵

Provisions of Health Reform have already begun (e.g., health coverage expansion for populations such as young adults, reduction of lifetime insurance payment benefit caps, eliminating pre-existing conditions exclusions, and expanded payment for wellness services) and will significantly expand over the next three to five years. Foremost, is the increase in coverage that is expected to drive down the rates of uninsured patients. In states like California, where current rates are high, this may drop to perhaps as few as five percent of the population by 2019. This will result in an increase in the number of insured either through a health exchange or Medi-Cal product. While this will have a profound impact on the number of insured, the method to pay for this coverage will largely come from approximately \$780

⁴ <http://www.ihi.org/explore/TripleAim/Pages/default.aspx>

⁵ Insure the Uninsured Project Analysis, 2012



billion in proposed Medicare payment reductions mostly through reductions in unnecessary services and a push to outpatient and home-health services. In California alone, these reductions are estimated to be \$60 billion with the impact in Riverside County estimated at approximately \$2.6 billion.⁶

There are many unknowns in Health Reform and their impact on the EMS and emergency care industry. These unknowns include how many newly insured eligible will not seek health coverage and thus accept modest penalties. For those newly insured that obtain coverage, how many will purchase very high deductible plans and thus limit their coverage for first-line services such as emergency care.

Key to these Medicare reductions is the elimination of waste. The Institute of Medicine recently estimated waste at 30 percent of healthcare spending in 2009 or \$750 billion.⁷ Medicare has largely ignored EMS systems with these latest rounds of cost cutting and incentive/disincentive payments, but this is likely to change in the future. The need to have EMS inclusion in the early development of the value-driven payment models of the future is a key factor for systems like Riverside County to explore a system evaluation and strategic planning process to prepare for the future.

There are many initiatives, including those for EMS delivery systems, being trialed across the country that are designed to evaluate and limit waste, redundancy, and unnecessary services. Care coordination and alignment of incentives are large topics for this area, including the concept of Accountable Care Organizations (ACOs).⁸ To date, EMS delivery systems have not been a substantial part of these initiatives but will be in the future.

⁶ Book, R., Ramlet, M. *What is the Regional Impact of Medicare and Medicare Advantage Payment Reductions*, University of Minnesota, September 2012

⁷ Institute of Medicine: *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America* (Sept. 6, 2012)

⁸ <http://www.accountablecarefacts.org/?gclid=CO-ZwsGjtrMCFUlxQgodP2sA4Q>



County Demographics

Overview

Riverside County, part of the Inland Empire, is the second largest county in terms of area among Southern California counties. According to the US Census Bureau, in 2010 Riverside County had a population of 2.2 million people.

Figure 1 shows the population among selected Southern California counties between the 2000 and 2010 censuses.

The population of Riverside County grew by 41.7 percent, with an annual growth rate of 4.2 percent. This was the largest percentage of growth compared to the other Southern California counties. The annual growth rate in Riverside County was also well above that of California, which was one percent per year.

County	2000	2010	Percent Change	Average Annual Change	Square miles
Riverside	1,545,320	2,189,641	41.7%	4.2%	7,206
Imperial	142,334	174,528	22.6%	2.3%	4,176
San Bernardino	1,709,479	2,035,210	19.1%	1.9%	20,057
San Diego	2,813,839	3,095,313	10.0%	1.0%	4,207
Orange	2,846,282	3,010,232	5.8%	0.6%	791
Los Angeles	9,519,315	9,818,605	3.1%	0.3%	4,058
Southern California Total	18,576,569	20,323,529	9.4%	0.9%	40,495
California	33,871,653	37,253,956	10.0%	1.0%	155,779
United States	281,424,600	308,745,538	9.7%	1.0%	3,531,905

Source: US Census Data 2000, 2010

Figure 1 - Population of Southern California Counties, 2000-2010

Region	2010	2015	2020	2010-2020 Change	Average Annual Change
Riverside County	2,192	2,351	2,593	18.3%	1.8%
California	37,309	38,801	40,644	8.9%	0.9%
United States	309,326	321,363	333,896	7.9%	0.8%

Source: US Census Bureau, 2012, CA Department of Finance, 2013

Figure 2 - Population Projections

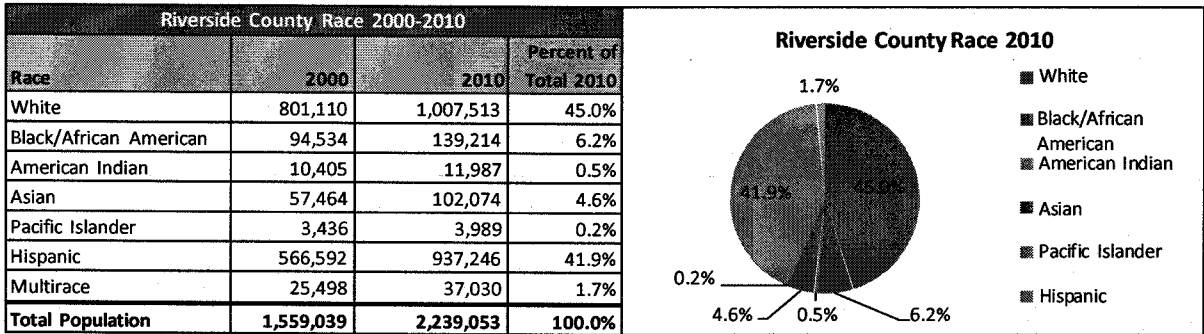
The California Department of Finance projects the Riverside County population to increase by 18.3 percent from 2010-2020 or 1.8 percent annually (Figure 2). Figure 3 shows that the fastest growing city between 2000 and 2010 was Beaumont; Murrieta was second and increased from 44,282 residents to 103,466 residents (13.4 percent increase). Palm Springs grew the least among cities in the county at 0.4 percent annually.

Four of the 28 cities were incorporated after the year 2000: Menifee (2008), Eastvale (2010), Wildomar (2010) and Jurupa Valley (2011); which make up 14.1 percent of the incorporated population.

City	2000	2010	Percent Change	Average Annual Change
Beaumont	11,384	36,877	223.9%	22.4%
Murrieta	44,282	103,466	133.7%	13.4%
Perris	36,189	68,386	89.0%	8.9%
San Jacinto	23,779	44,199	85.9%	8.6%
Lake Elsinore	28,928	51,821	79.1%	7.9%
Coachella	22,724	40,704	79.1%	7.9%
Temecula	57,716	100,097	73.4%	7.3%
Blythe	12,155	20,817	71.3%	7.1%
La Quinta	23,694	37,467	58.1%	5.8%
Desert Hot Springs	16,582	25,938	56.4%	5.6%
Indio	49,116	76,036	54.8%	5.5%
Moreno Valley	142,381	193,365	35.8%	3.6%
Hemet	58,812	78,657	33.7%	3.4%
Rancho Mirage	13,249	17,218	30.0%	3.0%
Indian Wells	3,816	4,958	29.9%	3.0%
Banning	23,562	29,603	25.6%	2.6%
Corona	124,966	152,374	21.9%	2.2%
Cathedral City	42,647	51,200	20.1%	2.0%
Unincorporated Area	420,721	504,392	19.9%	2.0%
Riverside	255,166	303,871	19.1%	1.9%
Palm Desert	41,155	48,445	17.7%	1.8%
Norco	24,157	27,063	12.0%	1.2%
Calimesa	7,139	7,879	10.4%	1.0%
Canyon Lake	9,952	10,561	6.1%	0.6%
Palm Springs	42,807	44,552	4.1%	0.4%
Jurupa Valley	N/A	95,004	N/A	N/A
Menifee	N/A	77,519	N/A	N/A
Eastvale	N/A	53,668	N/A	N/A
Wildomar	N/A	32,176	N/A	N/A
Riverside County	1,545,320	2,189,641	41.7%	4.2%

Source: US Census Data 2000, 2010

Figure 3 - Population Riverside County Cities



Source: State of California, Department of Finance, 2011

Figure 4 - Riverside County Race 2000-2010

As depicted in Figure 4, the largest population in terms of race in Riverside County for the decade 2000-2010 was White (45 percent), followed by the Hispanic race, which comprised 41.9 percent of the population.

Figure 5 shows race projections for Riverside County up to 2020. The California Department of Finance projects that by 2020, Hispanics will be the major race in Riverside County, comprising of 46.2 percent of the population. Whites are projected to be 40.2 percent of the population. Blacks would be the third largest population in terms of race, making up six percent of the population.

Riverside County Race Projections, 2020			
Race	2010	2020	Percent of Total 2020
White	1,007,513	1,166,730	40.2%
Black/African American	139,214	173,095	6.0%
American Indian	11,987	15,956	0.5%
Asian	102,074	156,097	5.4%
Pacific Islander	3,989	4,635	0.2%
Hispanic	937,246	1,343,019	46.2%
Multirace	37,030	45,316	1.6%
Total Population	2,239,053	2,904,848	100.0%

Source: State of California, Department of Finance

Figure 5 - Race Projections, 2020

Sex and Age 2011			
Sex	Riverside County	California	United States
Male	49.8%	49.7%	49.2%
Female	50.2%	50.3%	50.8%
Age			
< 5 years	7.3%	6.7%	6.5%
5-18 years	27.8%	24.6%	23.7%
18-65 years	52.9%	57.0%	56.5%
> 65 years	12.0%	11.7%	13.3%

Source: U.S. Census Bureau, 2013

Figure 6 - Sex and Age Demographics, 2011

Figure 6 shows that the male population in Riverside County in 2011 was 49.8 percent while the female population was 50.2 percent. Both of these figures are similar to those of California and the US. Riverside County has a younger population (i.e., those less than 18 years of age) than California and the US.



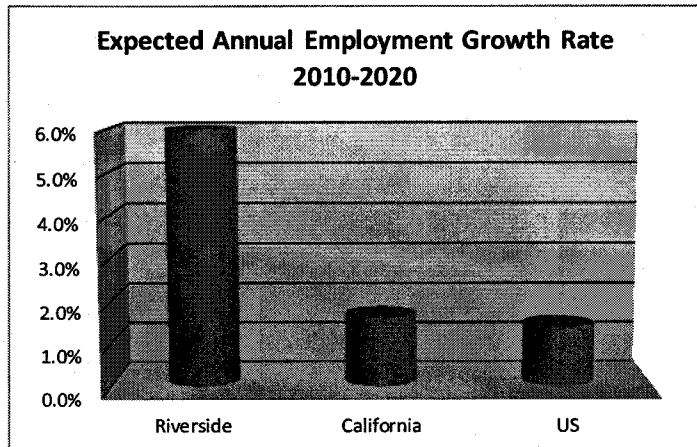
Household Income 2011	
County	Median Income
Santa Clara	\$84,741
Marin	\$78,470
Orange	\$72,046
San Diego	\$59,290
Riverside	\$52,491
Los Angeles	\$52,239
San Bernardino	\$51,017
Imperial	\$36,898
California	\$57,275
United States	\$50,502

Source: U.S. Census Bureau, Small Area Income and Poverty Estimates

Figure 7 - Household Income by California County 2011

As shown in Figure 7, Riverside County’s median household income in 2011 was \$52,491, which was similar to other selected Southern California counties (Orange County and San Diego County had higher household incomes). However, in 2011 Riverside County was below the average median household income in California (\$57,275) and above the median of the US (\$50,502).

According to the Southern California Association of Governments, Riverside County’s expected annual employment growth rate for the 2010-2020 is expected to be six percent. According to the US Bureau of Labor Statistics, the annual employment growth in California is expected to be 1.6 percent while the national rate is expected to be 1.4 percent.



Sources: Southern California Association of Governments 2013, Bureau of Labor Statistics, 2012

Figure 8 - Expected Annual Employment Growth Rate, 2010-2020



Riverside County Population Projections for Jurisdictional Boundaries - Highest Annual Change					
City	2010	2015	2020	Percent Change 2010-2020	Average Annual Change
Calimesa	7,879	11,369	14,858	88.6%	8.9%
Coachella	40,704	55,437	70,170	72.4%	7.2%
Desert Hot Springs	25,938	34,720	43,502	67.7%	6.8%
Beaumont	36,877	46,706	56,534	53.3%	5.3%
Banning	29,603	35,899	42,195	42.5%	4.3%
Lake Elsinore	51,821	61,185	70,548	36.1%	3.6%
Wildomar	32,176	37,325	42,474	32.0%	3.2%
San Jacinto	44,199	49,643	55,086	24.6%	2.5%
Indio	76,036	83,760	91,484	20.3%	2.0%
Perris	68,386	75,207	82,028	19.9%	2.0%
Eastvale	53,670	57,566	61,461	14.5%	1.5%
Norco	27,063	28,910	30,757	13.6%	1.4%
Temecula	100,097	106,168	112,239	12.1%	1.2%
Riverside	303,871	321,424	338,977	11.6%	1.2%
Riverside County	2,189,641	2,392,450	2,595,259	18.5%	1.9%

Source: US Census Bureau, 2010, Riverside County Projections, 2010

Figure 9 - Population Projections for Jurisdictional Boundaries - Highest Annual Change

Figure 9 shows the highest annual change of expected population by jurisdictional boundary in Riverside County. There are ten incorporated cities that are projected to increase at a faster rate than Riverside County as a whole (1.9 percent). The city of Calimesa is expected to increase by the largest amount (88.6 percent) over the ten-year period (2010-2020) with an average annual growth rate of 8.9 percent. The City of Riverside, the most populous city in the county, is expected to reach almost 340,000 residents by 2020 making its annual growth rate 1.2 percent.

Figure 10 shows the lowest annual change of expected population by jurisdictional boundary in Riverside County. The unincorporated areas are projected to decrease in population by 6.5 percent over the ten-year period (or a decline of 0.7 percent annually). Corona is expected to increase by an average 0.2 percent per year through 2020, making it the slowest increasing city in the County.

Riverside County Population Projections for Jurisdictional Boundaries - Lowest Annual Change					
City	2010	2015	2020	Percent Change 2010-2020	Average Annual Change
Unincorporated	504,392	487,930	471,467	-6.5%	-0.7%
Corona	152,374	154,096	155,818	2.3%	0.2%
Murrieta	103,466	106,405	109,343	5.7%	0.6%
Palm Desert	48,445	50,272	52,098	7.5%	0.8%
Hemet	78,657	81,757	84,856	7.9%	0.8%
Blythe	20,817	21,743	22,668	8.9%	0.9%
Rancho Mirage	17,218	18,003	18,788	9.1%	0.9%
Jurupa Valley	95,004	99,359	103,714	9.2%	0.9%
Palm Springs	44,552	46,745	48,938	9.8%	1.0%
Canyon Lake	10,561	11,085	11,609	9.9%	1.0%
Indian Wells	4,958	5,208	5,458	10.1%	1.0%
Moreno Valley	193,365	203,552	213,739	10.5%	1.1%
Menifee	77,519	81,746	85,973	10.9%	1.1%
La Quinta	37,467	39,545	41,623	11.1%	1.1%
Cathedral City	51,200	54,117	57,034	11.4%	1.1%
Riverside County	2,189,641	2,392,450	2,595,259	18.5%	1.9%

Source: US Census Bureau, 2010, Riverside County Projections, 2010

Figure 10 - Population Projections for Jurisdictional Boundaries - Lowest Annual Change



Figure 11 below shows the population projections by age for Riverside County. The last column shows that residents older than 65 will comprise 17.2 percent of residents by 2030. The exact impact of having a larger elderly population is not known; however, one can surmise that the healthcare and EMS systems will be utilized more.

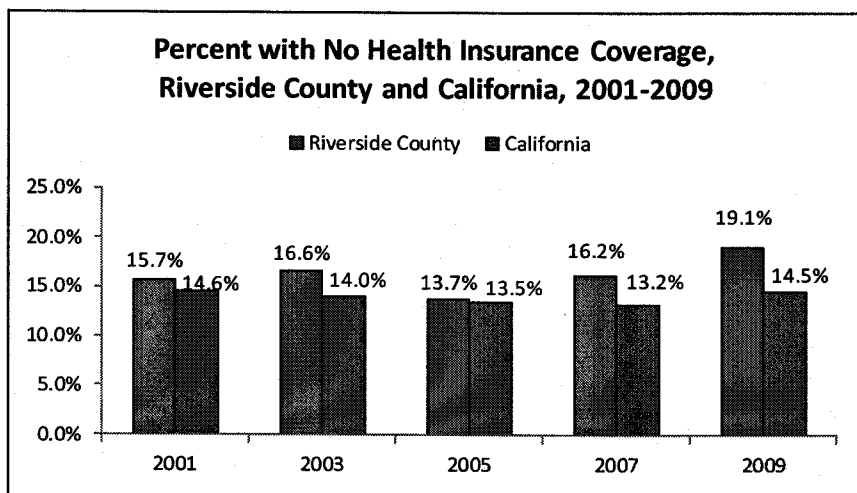
Riverside County Population Projections by Age									
Year	Total (All ages)	Preschool Age (0-4 years)	School Age (5-17 years)	College Age (18-24 years)	Working Age (25-64 years)	Young Retirees (65-74 years)	Mature Retirees (75-84 years)	Seniors (85 or more years)	Percent of residents older than 65
2010	2,191,886	161,015	456,708	229,438	1,085,465	141,046	85,793	32,421	11.8%
2020	2,593,211	180,466	463,859	277,359	1,307,888	207,255	111,484	44,901	14.0%
2030	3,046,064	205,821	523,902	282,717	1,509,527	290,890	168,807	64,399	17.2%

Source: State of California, Department of Finance, 2013

Figure 11 - Riverside County Population Projections by Age

Health Insurance

According to the California Health Interview Survey (CHIS), the percentage of residents in Riverside County without health insurance coverage rose from 15.7 percent in 2001 to 19.1 percent in 2009. In contrast, the number of California residents without health insurance remained generally unchanged between 2001 and 2009.



Source: CHIS, 2009

Figure 12 - Percent with No Health Insurance Coverage, Riverside County and California, 2001-2009



Emergency Care & Hospital Data/Projections

The following is a summary of key emergency care data related to the capacity and demand of emergency care services in Riverside County.⁹

Emergency Medical Services – Overview

All ambulance providers responded to a total of 172,700 9-1-1/ALS responses in 2012 with 136,271 patients transported (79.9 percent of responses resulted in transport). The majority of EMS activity in Riverside County is provided by American Medical Response (AMR). In 2012, AMR (including Blythe) responded to 152,051 calls and transported 121,663 patients (80 percent) to Riverside County hospitals.¹⁰

Riverside County - 2012 EMS Data		
Provider	Responses	Transports
AMR	150,194	120,169
Riverside County Fire (Indio & Covos)	15,303	10,898
Cathedral City	3,729	2,529
AMR/Blythe	1,857	1,494
Idyllwild FPD	672	425
Total	171,755	135,515

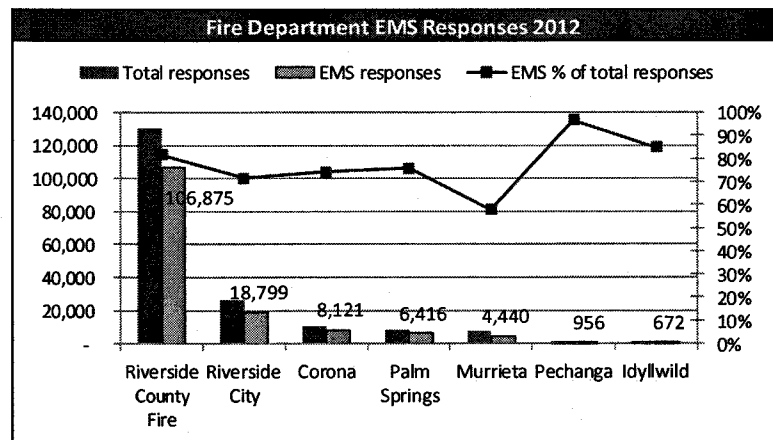
Note: Data is for emergency calls

Source: Riverside County EMSA, The Abaris Group FD Survey, April 2013

Figure 13 - Riverside County - 2012 EMS Data

Fire Department Responses

The Abaris Group conducted a survey in April 2013 of the fire departments in Riverside County and their EMS response times. Of the fire departments that responded to our survey (n=7), Riverside County Fire Department had the most total responses, 130,620, of which 106,875 were EMS responses. About 82 percent of Riverside County Fire Department's total responses were



Note: Numbers displayed on graph are EMS responses only.

Data might be better presented if details were known on the urban/suburban - rural area differences between response time, which was not available during this survey process.

Source: The Abaris Group Fire Department Survey, April 2013

Figure 14 - Fire Department EMS Responses, 2012

⁹ Certain projections on volume and capacity need are made in this report that are based on historical utilization trends. Should key patient utilization management models be instituted, these projections would need to be updated.

¹⁰ Charts depicting the number of EMS frequent users are pending for this report.



EMS responses.

The fire departments that operate in Riverside County vary in their measures of response time. Response time is defined according to the dispatch chart of variable time slots provided by The Abaris Group (See Appendix A). Some measure response times as T1-T7 (see Appendix A) while others measure from T5-T7.

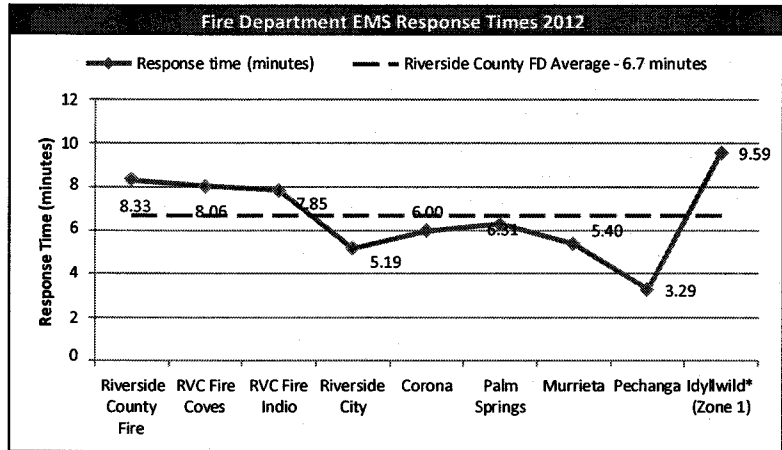


Figure 15 - Fire Department EMS Response Times, 2012

When compared to the average for fire departments in Riverside County (calculated by averaging the response times provided from the survey), there are four fire departments that are above the overall average of the fire departments of the County.

Not all fire departments have a response-time performance standard. Of those that have a response-time standard, there is much variability and no agency routinely reports their performance publicly.

FD	Response time (minutes)	Is this an "average" response time?	Response-time performance standard	Measure of response time (using The Abaris Group dispatch chart T1 - T12)
Riverside County Fire	8.33	Yes	None	T1-T7
RVC Fire Covas	8.06	Yes	None	T1-T7
RVC Fire Indio	7.85	Yes	None	T1-T7
Riverside City	5.19	Yes	5:00 minutes 90% of incidents	T5-T7
Corona	6.00	No	6 minutes 85% of the time	T5-T7
Palm Springs	6.31	Yes	None	T2-T7
Murrieta	5.40	Yes	6:30 from receipt of alarm	Response time is from the point crews are notified of a call and includes turn-out time and response.
Pechanga	3.29	Yes	5 minutes	T5-T7
Idyllwild* (Zone 1)	9.59	Yes	Response parameters are held to less than 9.59 minutes	IFPD Response times are calculated from the time of notification of a 911 call to the time of arrival on scene.

Note: Riverside County Fire average response time aggregate includes extremely large rural areas.

Data might be better presented if details were known on the urban/suburban - rural area differences between response time, which was not available during this survey process.

*Idyllwild has 3 different zones and response times and standards vary for each zone. Zone 1 was used because it has the lowest/fastest response time.

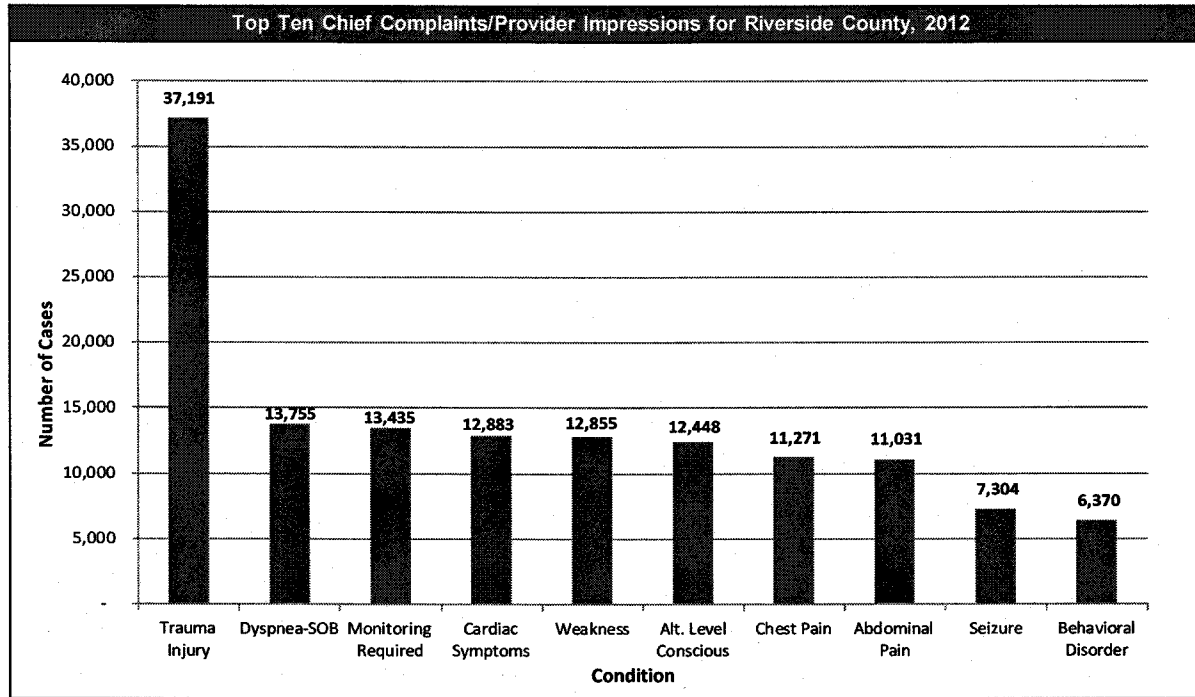
Source: Riverside County FDs and The Abaris Group analysis. Survey conducted April 2013

Figure 16 - Table of Fire Department EMS Response Times, 2012



EMS Patient Categories

The ten most frequent EMS patient categories or “impressions” for Riverside County in 2012 are displayed in the figure below. Trauma injury was the most common case and comprised of 37,191 cases in 2012. The next most frequent case was Dyspnea-short of breath (SOB), which had 13,755 cases in 2012.



Source: REMSA, AMR data, 2013

Figure 17 - Top Ten Chief Complaints/Provider Impressions for Riverside County, 2012



Hospital Emergency Departments - Overview

There are 16 hospitals in Riverside County with emergency departments (EDs). In 2011, these 16 hospitals received 688,760 ED visits (Figure 18). In total, there are 394 ED treatment stations (i.e., ED beds). The largest ED is at Riverside Community Hospital (50 beds), followed by Kaiser Permanente Riverside Medical Center (42 beds). However, Riverside County Regional Medical Center is the busiest ED in the County, with 92,626 visits in 2011 (39 beds).

Riverside County ED Visits, Treatment Stations, and AMR Emergency/ALS Transports							
Hospital	ED Visits (2011)	ED Treatment Stations	ED Visits per Station	AMR Transports (2011)	AMR Transports (2012)	Percent Change (2011-2012)	Percent AMR of all ED Visits
Riverside County Regional Medical Center	92,626	39	2,375	12,604	13,706	8.7%	13.6%
Riverside Community Hospital	75,785	50	1,516	17,136	18,455	7.7%	22.6%
Eisenhower Medical Center	64,571	41	1,575	4,460	4,753	6.6%	6.9%
Desert Regional Medical Center	59,781	28	2,135	10,303	10,787	4.7%	17.2%
Hemet Valley Medical Center	45,765	24	1,907	14,636	15,080	3.0%	32.0%
Parkview Community Hospital Medical Center	43,846	14	3,132	6,231	6,463	3.7%	14.2%
Corona Regional Medical Center-Main	42,622	19	2,243	6,918	7,117	2.9%	16.2%
Rancho Springs Medical Center	39,264	30	1,309	7,579	7,577	0.0%	19.3%
Kaiser Fnd Hosp - Riverside	39,226	42	934	5,629	5,577	-0.9%	14.4%
Inland Valley Medical Center	38,537	36	1,070	8,301	9,316	12.2%	21.5%
John F Kennedy Memorial Hospital	36,817	12	3,068	3,406	3,534	3.8%	9.3%
San Gorgonio Memorial Hospital	32,263	10	3,226	5,712	6,094	6.7%	17.7%
Kaiser Fnd Hospital - Moreno Valley	29,030	12	2,419	2,994	2,958	-1.2%	10.3%
Loma Linda University Medical Center-Murrieta	19,140	19	1,007	2,061	3,906	n/a**	10.8%
Menifee Valley Medical Center	18,987	12	1,582	5,527	4,846	-12.3%	29.1%
Palo Verde Hospital	10,500	6	1,750	1,551	1,494	-3.7%	14.8%
Riverside County Total	688,760	394	1,748	115,048	121,663	5.7%	17.7%
California Total	12,075,139	7,165	1,685	n/a	n/a	n/a	n/a

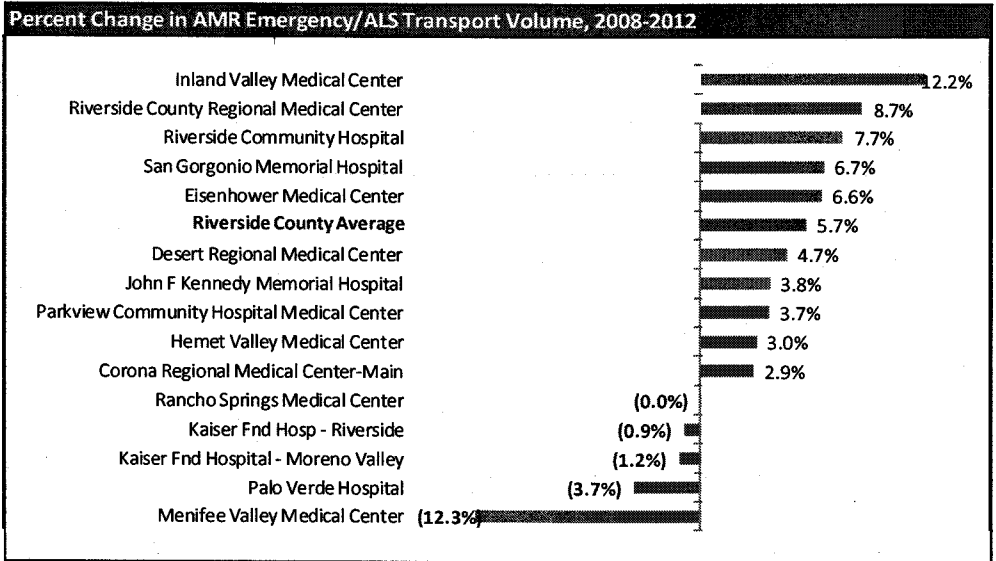
Notes: The number of ED treatment stations shown does not show other treatment space outside their licensed ED capacity that may be used by hospitals. Palo Verde Hospital did not report 2011 ED data to OSHPD. 2010 data used as substitute. Loma Linda University Medical Center-Murrieta opened 4/15/2011 and may have affected the volume of transports to Menifee Valley Medical Center and Rancho Springs Medical Center.

Sources: OSHPD Hospital Annual Utilization Data, 2011; Riverside County EMS Ambulance ED Wait Time Data; Blythe Compliance data

Figure 18 - Riverside County ED Data

Emergency Ambulance Transports

Riverside County's primary ground ambulance provider, AMR (including Blythe), transported 121,663 patients in 2012 – an increase of 5.7 percent from 2011. AMR ground transports increased the most at Inland Valley Medical Center (+12.2 percent) and declined the most at Menifee Valley Medical Center (-12.3 percent). AMR transported most often to Riverside Community Hospital (18,455 transports). Other ground ambulance providers in the County (i.e., Riverside County Fire Department, Idyllwild Fire Protection District, and Cathedral City) transported 13,852 patients to area hospitals in 2012. This accounts for approximately 10 percent of the total ground ambulance transport volume.



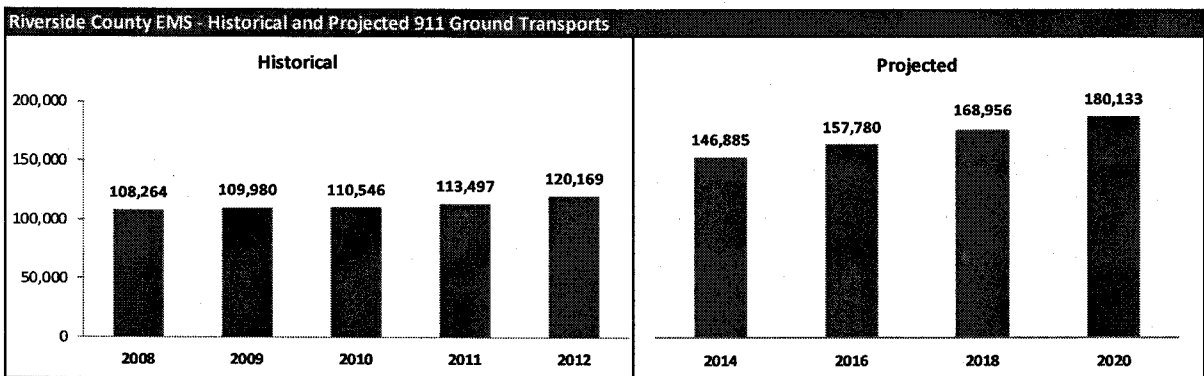
Source: Riverside County EMS Ambulance ED Wait Time Reports & Blythe compliance time data, 2011-2012

Figure 19 - Percent Change in AMR Emergency/ALS Transport Volume, 2008-2012

Emergency Medical Services (EMS) and Emergency Department (ED) Projections

EMS 9-1-1 Transport Projections

The EMS transport projection is calculated from historical EMS data from 2008 to 2012 and population projections by the California Department of Finance. EMS transports are projected to increase to 180,133 emergency transports by 2020, an increase of 32 percent between 2012 and 2020.



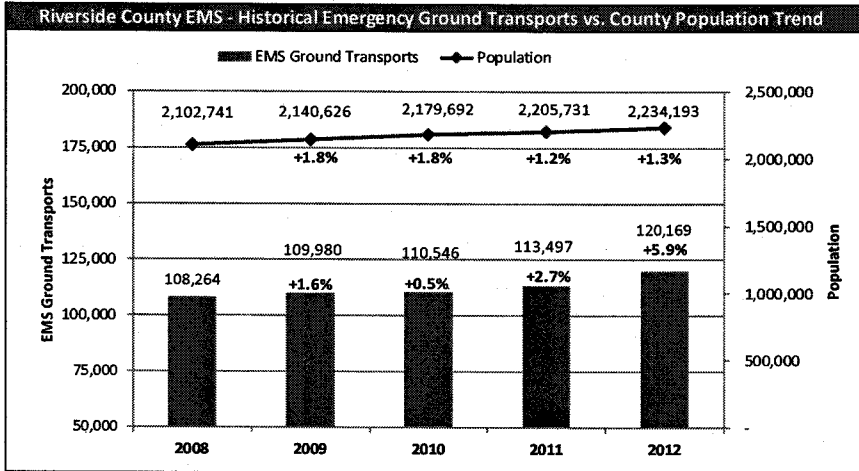
Note: Historical data does not include any non-AMR transports or Blythe Ambulance transports. Projections include all 9-1-1 transports.

Source: REMSA, The Abaris Group, 2013

Figure 20 - Riverside County EMS Historical and Projected Transports



Although the population of Riverside County has been increasing at 4.2 percent per year¹¹ between the years 2000-2010, recent population estimates suggest that growth has slowed (1.6 percent per year, 2008-2012). Despite reductions in population growth, EMS ground transports have been increasing at a higher rate than population trends for 2011 and 2012. Figure 21 plots historical emergency ground transports against the County population trend.



Note: Historical data of EMS transports from 2008-2012 does not include any non-AMR transports or Blythe
Sources: REMSA, CA Department of Finance, 2013

Figure 21 - Riverside County Historical Emergency Ground Transports vs. County Populations

ED Visit Projections

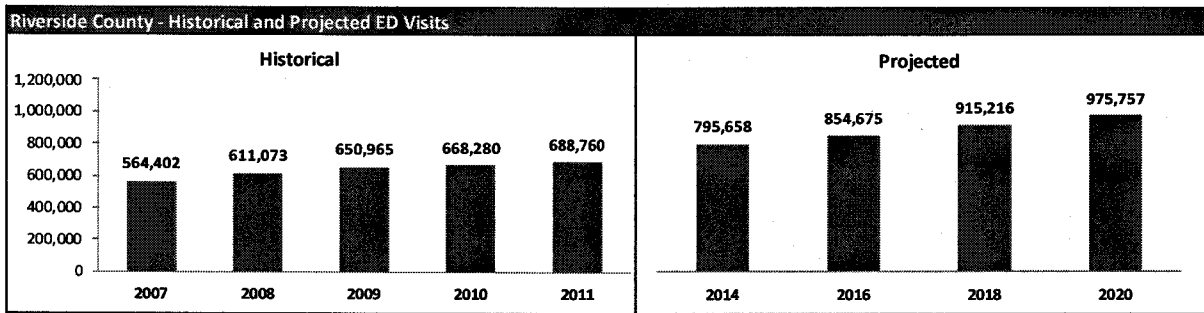
The ED visit projection is calculated using historical ED data from 2007 to 2011 and population projections by the California Department of Finance. ED visits are projected to increase to 975,757 visits by 2020, an increase of 32.2 percent between 2012 and 2020. The ED projection assumes that ED utilization will not be significantly impacted by the Patient Protection and Affordable Care Act (PPACA). This assumption is based on the findings of Chen et al., who concluded that the Massachusetts Health Reform of 2006 did not impact (positively or negatively) ED utilization.¹² However, there is some variability of thinking in the literature on this subject. As such, The Abaris Group considered all of the cited articles in the assumptions on ED projections. One article suggests ED demand could decline as a result of better access to primary care,¹³ and another suggests that ED use could increase due to lack of access in other settings.¹⁴

¹¹ US Census data

¹² Chen C, Scheffler G, Chandra A. Massachusetts' Health Care Reform and Emergency Department Utilization. *New England Journal of Medicine*. 2011;110907140018030.

¹³ Smulowitz PB, Lipton R, Wharam JF, et al. Emergency Department Utilization after the Implementation of Massachusetts Health Reform. *Annals of Emergency Medicine*. 2011;58(3):225-234.e1.

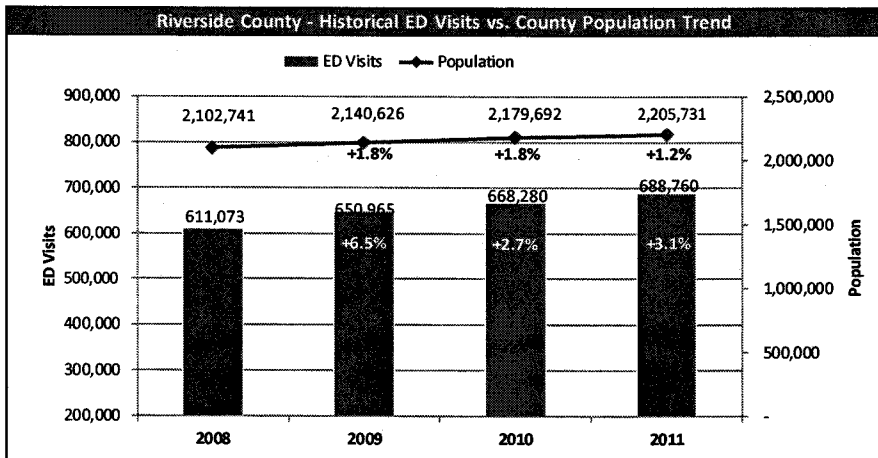
¹⁴ Goodman J. What Will Happen To Emergency Room Traffic? *Health Affairs Blog*. July 12, 2010 <http://healthaffairs.org/blog/2010/07/12/what-will-happen-to-emergency-room-traffic/>



Source: OSHPD, 2013, The Abaris Group, 2013

Figure 22 - Riverside County Historical and Projected ED Visits

When comparing recent population estimates to historical ED visits, Figure 23 shows that the ED visit growth rate was higher than the growth rate for population, 2008-2011. This suggests that population growth cannot be the only driving factor of increasing ED visits.

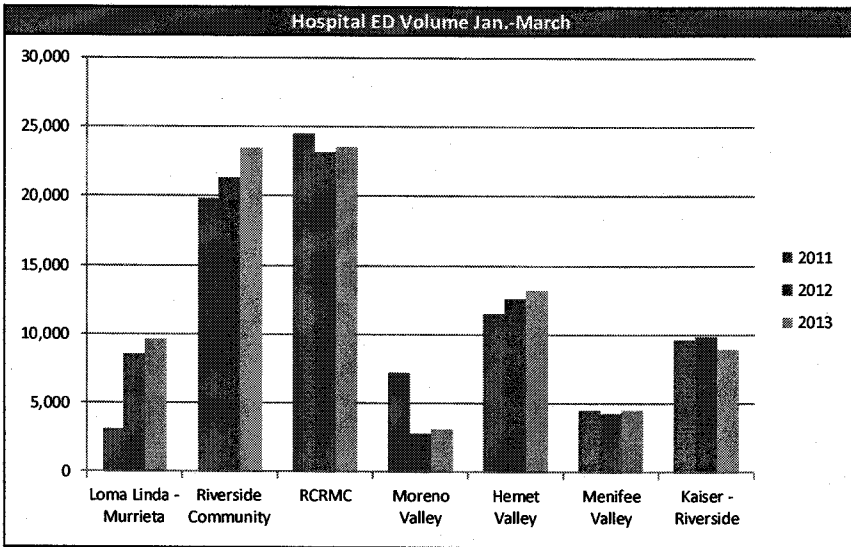


Sources: CA Department of Finance, 2013, OSHPD Annual Utilization Data 2008-2011

Figure 23 - Riverside County Historical Visits vs. County Population

Hospital Volume

A survey conducted by The Abaris Group in April of 2013 asked hospitals for ED volume data for 2012 and 2013, the data is displayed in Figure 24. When compared to ED volume in 2011, ED volume in 2013 (January through March) was higher for four of the seven hospitals that responded to the survey. In general, there was an increasing trend in ED volume from 2011 to 2013 (January through March).



Note: 2011 Jan.-March volume is estimated from 2011 total volume. Data displayed includes hospitals that responded to The Abaris Group Survey only.

Source: OSHPD, 2013, The Abaris Group Hospital Survey, April 2013

Figure 24 - Hospital ED Volume January to March 2011

Hospital Utilization

Between 2007 and 2011, ED utilization rates in Riverside County were lower compared to California and the US. As shown in Figure 25, ED utilization has been rising at the County, state and national levels.

US, California and Riverside County ED Utilization Rates 2007 - 2011									
Year	US			California			Riverside County		
	Population (thousands)	ED Visits (thousands)	ED Utilization Rate	Population (thousands)	ED Visits (thousands)	ED Utilization Rate	Population	ED Visits	ED Utilization Rate
2007	301,231	116,802	387.7	36,553	10,403	284.6	2,049,902	564,402	275.3
2008	304,094	123,761	407.0	36,856	10,927	296.5	2,102,741	611,073	290.6
2009	306,772	136,072	443.6	37,077	11,702	315.6	2,140,626	650,965	304.1
2010	309,350	129,843	419.7	37,309	11,809	316.5	2,179,692	668,280	306.6
2011	311,588	n/a	n/a	37,570	12,086	321.7	2,205,731	688,760	312.3

Sources: US Population: US Census Bureau, Office of Employment & Population Statistics

US ED visits: Centers for Disease Control and Prevention, National Health Statistics Reports, National Hospital Ambulatory Medical Care Survey: Emergency Department Survey (Various Years)

Riverside County population: State of California, Department of Finance, 2013

CA population: State of California, Department of Finance, E-7. California Population Estimates, with Components of Change and Crude Rates, July 1, 1900-2012, December 2012

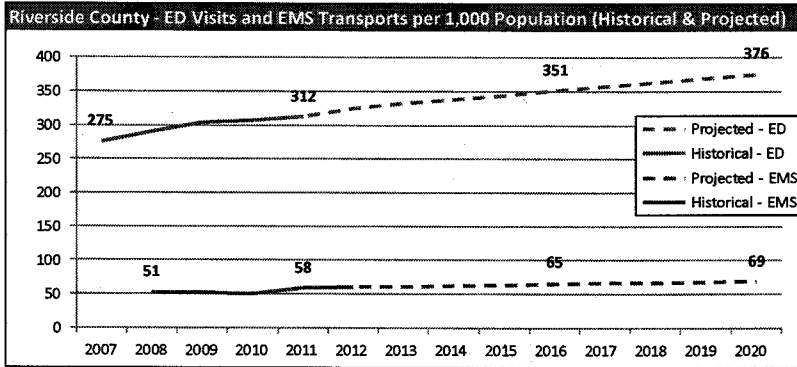
CA ED visits: OSHPD Annual Utilization Data (various years)

Riverside County ED visits: OSHPD, 2013

Figure 25 - ED Utilization Rates 2007-2011



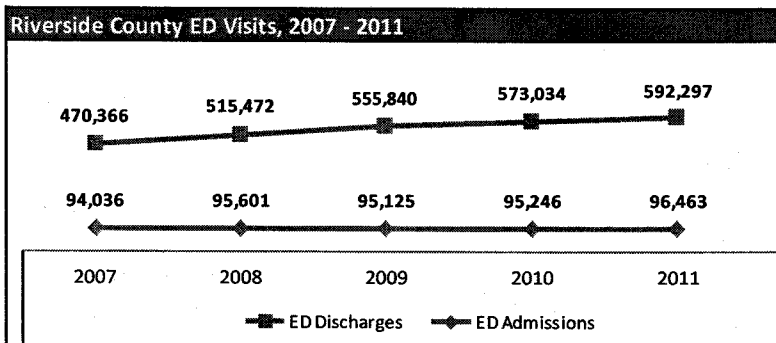
ED utilization is projected to increase to approximately 376 ED visits per 1,000 population between 2010 and 2020. This is up from 312 ED visits per 1,000 in 2011. EMS utilization is projected to increase to 69 transports (ALS/emergency) per 1,000 population by 2020. This increase is up from 58 transports per 1,000 in 2011 (Figure 26).



Source: State of California, Department of Finance, 2013, California Department of Finance population projections, OSHPD utilization data, The Abaris Group, 2013

Figure 26 - Riverside County ED Visits and EMS Transports- Historical and Projected

The historical growth in ED visits has primarily been driven by the increase in visits that are treated and released (ED discharges) as opposed to those ED visits that are admitted to the hospital (i.e., ED admissions). Between 2007 and 2011, the number of ED discharges increased by a total of 25.9 percent while ED admissions only increased by 2.6 percent.



Source: OSHPD Annual Utilization Data, 2007-2011

Figure 27 - Riverside County ED Discharges and Admissions

The ED admission rate, defined as the percentage of ED visits that were admitted to the hospital, declined from 16.7 percent in 2007 to 14.0 percent in 2011. As a result of this declining trend, the ED admission rate in Riverside County (14.0 percent) is now below the statewide average (15.9 percent).



Severity of ED Patients

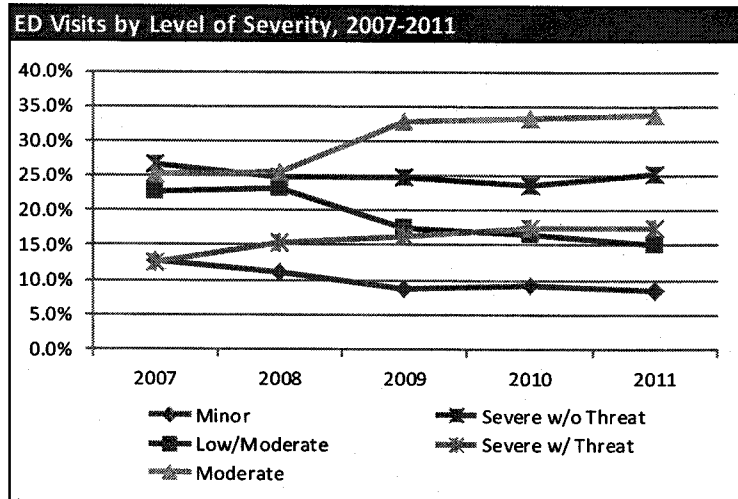
All Riverside County ED visits are classified into one of five categories based on the complexity of the medical decision and the severity of the problem.

ED Visits by Level of Severity, 2007 and 2011			
Severity Level	2007	2011	Change
Minor	12.8%	8.5%	-4.3%
Low/Moderate	22.6%	15.1%	-7.5%
Moderate	25.2%	33.8%	8.5%
Severe w/o Threat	26.7%	25.1%	-1.6%
Severe w/ Threat	12.6%	17.5%	4.9%

Source: OSHPD Hospital Annual Utilization Pivot Profiles, 2007 & 2011

Figure 28 - Riverside County ED Visits by Severity Level, 2007-2011

The overall severity of visits seen in the ED has been trending up in recent years.¹⁵ The proportion of ED visits classified as minor and low/moderate has declined while the proportion of ED visits classified as moderate and severe with threat has increased.



Source: OSHPD Hospital Annual Utilization Data, 2007-2011

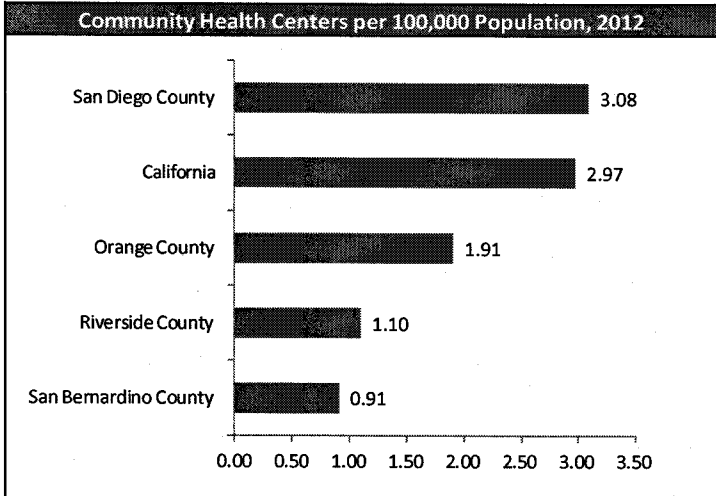
Figure 29 - Graphical Trend: Proportion of ED Visits Classified by Severity, 2007-2011

¹⁵ ED visit severity is coded by hospitals and trends may be a reflection of coding practices rather than actual changes in visit severity. For example, adoption of electronic medical records in EDs could imply an increase in severity if more services/procedures are being captured in the patient's medical record than were previously.



Community Clinics per Population

In 2012, there were 1.10 community health centers for every 100,000 residents in Riverside County. This was below the state average of 2.97 and below other counties in the region.



Source: OSHPD Healthcare Information Resource Center, December 2012, US Census Bureau, 2013
Figure 30 - California Community Clinics per Population

Physicians per Population

Riverside County's ratio of population to primary care physicians is 2,515:1, which is well below the ratio for both California and the US.

Riverside County	2,515:1
California	1,341:1
National Benchmark*	1,067:1

* 90th percentile among all U.S. counties

Source: County Health Rankings, 2013

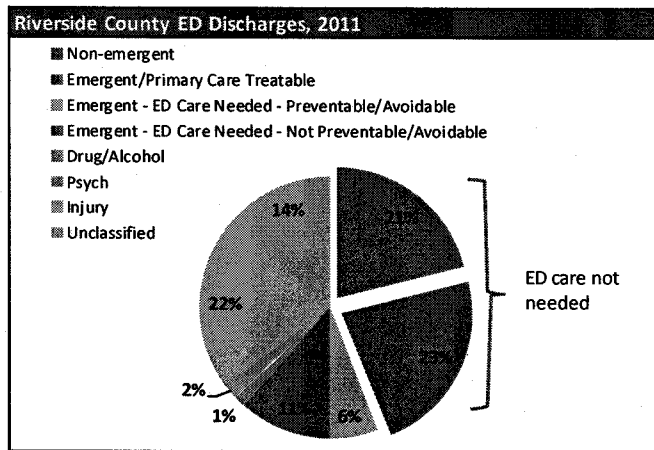
Figure 31 - Physicians per Population



Preventable/Avoidable ED Visits

To investigate preventable/avoidable ED visits further, all visits that did not result in admission were analyzed by employing the New York University (NYU) ED Algorithm. The analysis used as data all ED discharges in Riverside County EDs in 2011.

The algorithm classifies patients based on their primary discharge diagnosis (i.e., ICD-9) as either non-emergent, emergent but treatable in a primary care setting, or ED care needed. The algorithm does not classify drug/alcohol, psychiatric, or patients with an injury. Findings from the algorithm show that 44 percent of ED discharges could be classified as not needing ED care.



Source: NYU ED Algorithm, OSHPD Emergency Department Discharge data, 2011

Figure 32 - Riverside County Preventable/Avoidable ED Visits

NYU ED Algorithm Definitions:

Non-emergent - The patient's initial complaint, presenting symptoms, vital signs, medical history, and age indicated that immediate medical care was not required within 12 hours;

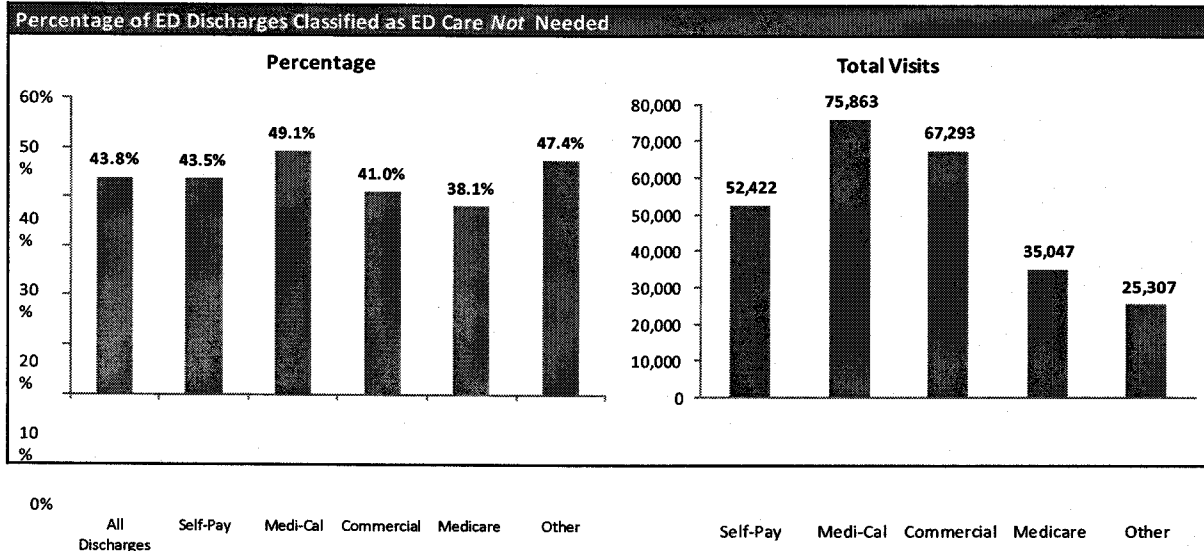
Emergent/Primary Care Treatable - Based on information in the record, treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting. The complaint did not require continuous observation, and no procedures were performed or resources used that are not available in a primary care setting (e.g., CAT scan or certain lab tests);

Emergent - ED Care Needed - Preventable/ Avoidable - Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness (e.g., the flare-ups of asthma, diabetes, congestive heart failure, etc.); and

Emergent - ED Care Needed - Not Preventable/ Avoidable - Emergency department care was required and ambulatory care treatment could not have prevented the condition (e.g., trauma, appendicitis, myocardial infarction, etc.).



When the data is stratified by payer mix, Medi-Cal patients have the highest percentage of visits that are classified as “not needing ED care” (49.1 percent) and also have the highest total number of visits classified as “not needing ED care” (75,863 visits).



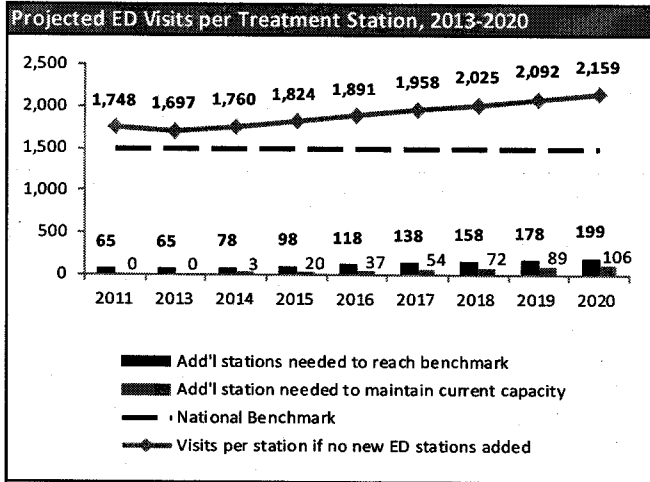
Source: OSHPD 2010 Emergency Department Data & NYU ED Algorithm

Figure 33 - Riverside County Preventable/Avoidable ED Visits by Payer

Emergency Department (ED) Treatment Station Projections

Beds that are located in the ED are known as treatment stations. ED treatment stations require a license.

There were a total of 394 ED treatment stations that treated 688,760 ED patient visits in Riverside County in 2011, which equates to 1,748 ED visits per station. In 2011, Riverside County saw the first decline in ED visits per station than in the previous years. ED capacity in Riverside County was expanded in 2011 with the addition of 22 ED treatment stations at Southwest Healthcare System (Rancho Springs Medical Center and Inland Valley Medical Center) and the opening of Loma Linda University Medical Center – Murrieta (19 stations). ED treatment station expansion has continued as San Geronio Memorial Hospital opened 27 new ED beds in May of 2013 and 41 ED treatment stations are scheduled to be opened at the new Temecula Valley Hospital in the fall of 2013.

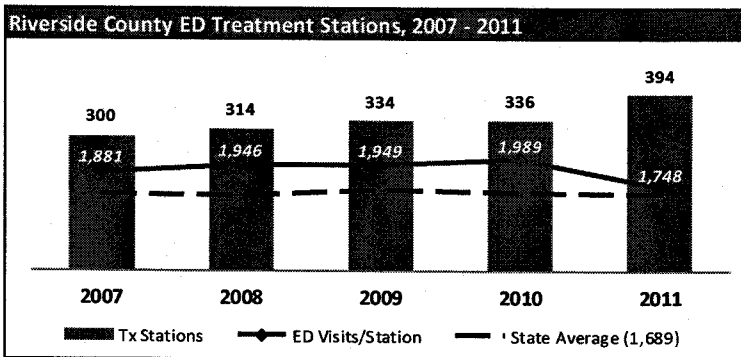


Note: Projection includes 27 ED beds at the new San Geronimo Memorial Hospital ED and assumes an additional 41 stations will be added when Temucula Valley Medical Center opens in fall of 2013.

Source: OSHPD Hospital Utilization data, The Abaris Group, 2013

Figure 34 - Riverside County ED Capacity Projections

Even with the recent additions and scheduled opening of Temecula Valley Hospital, ED capacity in Riverside County lies above the national benchmark of 1,500 visits per station. If no stations are added beyond what is already planned, the number of ED visits per station is projected to rise to 2,159 by 2020. To reduce the number of ED visits per station to the national benchmark, Riverside County would need an additional 199 stations by 2020 to make up for current shortages and keep with rising ED demand. To maintain the 2011 rate of 1,748 ED visits per station, the county would need an additional 106 treatment stations by 2020.



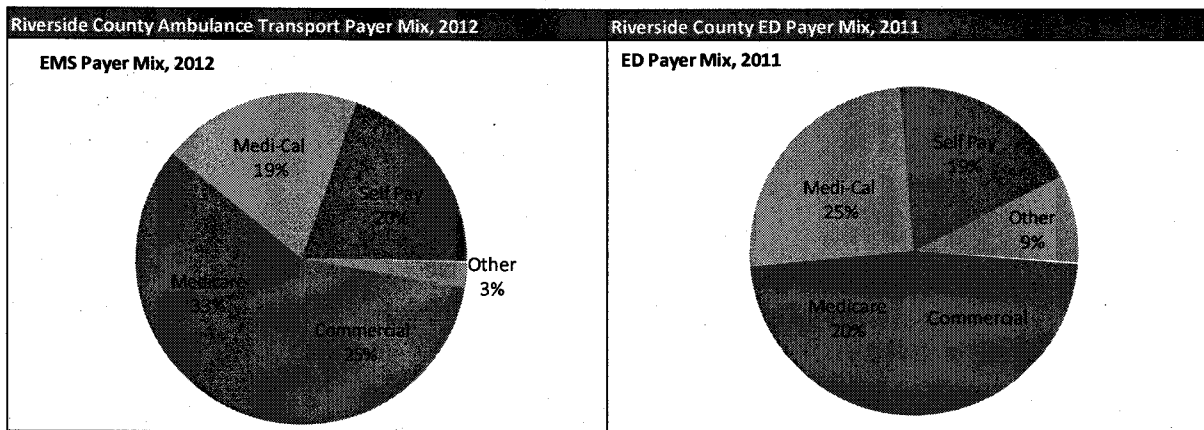
Source: OSHPD Annual Utilization Data, 2007-2011

Figure 35 - Riverside County ED Treatment Stations, 2007 - 2011



Emergency Medical Services (EMS) & Emergency Department (ED) Payer Mix

Patient data from the Office of Statewide Health Planning and Development (OSHPD) for 2011 was used to examine ED payer mix. The most common type of payer that resulted in an ED visit was commercial insurance (27 percent) followed by Medi-Cal (25 percent). The uninsured (i.e., "Self Pay") accounted for 19 percent of all ED visits. EMS payer mix data was obtained for AMR, Cathedral City, Idyllwild Fire Protection District, and Riverside County Fire Department-Indio. Compared with the ED payer mix, the EMS payer mix has a higher proportion of Medicare patients and fewer Medi-Cal patients. The proportion of commercially insured and the uninsured are similar in both ED and EMS.



Sources: AMR, Cathedral City, Idyllwild Fire Protection District, and Riverside County Fire

Source: OSHPD Emergency Department Discharge data, 2011

Figure 36 - EMS and ED Payer Mixes

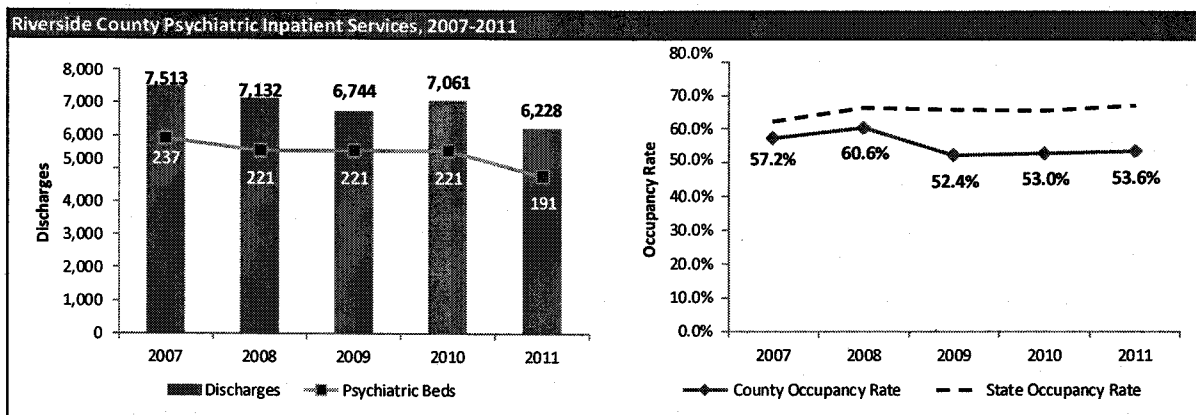


Psychiatric Care

There are a total of 191 licensed inpatient psychiatric beds at four facilities in Riverside County:

- Riverside County Regional Medical Center – 77 beds
- Oasis Psychiatric Health Facility – 16 beds
- Corona Regional Medical Center-Magnolia – 40 beds
- Riverside Center for Behavioral Medicine – 58 beds

Capacity to treat psychiatric patients in Riverside County has declined by 46 beds since 2007 (30 beds at Kaiser-Moreno Valley and 16 beds at Hemet Valley Medical Center). Even with this decline in capacity, licensed bed occupancy rates remain below the state average (Figure 37).

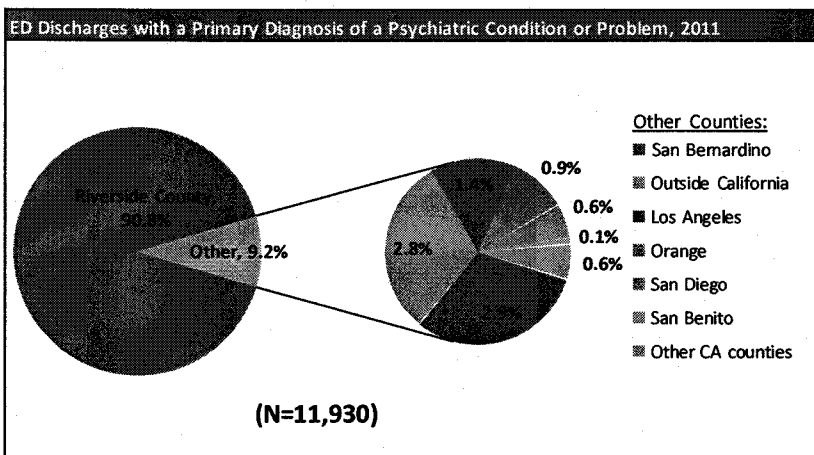


Source: OSHPD Hospital Annual Utilization Data, 2007-2011

Note: Discharges from licensed psychiatric beds only. Bed occupancy does not take into account specialized psychiatric beds.

Figure 37 - Psychiatric Inpatient Services, 2007-2011

In Riverside County, there were a total of 11,930 psychiatric-related ED discharges (e.g., not admitted) in 2011.¹⁶ Over 90 percent of these discharges were residents of Riverside County (Figure 38).



Source: OSHPD 2011 Emergency Department Data & NYU ED Algorithm

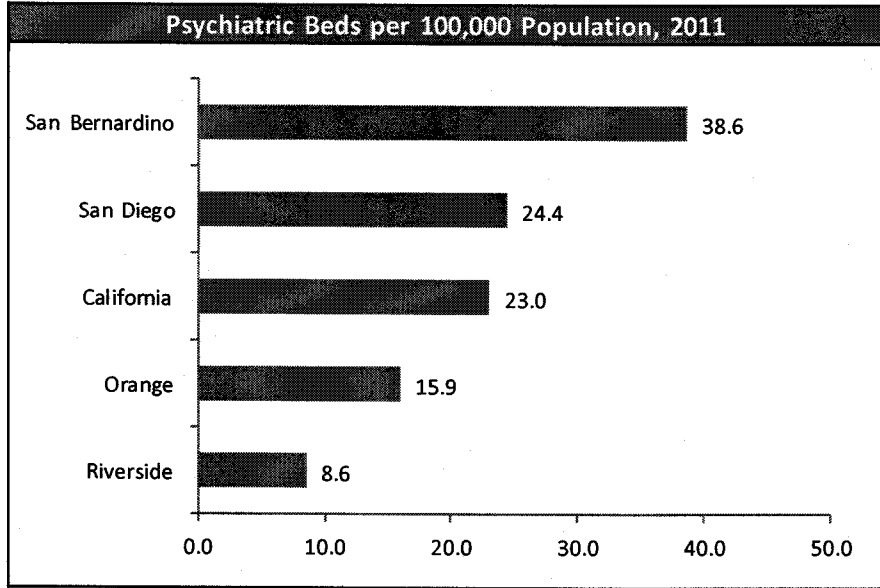
Figure 38 - ED Discharges with Primary Diagnosis of Psychiatric Condition, 2011

¹⁶ The NYU algorithm is based on primary ICD-9-CM discharge diagnosis. Therefore, any diagnoses of psychiatric conditions/problems not considered the chief cause of the encounter for care in the ED visit are not included.



Psychiatric Beds per Population

In 2011, there were 8.6 licensed psychiatric beds for every 100,000 residents in Riverside County. This was well below the state average of 23 and below other counties in the region (Figure 39).



Sources: State of California, Department of Finance, E-6. Population Estimates and Figure 39 - Psychiatric Beds per 100,000 Population, 2011

Among all California counties with at least one million residents, Riverside County has the fewest psychiatric beds per population (Figure 40).

	Population	Licensed Psychiatric Beds	Psych Beds/ 100,000 pop.
San Bernardino	2,053,348	792	38.6
Los Angeles	9,860,836	3,547	36.0
Sacramento	1,430,884	376	26.3
San Diego	3,125,321	762	24.4
Alameda	1,526,220	360	23.6
Orange	3,047,120	486	15.9
Contra Costa	1,061,375	116	10.9
Santa Clara	1,806,881	166	9.2
Riverside	2,220,502	191	8.6
California	37,570,307	8,659	23.0

Sources: State of California, Department of Finance, E-6. Population Estimates and Components of Change by County — July 1, 2010–2012, December 2012; OSHPD, 2011 Hospital Annual Utilization Database

Figure 40 - Psychiatric Beds per 100,000, 2011



5150 Utilization

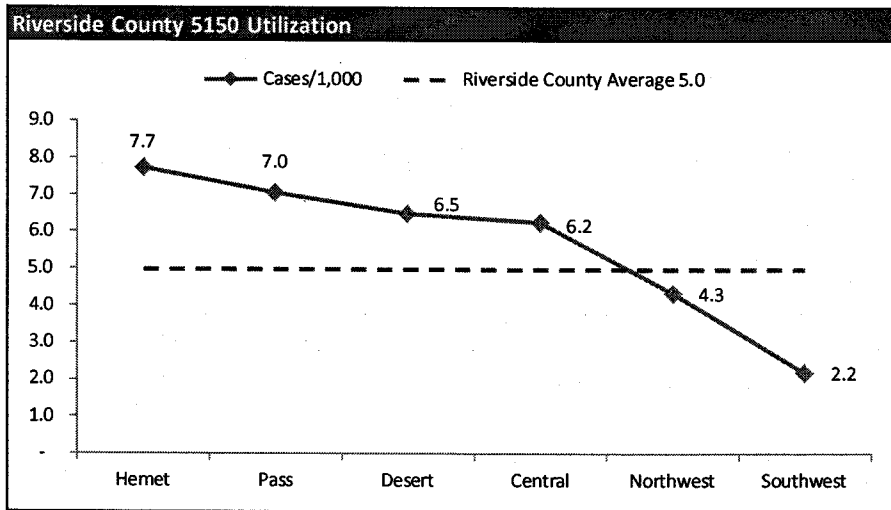
Riverside County’s 5150 utilization by zone is displayed in Figure 41. The Hemet Zone had the highest incident rate (7.7) followed by the Pass Zone (7.0). The zone with the highest number of 5150 transports was the Desert Zone (3,123) followed by the Northwest Zone (3,110).

Riverside County 5150 Utilization			
Zone	Volume	Population	Cases/1,000
Hemet	1,379	178,124	7.7
Pass	626	88,795	7.0
Desert	3,123	480,563	6.5
Central	1,971	316,180	6.2
Northwest	3,110	717,771	4.3
Southwest	1,042	474,981	2.2
Mountain	8	14,392	0.6
Total	11,263	2,270,806	5.0

Source: US Census Block Data 2010, AMR 5150 data 2012, The Abaris Group calculation, 2013

Figure 41 - 5150 Utilization - Table

Figure 42 below is a graphical representation of 5150 utilization. Only three zones, Northwest, Southwest and Mountain Plateau (not displayed) fall below the average utilization rate of Riverside County (5.0).



Note: The Mountain Zone is not shown in this graph because of low volume and population

Source: US Census Block Data 2010, AMR 5150 data 2012, The Abaris Group calculation, 2013

Figure 42 - 5150 Utilization - Graph

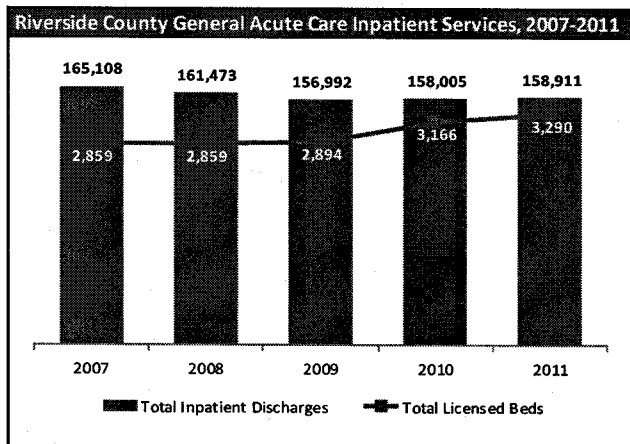


Hospital Data

Inpatient OSHPD data was reviewed for the 16 acute-care hospitals that have an ED. The inpatient data presented does not include admissions from the following facilities:

- The Betty Ford Center at Eisenhower
- Riverside Center for Behavioral Medicine
- Oasis Psychiatric Health Facility
- Corona Regional Medical Center-Magnolia
- Kindred Hospital Riverside

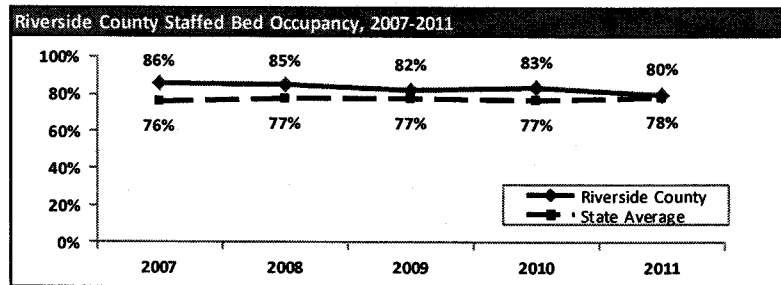
The number of acute care inpatient services in Riverside County hospitals declined from 165,108 in 2007 to 158,911 in 2011. Concurrently, the number of licensed beds in the County increased from 2,859 to 3,290.



Source: OSHPD Hospital Annual Financial Data, 2007-2011

Figure 43 - Riverside County Inpatient Services

Staffed bed occupancy rates were slightly above the state average from 2007 to 2011 but have declined from 86 percent in 2007 to 80 percent in 2011.

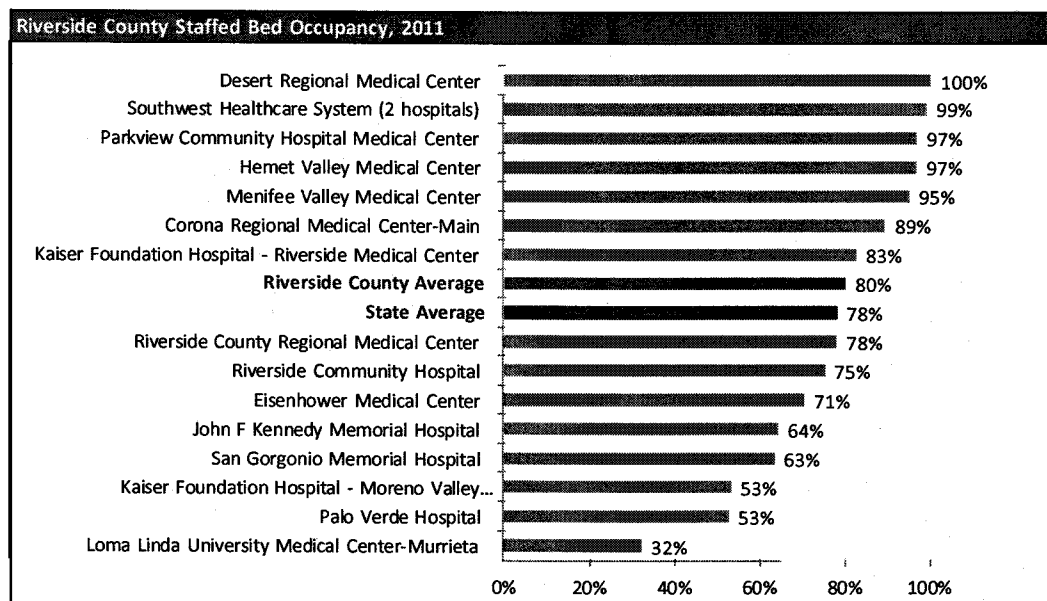


Source: OSHPD Hospital Annual Financial Data, 2007-2011

Figure 44 - Riverside County Bed Occupancy Rates



Seven hospitals in Riverside County have staffed bed occupancy rates above the statewide average. In 2011, bed occupancy rate ranged from 32 percent at Loma Linda University Medical Center-Murrieta (opened 4/15/2011) to 100 percent occupancy at Desert Regional Medical Center. The statewide and County average occupancy rates were almost identical in 2011.



Note: Loma Linda University Medical Center-Murrieta data is for partial year, opened 4/15/2011

Source: OSHPD Hospital Annual Financial Data, 2011

Figure 45 - Riverside County Bed Occupancy Rates by Hospital



Emergency Medical Services System

Overview

The mission of the Riverside County EMS System is to provide optimal emergency pre-hospital medical care to residents and visitors. This is achieved through planned processes for readiness, response, on scene care, transport to definitive care, transition of care and documentation and continuous quality improvement (CQI).

Emergency Medical Services Agency

The mission of the Riverside County EMS Agency (REMSA) is to ensure the timely provision of high quality emergency medical services to the residents and visitors of Riverside County. As one of 32 Local EMS Agencies (LEMSAs) in the State of California, REMSA is responsible to plan, implement, monitor, and evaluate for the Countywide EMS system pursuant to the California Health and Safety Code, Division 2.5 and the regulations and guidelines adopted by the State EMS Authority (EMSA). REMSA continues to meet new challenges as the EMS delivery system changes.

REMSA and its medical director provide clinical oversight through medical and operational protocols and the CQI process. REMSA's medical director is responsible for medical direction and establishment of medical control over the local EMS system. This is accomplished by establishing policies, protocols and procedures for:

- Authorization of Pre-hospital Receiving Hospitals (PRC), Base Hospitals (BH) and Specialty Care Centers (SCC)
- Clinical and Performance Quality improvement
- EMS Dispatching and Response
- Medical Treatment and Procedures
- Multiple Casualty Incidents (MCIs)
- Patient Care Documentation and Data Management
- Provider Credentialing
- Training and Education

In order to foster a collaborative approach to EMS system design and operation, REMSA has established a variety of stakeholder advisory committees to receive input during the development and implementation of policies, protocols and procedures. REMSA also provides round-the-clock system monitoring and support through a Duty Officer/Duty Chief program.



Additional administrative responsibilities for REMSA Include:

- Development and Monitoring of Contracts for Emergency Ambulance Services
- Development and Monitoring of Contracts with Authorized Pre-hospital Receiving Hospitals (PRC), Base Hospitals (BH) and Specialty Care Centers (SCC)
- Development and Monitoring of Contracts with Authorized ALS Provider Agencies
- Permitting and Regulation of Ambulance Providers and Air Ambulance Providers
- Development and Submission of the County EMS Plan
- Development and submission of the County Trauma Plan
- Personnel Credentialing Enforcement and Disciplinary Proceedings

One of REMSA's primary roles is to monitor, track, and report the performance of the transport providers in the 12 ambulance zones, 10 of which are exclusive operating areas (EOAs). REMSA staff compiles and shares response data with the first response and transport providers of each EOA on a quarterly or semiannual basis.¹⁷

Public Access

The entire County of Riverside is covered by enhanced 9-1-1 services, which provide the dispatcher with the caller's location, coverage includes the Native American reservations. Historically, cellular phone calls to 9-1-1 were challenging as the caller location was unknown and were transferred to the California Highway Patrol (CHP) before being routed to the appropriate Public Safety Answering Point (PSAP). With the new generation of cellular phones and the availability of latitude/longitude information, calls are automatically directed to the most appropriate PSAP for disposition. Typically, the location information is so precise, that dispatchers know the address of the caller. There are a few unincorporated areas for which the CHP remains the primary answering point but that is expected to change over the next 6-12 months as these areas are identified and reprogrammed accordingly.

9-1-1 Dispatch/Public Safety Answering Point (PSAP) System

The Abaris Group conducted two days of site visits and interviews with leaders and dispatch staff of seven of the key dispatch centers and/or PSAPs. The purpose of the interviews was to gain an insight into the operations, procedures and relationships with other stakeholders in the Riverside EMS system and to gain a picture of how 9-1-1 calls for medical incidents are routed and managed. There are a number of different mechanisms for the receipt, transfer and medical management of these 9-1-1 calls for assistance.

¹⁷ A local EMS agency staffing benchmark survey is underway and will be added to this report upon completion.



The Abaris Group met with officials from the cities of Riverside, Corona, Murrieta and Palm Springs as well as the dispatch center at American Medical Response (AMR), the current county contract ambulance provider, the County Sheriff's main dispatch center in Riverside and the Riverside County Fire Department Emergency Communications Center (ECC) in Perris. A brief summary of those individual site visits is provided below.

City of Riverside

The City of Riverside PSAP has moved successfully to a renovated city building, and will be expanding from 14 dispatch positions to 17 in the new center. Typical staffing in the PSAP would be 10 positions; 7 call-takers and 3 dispatchers with one or two supervisors, depending on the time of day.

Annually, the police department handles over 180,000 to 200,000 incidents, with approximately 29,000 of those calls for fire department calls with 18,000 – 19,000 of those for medical emergencies. Total phone calls made and received by the City's PSAP is approximately one million per year. All of the dispatchers are trained and certified as Emergency Medical Dispatchers through Medical Priority's certification course. Emergency medical dispatch (EMD) is provided using Medical Priority Dispatch System (MPDS) Pro QA software.

The City of Riverside transitioned to providing EMD in 2006. New personnel must complete an 18-month probation. All first through fourth party calls are provided EMD by the City, and all low acuity (e.g., "alpha" and "omega") determinant calls are "ambulance-only" responses, with the City not providing first response on those calls.

Quality improvement activities are conducted in compliance with MPDS standards. Between 3-5 percent of all EMD calls are reviewed using the Advanced Quality Assurance (AQUA) product (the quality improvement software product of ProQA). Feedback is provided to individual dispatchers privately, as required. Dispatch center trended statistics are posted and reviewed on a monthly basis, with annual reports prepared as well. The City of Riverside states that their average call time to dispatch was 62 seconds in 2012 (via data dump between dispatch centers).

As noted above, the transfer of call data to the County ambulance contractor is via a "data dump" to the ambulance dispatch center. The City did not report any issues with their transfer process to AMR.

The City of Riverside maintains a separate contract with AMR that includes extended ambulance response times for AMR, in return for a specified amount of funding to help offset the ALS first responder costs to the City. The response time requirement is relaxed from a 9 minute 59 second or better requirement to an 11 minute 59 second or better requirement. ALS first responder response time standards under the agreement are 9:59 minutes 90 percent of the time with a goal of 7:59 minutes 90 percent of the time. As of the writing of this report, the ALS first responder response times are not being publically reported.



City of Corona

There are a total of 10 positions at the dispatch center. Typical round-the-clock staffing in the PSAP would be 6-7 positions; 3-4 call-takers and 3 dispatchers with one supervisor.

The City computer aided dispatch (CAD) vendor is the West Covina Service Group, a division of the West Covina Police Department. The city uses Motorola consoles, and describes a backup system of redundant servers in the event of a loss of the primary server.

Annually, the police department handles over 200,000 calls, with approximately 8,000 of those calls for medical emergencies. All of the dispatchers are trained and certified in incident command, CPR, pre-arrival instruction and all are also certified by Peace Officers Standards and Training (POST). EMD is provided using an in-house developed medical dispatch product, which is approved by the City's medical director and REMSA.

Quality assurance activities are conducted on a monthly basis. The City states that it reviews ten medical calls per month, which equates to approximately 1.5 percent of all medical calls. There was no description of the specific review process nor any specific criteria or benchmarks identified. Feedback is provided to individual dispatchers; however, no monthly or annually trended dispatch data is reviewed. Corona states that its average call processing time is approximately one minute. Corona also uses a "data dump" to AMR for the transfer of call information. The City did not report issues with the transfer process to AMR.

Like the City of Riverside, Corona maintains a separate contract with AMR with relaxed ambulance response times. AMR provides a specified amount of funding to help offset the ALS first response costs to the City. The response time requirement is the same as noted for the City of Riverside. The City does have a response time standard of 90 percent within 9:59 and with a response time goal of 7:59 fractile, which is located in the contract with AMR and the contract calls for holdbacks of payment if the City does not meet its performance standard. The City provides that response report to AMR on a monthly basis but does not report to the County of Riverside.

City of Palm Springs

The City does not maintain or contract for secondary PSAP functions for medical requests, and sends a fire unit to all medical emergencies. There is no EMD provided to 9-1-1 callers in Palm Springs.

The City CAD vendor is Cyrun, and the CAD runs on Dell Power Edge servers. The City states that it has a redundancy server in the event of a failure of the primary. Palm Springs has no CAD-to-CAD interface with any other party in the EMS system; but expressed great interest in establishing such interfaces with the County ambulance provider or whoever assumes responsibility for ambulance dispatching. The only hesitation to implement a CAD-to-CAD linkage is the cost of establishing such a system.



The City maintains five dispatch positions. There are two to four dispatchers and a supervisor on duty, depending on the time of day. The center receives nearly 75,000 calls annually, with approximately 8,000 of the calls for a medical emergency.

Palm Springs sends dual tones – multi-frequency (DTMF) to AMR with dispatch information when it notifies its fire units. When a button is pressed on a keypad, a connection is made that generates two tones at the same time. The tones identify the key that was pressed to any equipment, and will activate the receiving end of the “connection.” The City states that there have been intermittent issues with the tone-out process with AMR not receiving some calls and with delays in dispatching units to the scene. At the time of the interview, the City stated that the frequency of such errors has been reduced over the past two months. While the City cited potential reasons for the decrease, there was no specific issue identified as the cause.

The dispatch manager states that the center’s call processing times are 45.6 percent in 60 seconds or less. An average processing time was not provided. The City also states that it is using the Higher Ground Next Generation Quality911 quality assurance program. Palm Springs is processing between 80 and 120 calls per month. This equates to a review percentage of approximately two percent of their call volume; the industry standard for medical dispatching is approximately seven percent.

City of Murrieta

The City does not operate or contract for secondary PSAP operations. The primary PSAP dispatches all police and fire responses and places requests for ambulance response by telephone line to the AMR dispatch center.

There are six dispatch positions in the PSAP. Round-the-clock staffing typically consists of four dispatchers and one supervisor. The City processes in excess of 40,000 calls per year, with approximately 7,400 of those calls being fire responses. The City states that the fire department runs approximately 60 percent EMS and 40 percent fire and other responses. The City responds to just under 4,500 EMS calls per year.

The CAD vendor for Murrieta is Cyrun, and the City operates mirrored, redundant servers for backup capability. EMD is not provided for medical calls in Murrieta. All medical requests receive a fire and ambulance response. As with other jurisdictions, there is an interest in CAD-to-CAD interface with AMR; however, the City of Murrieta has concerns as well for the initial and on-going costs of establishing such an interface.



AMR Dispatch Center

The dispatch center at AMR functions as neither a primary nor secondary PSAP. Its purpose is to receive requests for service from the various primary and secondary PSAPs throughout Riverside County. The center receives emergency and non-emergency requests for inter-facility transfers and other non-emergency ambulance scheduling in addition to managing the system status plan and unit deployment.

AMR utilizes Tritech CAD, which is integrated with its Global Positioning System (GPS)/Automatic Vehicle Location (AVL) system and makes recommendations on unit selection and posting moves. AMR is not utilizing MARVLIS¹⁸ or other related advanced technologies for deployment strategies.

AMR expressed interest in establishing CAD-to-CAD interfaces; however, the overall cost of such interfaces and the number of connections needed still remains a concern. AMR has a CAD-to-CAD interface with the Riverside County Fire Department ECC and describes the transfer of dispatch data as seamless.

AMR typically staffs the dispatch center with a combination of 3 call-takers and three dispatchers/system status controllers (SSC), and has the ability to increase staffing for high volume periods. The AMR dispatch center processed 150,194 9-1-1 calls in 2012, along with 37,814 other types of calls for a total of 188,008 calls.

Riverside County Sheriff's Dispatch Center

A site visit to the Sheriff's Dispatch Center was conducted. The dispatch center operates a primary PSAP only. It transfers fire and medical calls to the Riverside County Fire Department ECC in Perris. The primary dispatch center in Riverside has 23 dispatch positions while satellite centers in Palm Desert and Blythe have seven and one positions, respectively. The dispatch center handles in excess of 1.6 million calls per year, with approximately eight percent of those being fire/EMS emergencies.

Riverside County Fire Department Emergency Communications Center (ECC)

The ECC provides secondary PSAP services to all of the unincorporated areas in Riverside County as well as 21 contracted cities, two tribal entities, Idyllwild Fire Protection District, and County Environmental Health. The ECC also provides EMD utilizing Pro QA software to each of those entities. This system is integrated with a Northrup/Grumman CAD system.

The ECC is a combination of County employees and Riverside County Fire Department staff. All of the dispatchers are County employees. There are supervisory positions staffed by Riverside County Fire Department captains. There are a total of 12 positions within the dispatch center. The hardware utilized in the center is Dell servers with a CISCO network. All mobile assets utilize Panasonic Toughbook 19's. The mobile data computers receive real-time notes from the CAD for call specifics.

¹⁸ Motorola's Mobile Area Routing and Vehicle Location Information System



All dispatchers are certified by the National Association of Emergency Dispatch (NAED), and receive weekly feedback through the CQI system regarding performance. All pre-arrival instructions are reviewed to ensure compliance with MPDS standards. Additionally, trended data is posted on a monthly basis and drives the continuing education process.

The Riverside County Fire Department (operated by CAL FIRE) is unique in California, as it constitutes nearly one third of all of CAL FIRE's operations statewide. Most of their information technology support positions are maintained in-house with either Riverside County Fire Department or county employees, allowing for an immediate response to any technical issues. Approximately 130,000 incidents are processed at the ECC annually, with 80 percent of those being medical emergencies. Management at the ECC indicated an interest in working with the County and the REMSA to facilitate the consolidation of ambulance dispatching services. ECC management stated that they were confident that such consolidated services would produce costs savings to all of the parties.

Riverside County Public Safety Enterprise Communication (PSEC)

The Public Safety Enterprise Communication project, which is hosted by Riverside County, is the expansion of the communications system capabilities and its associated infrastructure. The current system provides coverage to only about 60 percent of the County and is at the end of its useful life. PSEC is no longer adequate to meet the County's coverage and capacity needs. Population growth within the County is necessitating the expansion of coverage. Additionally, due to increases in the County's radio usage and technological enhancements, additional traffic-carrying capacity is required to meet the needs of emergency services personnel.

The communications expansion includes both 700 MHz and VHF capabilities, and greatly expands the communications tower locations, as noted in Figure 46.

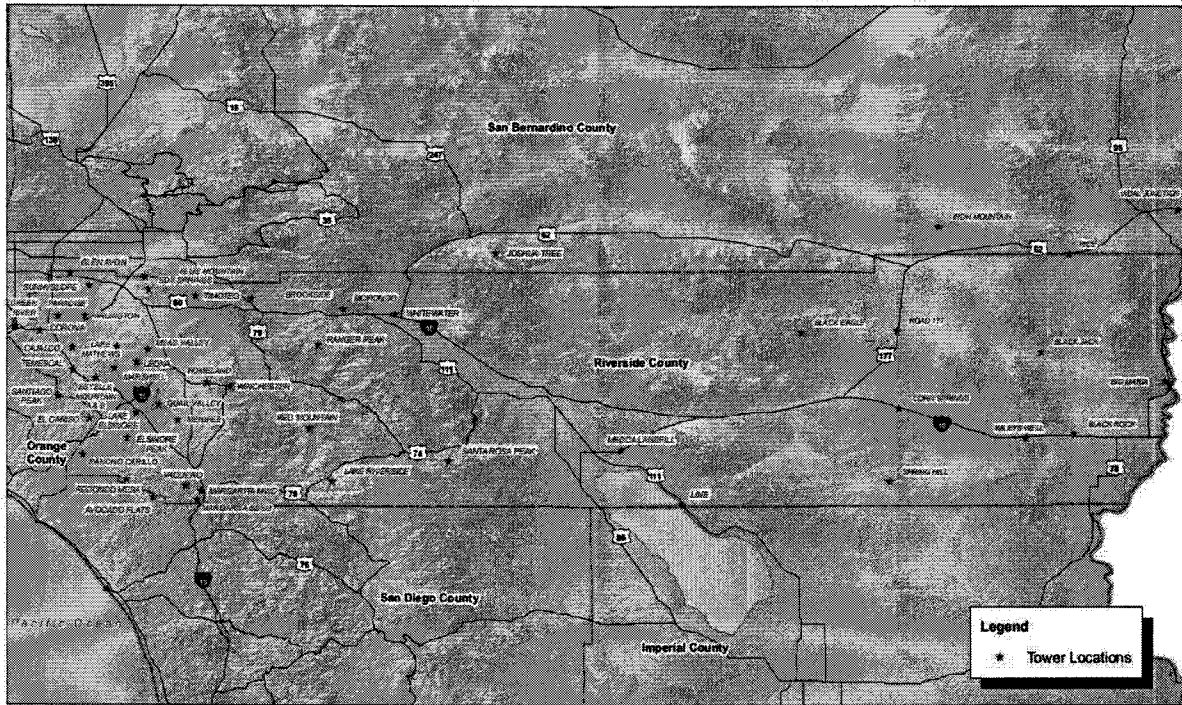


Figure 46 - Riverside County Public Safety Enterprise Communication (PSEC)

Officials with the County stated that the new system standard required the vendor to achieve a “95 percent coverage of the County, 99 percent of the time from a hand-held radio.” PSEC officials state that this standard has been achieved and that the new system has greatly improved voice and data coverage and transfer speed and capacity. A marketing strategy has been developed, and County officials are in the process of meeting with community leaders around the County to discuss expansion opportunities with other potential users. At a cost approximating \$151 million dollars to establish, one key to adding additional users will be ensuring that the cost of participation is reasonable and consistent with the value that users will realize.

PSEC officials that spoke stated that the cost to users will be based on the equipment utilized and on-going maintenance. The County indicated that no recovery of the initial system investment will be included with the cost of participation.



Summary of Review

The Riverside County emergency services network of PSAPs and dispatch centers is very complex and is comprised of both state-of-the-art technology as well as many opportunities for improving both technology and process. Riverside County contains 28 incorporated cities, with 15 Primary PSAPs, including the three CHP locations and the University of California (UC) Riverside Police Department. Additionally, there are seven secondary PSAPs for EMS/Fire requests. Figure 47, below, displays these relationships in more detail:

Riverside County PSAPs and Dispatch Centers						
Primary PSAP	Secondary PSAP	EMD Provided by:	Ambulance Dispatch Info Transfer	Population served by EMD	EMD Product	
Banning P.D.	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	29,603	MPDS	
Beaumont P.D.	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	36,877	MPDS	
Blythe P.D.	NA	No	Phone Line to River Medical	0	NA	
Riverside County Sheriff's Office Primary PSAP for: Callimesa, Canyon Lake, Coachella, Eastvale, Indian Wells, Jurupa Valley, Lake Elsinore, La Quinta, Menifee, Moreno Valley, Morongo Indian Reservation, Norco, Palm Desert, Perris, Rancho Mirage, San Jacinto, Temecula, Wildomar and all unincorporated areas	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	1,415,837	MPDS	
Cathedral City PD/Fire/EMS	Cathedral City PD/Fire	No	NA	0	NA	
CHP	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	NA	MPDS	
CHP	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	NA	MPDS	
CHP	RivCo/CalFire ECC	RivCo/CalFire ECC	CAD to CAD - AMR	NA	MPDS	
Corona PD/Fire	Corona	Corona	Data Dump to AMR	152,374	In-House	
Hemet PD ¹	Hemet	No	Two-way Radio	0	NA	
Indio PD	RivCo/CalFire ECC	RivCo/CalFire ECC	NA	76,036	MPDS	
Murrieta PD/Fire	Murrieta	No	Phone Line to AMR	0	NA	
Palm Springs	Palm Springs	No	Two-way Radio	0	NA	
Riverside City	Riverside City	Riverside City	Data Dump to AMR	303,871	MPDS	
UC Riverside PD	Riverside City	Riverside City	Data Dump to AMR	26,500 ²	MPDS	
				Total Population Served by EMD	2,041,098	93.22%

Source: Riverside County EMS Agency and On-Site Inspections
¹ Hemet has applied for grant funding to implement EMD
² UC Riverside students, faculty and staff. <http://www.ucr.edu/staff/>

Figure 47 - Riverside County PSAPs and Dispatch Centers



Pre-hospital Providers

Two-Tiered Advanced Life Support (ALS) System

The Riverside County emergency medical services (EMS) system is an integrated, cooperative system that includes public, private and public-private partnerships for coordination of resources focused on delivering optimal care in the pre-hospital environment. For the majority of the County, the current EMS system utilizes a two-tiered Advanced Life Support (ALS) response design. This design provides for fire department ALS first response to medical calls with either a private ALS ambulance or fire department ALS ambulance providing transportation to the hospital. The design allows for optimal use of ALS resources Countywide by providing the option of ALS transfer of care in the field as well as providing for two ALS trained personnel to continue care during transport to the hospital when dictated by patient need. The two-tiered ALS response system has also provided the following benefits to the Countywide EMS system:

- Assures ALS care from the ambulance crew during rare events when ALS first responders were not available (e.g., wildfires, major emergencies)
- Provides experienced paramedics for staffing transitions between provider agencies (e.g., fire departments hire paramedics from the private ambulance provider)
- Provides additional paramedics during Multiple Casualty Incidents (MCIs) and when needed for EMS surge events (e.g., additional resources required during H1N1)

First Responders

There are nine fire departments within Riverside County who provide first response EMS within the incorporated and unincorporated service areas. The two tribal lands and one air reserve base are covered by internal departments (see Figure 48). A significant area of the County is covered by Riverside County Fire Department through agreements with individual cities as well as the County of Riverside (for unincorporated areas).

Most first responder agencies have firefighter/paramedics staffing ALS fire engines, squads, or trucks who respond to medical calls. The only incorporated areas without firefighter/paramedics are the cities of Hemet, Blythe, and Calimesa. Hemet Fire is staffed with emergency medical technicians (EMTs) and provides BLS care for all medical calls. The City of Calimesa’s BLS first response services are provided by the Riverside County Fire Department. Blythe Fire is an all-

First Responder Medical Service Level	
Incorporated & Unincorporated Response Areas	
Blythe Fire Department	FR
Cathedral City Fire Department	ALS
Corona Fire Department	ALS
Hemet Fire Department	BLS
Idyllwild Fire Protection District	ALS
Murrieta Fire Department	ALS
Palm Springs Fire Department	ALS
Riverside County Fire Department	ALS
Riverside County Fire Department - Calimesa	BLS
Riverside Fire Department	ALS
Special Response Areas	
March Field (Air Reserve Base) Fire Department	BLS
Morongo (Tribe) Fire Department	BLS
Pechanga (Tribe) Fire Department	ALS

Source: Fire Department interviews
Notes: FR = First Responder

Figure 48 - First Responder Medical Service Level



volunteer fire department that began responding in 2012 to life-threatening medical calls. It is staffed primarily by first responders and some EMTs. There are no automated external defibrillators (AEDs) on their engines or chief officer vehicles.

Two fire departments, the Cities of Riverside and Corona have developed contractual partnerships with AMR to provide ALS fire engine first response. These agreements allow AMR to extend the ambulance response times by two minutes. Under this agreement, AMR financially compensates the fire departments based on the cost savings from the extended response times. However, Riverside City Fire Department is not contractually obligated to meet an ALS fire response-time standard and neither fire department publically reports their response times. REMSA has approved these partnerships based on ALS first-response-time requirements incorporated into the contracts. Figure 49 provides a summary of first responder contracts and revenue categories for two of these cities.

First Responder Contracts								
Service Area	Riverside City	Corona	Murrieta	Palm Springs	Temecula	Idyllwild	Riverside County Fire - Municipal	Riverside County Fire - Unincorporated
Response Times (90th Percentile)								
1st Responder ALS	9:59	9:59	N/A	N/A	N/A	N/A	N/A	N/A
Transport ALS	11:59	11:59	10:00	10:00	10:00	10:00	10:00	10:00
Fees/Penalties								
1st Responder ALS fee	\$1,322,076	\$558,140	None	None	None	None	None	None
Firefighter on ambulance ≥ 2 times/24 hours*	\$100/call							
AMR false on-scene time	\$200							
Notes								
	Ambulance level of staffing required; fire stations can be used by provider	Based on per transport fee				Run by Riverside County Fire		

Source: Riverside County, AMR, and city agreements and amendments
 Note: This applies after 200 assists per year, which has never occurred

Figure 49 - First Responder Contracts

Through the interview process, the fire and EMS chiefs representing the different fire departments stated that the EMS system is working well overall. They also reported an excellent working relationship with the REMSA staff and are confident that issues are addressed timely. Certain areas of the County have local and Riverside County Fire Department resources stationed in close proximity to certain areas. However, the current EMS system does not necessarily assure the closest resource responds to incidents. This causes some inefficiencies, prolonged responses, and delayed patient assessments and treatments. The fire chiefs noted that other progressive EMS systems have implemented policies that the closest, most appropriate resource(s) is dispatched to the call regardless of service area boundaries.



9-1-1 Ambulance Providers – AMR, Idyllwild

The County contracted ALS emergency ambulance services, currently provided by AMR and the Idyllwild Fire Protection District (IFPD), to operate within the performance levels set by those agreements. These agreements utilize objective response-time criteria that are monitored, collected, analyzed and reported by REMSA. During focused group interviews, most stakeholder groups stated their belief that the providers generally perform well based upon the requirements contained in the current agreements. Comments made by stakeholders during the focus group interviews and broad stakeholder meetings also indicate there is a strong desire amongst stakeholders to see the performance standards and other requirements in the current ambulance agreements continue to improve. In 2004 and 2009, REMSA made some significant improvements in performance standards and system enhancement requirements through the Master Agreement for ALS Ambulance Services. Although improvements were made, many elements of the agreement remain as they were designed in the original 1998 contract. All subsequent agreements with fire departments for ALS first responder services, predominantly implemented in the system between 1999 and 2005, continue to be based upon and reference standards developed for that original 1998 agreement. Provider agency continuous quality improvement (CQI) program, ALS first responder support requirements and education/training requirements continue to reference concepts adopted in the original agreement as “system standards” (i.e., Schedule E of the Master Agreement for ALS Ambulance Services). This dynamic leaves the core of the current pre-hospital care system largely tied to elements of the 1998 Master Agreement for ALS Ambulance Services.

Forty years ago, there were a number of private ambulance companies providing 9-1-1 transport services within Riverside County. During the 1990s, they were purchased by either Laidlaw/MedTrans or AMR, which eventually merged to become one provider – AMR. The 9-1-1 provider contracts with the original companies were assumed through the acquisition process and continue to be in effect today (subject to amendments). Currently, AMR is the only private provider of 9-1-1 ambulance transports in Riverside County. There are a total of eight exclusive operating area (EOA) zones in Riverside County operated by AMR, all zones meet criteria for exclusivity under the Health and Safety Code, §1797.224 – Northwest, Southwest, Central, San Jacinto/Hemet, Pass, Mountain Plateau, Desert, and Palo Verde/Blythe. All zones have response-time standards and reports provided by REMSA that indicate AMR is in compliance.

The response-time standards are based on population density as specified by REMSA and broken into four geographical performance categories. The metro/urban service area standard is 9:59 minutes at least 90 percent of the time for emergency calls. Riverside and Corona cities have 11:59 minute response times due to the ALS first response programs established in these communities. This is an accepted practice in other EMS systems. Overall, the ambulance response-time standards are consistent with those established by other California EMS agencies although they are not as high performance as some benchmark communities (See Benchmark Section of this report).

When AMR does not meet the response-time standards on a particular call, a penalty is assessed for non-compliance. Penalties range from \$5 to \$2,000 based on the number of minutes late. AMR has the



ability to request mutual aid from the BLS ambulance providers but each request carries a \$500 penalty. There are also penalties assessed for not reporting on-scene times (i.e., \$360/call) and vehicle failure while transporting a patient (i.e., \$500/call). On a monthly basis, each zone must maintain a fracture response standard of 90 percent. If AMR falls below this amount the fines double (88-89.99 percent), triple (86-87.99 percent), or quadruple (less than 86 percent). Conversely, AMR can receive credit when a zone (or all zones) exceeds 91 percent (15 percent credit) and up to 95 percent (100 percent credit). When late response times exceed 10 minutes, there is no additional fine, but no zone performance credit is provided. These fines or "liquidated damages" are collected and redistributed to the jurisdiction where the late response occurred. Penalties assessed were \$449,013 and \$494,016 during 2011 and 2012, respectively.¹⁹

Idyllwild Fire Protection District (IFPD) operates in three zones and meets the criteria for exclusivity in Zone I pursuant to the Health and Safety Code, §1797.224. IFPD provides ambulance service under contract with the County within Idyllwild Zone I and to the two adjacent zones (Zone II – Pine Cove CSA 38 and Zone III – north of CSA 38). These areas are in a rural, isolated section of Riverside County. Two ALS ambulances are staffed at all times and a third ambulance is staffed on an as needed basis. There are approximately 500 transports in that community annually. A significant portion (i.e., 3-4/week) is flown by helicopter due to the mountain roads and a minimum 40-minute transport time. IFPD has established a letter of understanding (LOU) with AMR's Hemet Division to cover the Mountain Plateau Zone. This zone is geographically remote from the rest of AMR's operational area and contiguous to the Idyllwild Zone I. The public-private partnership appears to be a cost-effective solution for providing service for the low volume of calls in this zone.

In 1966, Springs Ambulance provided 9-1-1 transport services to Cathedral City. The City formed its own fire department in 1988 electing not to continue County coverage following an impending transition to CAL FIRE's contract to operate the Riverside County Fire Department (then called CDF). During this same time, the City assumed the 9-1-1 ambulance service from Springs Ambulance. It now staffs two ALS ambulances at all times which perform roughly 2,500 transports annually. The City relies on mutual aid from the AMR Palms Springs Division when its ambulances are committed. The State EMS Authority has determined that this operating area does not meet criteria for exclusivity pursuant to the Health and Safety Code, §1797.224.

Riverside County Fire Department provides 9-1-1 ambulance service in cities of Indio, Indian Wells, Palm Desert, and Rancho Mirage. Indian Wells, Palm Desert and Rancho Mirage comprise the Cove Cities Zone and meet criteria for exclusivity under the Health and Safety Code, §1797.224. The Cove Cities Zone also meet criteria under the Health and Safety Code, §1797.201. Indio is served by Riverside County Fire Department and has been determined by the State EMS Authority to not meet the criteria for exclusivity pursuant to the Health and Safety Code, §1797.224 due to their operations starting after 1981. The Cove Cities Zone has been in operation since 1980 when the voters approved a fire-tax measure to provide

¹⁹ Does not include Blythe Zone penalties



these services at no additional cost to their community. This operation does receive mutual aid primarily from AMR (and on rare occasions from Riverside County Fire Department; those interviewed thought the limited response by Riverside County Fire Department was due in part to this area being fully tax-funded). Riverside County Fire Department transports approximately 3,200 patients annually.

Air Ambulance Providers

There are three private helicopter EMS (HEMS) providers serving Riverside County – Mercy Air, with bases in Thermal and Hemet, REACH Air, out of Thermal (Thermal-area calls are rotated daily), and Tristate Careflight, based in Arizona, which serves Eastern Riverside County because it is closer than the other providers. Three public helicopter services also have the capability to transport, but are typically more involved with search and rescue and fire operations – Riverside County Fire Department, California Highway Patrol, and Riverside County Sheriff. The primary HEMS operators are required to have one paramedic and one registered nurse (or higher staffing); the rescue aircraft can be staffed by ALS, BLS, or only rescue staff. Figure 50 provides the volume of scene responses and transports reported by all HEMS providers to REMSA during 2010 and 2011. These transport numbers are 15-40 percent different than the transport volume identified through the HEMS quality improvement (QI) review process; REMSA may want to audit both data capture mechanisms to ensure accurate data is available.

Air Ambulance Emergency Volume					
Year	2012	2011	2010	2009	2008
Responses	639	402	440	-	315
Transports	237	258	153	156	175
% Transported	37%	64%	35%	-	56%

Note: 2009 data incomplete
Source: REMSA

Figure 50 - Air Ambulance EMS Volume

All requests for HEMS resources are managed by the Riverside County ECC for better coordination of air resources Countywide. There were varying opinions during the interview process on whether HEMS are simultaneously dispatched with ground resources to remote areas. The consensus was that the responding fire and transport resources as well as the County dispatch supervisor have the authority. However, this is not done consistently and there are no written policies for specific distances for simultaneous dispatch or type of call (e.g., trauma, pediatric). Some ground providers felt pressured not to use air resources based on the scrutiny placed on it by the 100 percent retrospective review process.

Similar to other counties, REMSA performs retrospective quality improvement on all transports to ensure proper utilization of air resources. REMSA currently audits 100 percent for not only appropriateness, but also landing zone safety, care and documentation, accurate estimate arrival times, and on scene times. For 2013, it is beginning to review extended ground transport times and inter-facility transfers following a ground ambulance transport to a local ED for possible opportunities to use HEMS more effectively.



Inter-facility Ambulance Providers

A total of 19 non-emergency ambulance providers offer BLS ambulance inter-facility transports (IFT) between healthcare facilities. There is significant variability on the volume of transports conducted by each provider within Riverside County. The City of Riverside establishes exclusivity through a City ordinance for ALS and BLS ambulance IFT. Other BLS providers have applied to the City of Riverside, but they have historically been denied based on not being able to demonstrate the “need and necessity” required by the City. The IFT data is available in Figure 51.

ALS IFT is part of each EOA. Only the EOA provider can offer ALS-level service within the EOA.

Ground Ambulance Interfacility Volume					
Type	2012	2011	2010	2009	2008
BLS transports	54,399	56,564	58,078	47,018	50,778
ALS transports	10,726	10,364	11,023	10,288	10,128
CCT transports	7,391	7,048	N/A	N/A	N/A
Total	72,516	73,976	69,101	57,306	60,906

Source: BLS, ALS- REMSA, CCT- providers, N/A = Not Available

Figure 51 - Ground Ambulance Inter-Facility Volume

There are nine ground ambulance providers offering

Ground Ambulance Interfacility Revenue				
Transport Type	2012		2011	
	Transports	Net Revenue	Transports	Net Revenue
BLS	54,399	\$18,671,314	56,564	\$19,414,405
ALS	10,726	\$ 4,246,289	10,364	\$ 4,102,978
CCT	7,391	\$ 6,915,485	7,048	\$ 6,594,553
Total	72,516	\$29,833,089	73,976	\$30,111,936

Transport Source: BLS, ALS- REMSA, CCT- providers

Net Revenue Assumption: Based on local Medicare allowables, average 10 mile transport, and 15 percent increase

Figure 52 - Ground Ambulance Inter-Facility Revenue

inter-facility nurse critical care transportation (CCT). Providers utilize either a dedicated CCT ambulance with a nurse and EMT or a BLS ambulance with a nurse who meets the ambulance at the sending hospital with the CCT supplies and equipment. Figure 52 identifies the CCT volume during the last two years.

The Riverside Chapter Board of the California Association of Healthcare Facilities (CAHF) was interviewed as part of the EMS strategic process as well as a sampling of other long term care facilities that use IFT. They reported a good working relationship with the different IFT providers and stated response times are good including Riverside City, where AMR is the only provider. Some facility charge nurses mentioned ambulance crews making negative comments about the need for transport, but this appears to be more related to the 9-1-1 ambulance crews.

The current IFT market is non-exclusive and there a number of ambulance companies competing for the BLS and CCT transports as mentioned above. There is one exception, the City of Riverside, through City ordinance, has created a franchise through city ordinance.²⁰ AMR is currently the only provider and while other ambulance companies have applied, they have not been approved up to this time period. Figure 52 demonstrates the number of transports and estimated net revenue during the last two years.

²⁰ The City of Riverside has a longstanding City ordinance (City Ordinance 4768) that seeks to permit and establish control over the number and extent of ambulance providers within that city.



Advanced EMT

The Advanced EMT (AEMT) certification represents an EMT with the ability to perform limited airway devices and medication administration. It was first articulated in the 1996 EMS Agenda for the Future and further defined by the 2000 EMS Education Agenda for the Future: A System Approach. The California EMS Authority (EMSA) released the initial AEMT policy in 2010 and updated in 2012 to match the National EMS Education Standards and require National Registry EMT testing. However, EMSA allows each local EMS agency (LEMSA) to determine whether it will recognize AEMT within each jurisdiction. To date, three LEMSAs have decided to approve AEMT as a certification level – Sierra-Sacramento, Mountain Valley, and Imperial.

While Riverside County does not currently have an AEMT program, the AEMT program is included in the County's medical protocols. The vast majority of the County, both cities and unincorporated areas, are being served by paramedics. If REMSA were to add AEMT certification, it would most likely not improve the level of EMS care provided in most zones. However, REMSA may want to talk with non-ALS first responders for a potential opportunity to use AEMTs. Some ALS agencies may also want to determine field provider interest in AEMT as an opportunity to better support the existing paramedics.



Review of Ambulance Performance, EOAs and Sub-Zones

The process for establishing ambulance Exclusive Operating Areas (EOAs) has been established by state law for the purpose of identifying a single (exclusive) provider, thereby restricting trade and thus must comply with state legal requirements to qualify a county for state anti-trust immunity. There are 12 major zones in the Riverside County EMS plan, ten are EOAs and two are non-exclusive operating areas. Five of the ten major zones are further subdivided into response-time subzones. Development of response subzones has been necessary as population and EMS call volume has grown. However, there have been no significant changes to EOA boundaries or the “manner and scope” to which the grandfathered providers have provided continuous, uninterrupted service since January 1, 1980.²¹

Figure 53 describes the ambulance zones; any sub-zones incorporated in the zone; whether or not it is exclusive and the service provider for the zone. There are a total of 12 zones and 15 sub-zones. These zones (and sub-zones) either follow a historical provider’s service area or the jurisdictional boundaries of the municipal service providers.

The Abaris Group reviewed each of the zones (and sub-zones) in this portion of the report, and provides analysis and observations on each.

²¹ “Manner and Scope” are terms used by the California EMS Authority to describe a threshold of change for an EOA for which that EOA loses their H&S 201 or 224 exclusivity rights and must be competitively bid to regain the EOA’s exclusivity.



Riverside County Ambulance Zones			
Zone Name	Subzones Included	Exclusive (Yes or No)/Provider	Geographic Description
Central Zone	Central Unincorp. South, Moreno Valley	Yes/AMR	Cities of Moreno Valley and Perris and surrounding unincorporated areas.
Desert Zone	Desert Unincorp., Palm Springs and Desert Hot Springs, La Quinta-Coachella, (and contains Coves Cities, Cathedral City, Indio City)	Yes/AMR	Cities of Palm Springs, Desert Hot Springs, La Quinta, Coachella, and surrounding unincorporated areas east of Desert Center.
Northwest Zone	N. Norco/NW Unincorp., S. Corona/NW Unincorp., Riverside City	Yes/AMR	Cities of Riverside, Corona, Eastvale, Jurupa Valley, Norco and the surrounding unincorporated areas.
Pass Zone	None	Yes/AMR	Cities of Banning, Beaumont, Calimesa and surrounding unincorporated areas.
Mountain Plateau Zone	None (Idyllwild City Zones fall within)	Yes/AMR	Mountain Plateau area except the communities of Idyllwild and Pine Cove.
Southwest Zone	SW Unincorp 01, Murrieta-Temecula	Yes/AMR	Cities of Canyon Lake, Lake Elsinore, Menifee, Murrieta, Temecula, Wildomar and the surrounding unincorporated areas.
San Jacinto Valley / Hemet Zone	San Jacinto Unincorp., Hemet	Yes/AMR	Cities of San Jacinto, Hemet and the surrounding unincorporated areas.
Palo Verde Valley Zone	None	Yes/AMR, dba Blythe Ambulance	City of Blythe and the surrounding unincorporated areas in the Palo Verde Valley region from state and county boundaries west to Desert Center.
Idyllwild Fire Protection District (IFPD)	IFPD Subzones I, II and III	Subzone I - Yes/IFPD Subzones II and III - No/IFPD	Idyllwild Fire Protection District
Cathedral City Zone	None	No/Cathedral City Fire Department	Cathedral City
Indio City Zone	None	No/RivCo Fire-Cal Fire	City of Indio
Coves Cities Zone	None	Yes/RivCo Fire-Cal Fire	Cities of Indian Wells, Palm Desert and Rancho Mirage.

Source: Riverside County EMS Plan, 2012 Draft Update

Figure 53- Riverside County Ambulance Zones



EOA/Zone Configuration

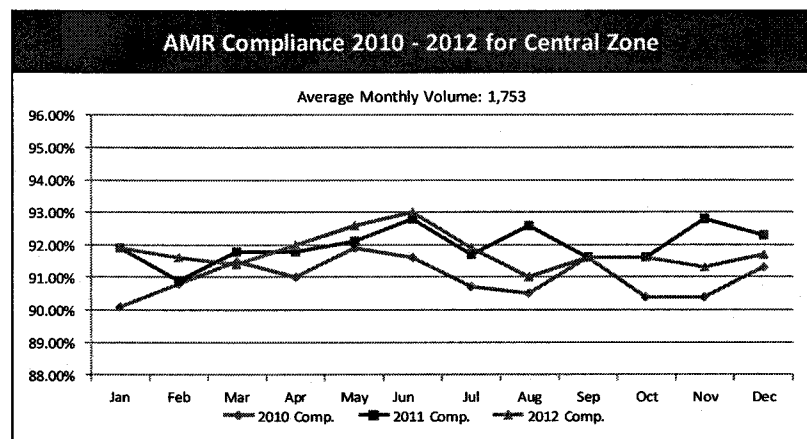
The Abaris Group typically uses a combination of factors when evaluating an EMS EOAs and Zones. The factors include:

- Geographic barriers to access within the zone
- Hospitals within the zone (i.e., destination options)
- Population density
- Total annual EMS responses within the zone
- Total population of the zone
- Transportation access within the zone
- Other considerations when relevant to REMSA

Depending on the preferences of the governing body and the qualifications of the county area(s) being examined, a determination also needs to be made with regard to the size and scope of exclusive zones, response time compliance zones, etc. Another area of evaluation is the impact of zone development on smaller communities within the zone. In zones with a large metropolitan area, response time compliance in the smaller communities can fall to unacceptable levels without necessarily being reflected in the zone compliance, due to the large number of [presumably on-time] responses within the large metropolitan area. This will be examined further during the individual zone reviews, below.

Central Zone

The Central Zone includes the cities of Moreno Valley (population 193,365) and Perris (population 68,386) and surrounding unincorporated areas including the communities of Nuevo (population 6,447) and Lakeview (population 2,104).²² The total estimated population of the Central Zone is 316,180.²³ Subtracting the population of the two incorporated cities, the unincorporated population within the Central Zone is estimated at 54,429.



Source: Riverside EMSA Compliance Data

Figure 54 - AMR Compliance 2010-2012 for Central Zone

²² All population numbers are based on the 2010 U.S. Census

²³ Estimates are calculated using Census Block Groups. Where a Census Block Group extends beyond the boundary of a zone, the percentage of the total Block Group population within each zone is estimated, based on underlying infrastructure.



Central Zone Determination – Exclusive (Grandfathered)

Goodhew Ambulance Service provided emergency ambulance services to the Central Zone since the 1970s. In 1995, Laidlaw/MedTrans purchased Goodhew Ambulance Service and then merged with AMR in 1997. The Central Zone exclusivity was established via the “grandfathering” provisions of California Health and Safety Code, §1797.224, as the County established that AMR and its predecessor companies maintained uninterrupted service in the same scope and manner since prior to January 1, 1981. Riverside County entered into a contract with AMR in September, 1998 for the Central Zone and six other zones.

As noted in Figure 54, the Central Zone averages 1,753 responses per month, based on a three-year average from 2010-2012. This volume ranged from a high in August, 2012 of 2,070 responses to a low in February, 2010 of 1,525. There are two sub-zones within the Central Zone, the Central Unincorporated South Sub-zone (average monthly responses = 693), and the Moreno Valley Sub-zone (average monthly responses = 1,060). The Central Unincorporated South Sub-zone contains all of the Central Zone except for the city of Moreno Valley. See Figure 55 for the map layout of these sub-zones. In addition to the city boundaries and zones, Figure 55 displays highways, interstates, hospital locations and, more importantly, the population density of the Central Zone, based on Census Block Groups (i.e., 2010 Census).

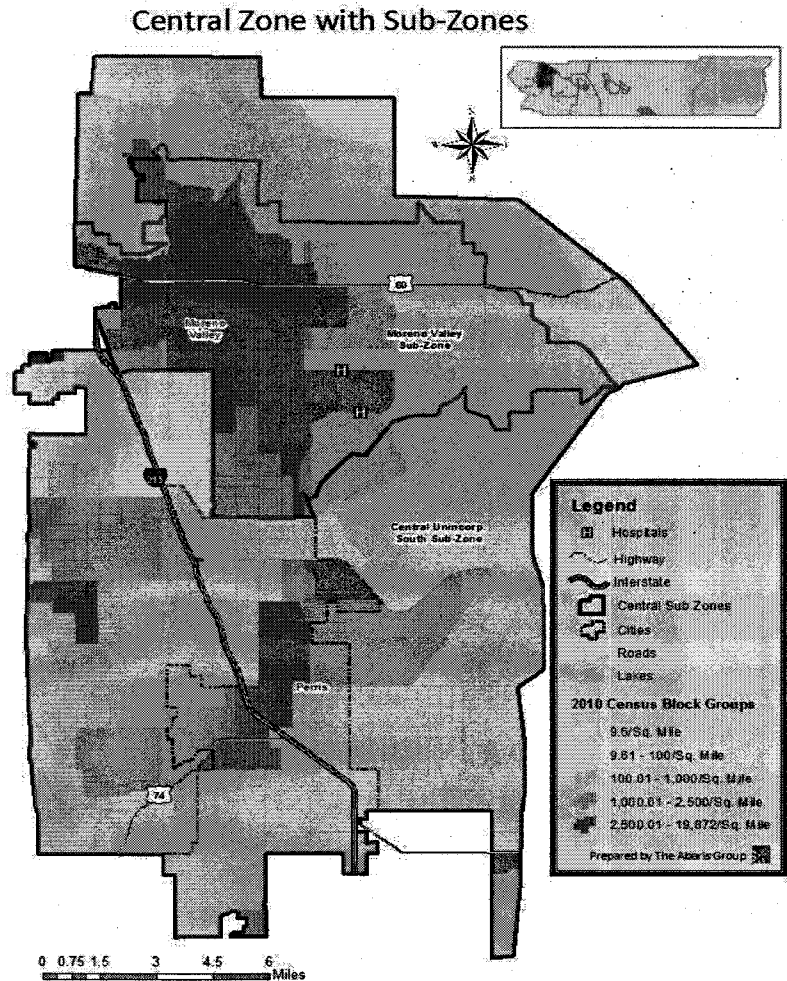


Figure 55 - Central Zone with Sub-Zones

Based on these considerations, The Abaris Group finds that the Central Zone has historically been appropriately designed and configured to function as a stand-alone zone for the purpose of conducting response time compliance analysis.



Desert Zone

The Desert Zone includes the cities of Cathedral City (population 51,200), Palm Springs (population 44,552), Rancho Mirage (population 17,218), Desert Hot Springs (population 25,938), Palm Desert (population 48,445) Indian Wells

(population 4,958), Indio (population 76,036), La Quinta (population 37,467) and Coachella (population 40,704). The overall population of the Desert Zone is estimated at 480,563. After subtracting the incorporated city populations, the population of the unincorporated area is estimated at 134,045. It is important to note that the cities of Cathedral City, Indio and Cove Cities are served by separate providers and are sub-zones within the greater Desert Zone.

Desert Sub-Zone Detail			
Sub-Zone Name	Geographic Description	Exclusive (Yes or No)/Provider	Population Served
Desert Unincorporated with Coachella and La Quinta	Cities of Coachella and La Quinta with the unincorporated areas extending to Desert Center.	Yes/AMR	212,216
Palm Springs & Desert Hot Springs	Cities of Palm Springs & Desert Hot Springs	Yes/AMR	70,490
Cathedral City Zone	Cathedral City	No/Cathedral City Fire Department	51,200
Indio City Zone	City of Indio	No/RivCo Fire-Cal Fire	76,036
Coves Cities Zone	Cities of Indian Wells, Palm Desert and Rancho Mirage	Yes/RivCo Fire-Cal Fire	70,621

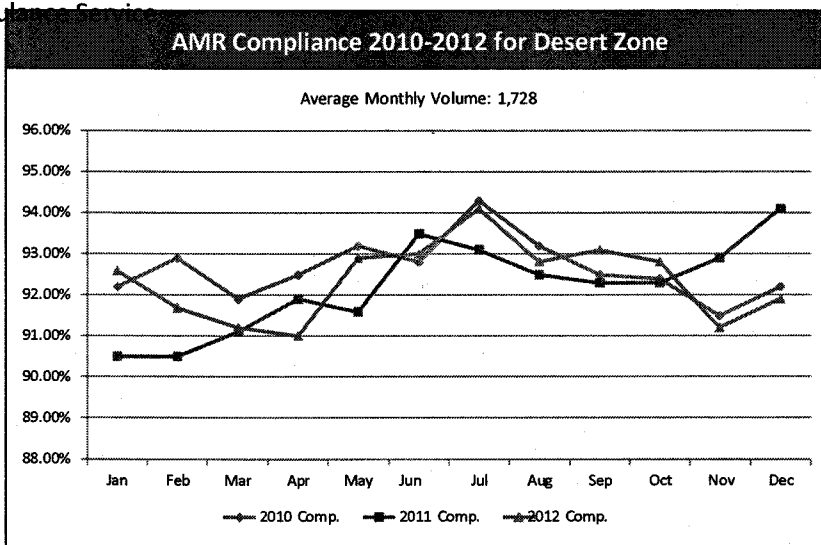
Source: Riverside County EMS Plan, 2012 Draft Update and US Census Bureau
Figure 56 - Desert Sub-Zone Detail

There are five sub-zones within the Desert Zone, most of which are clustered along the western region of the zone, near Interstate 10 (see Figure 56 for description).

Desert Zone Determination – Exclusive

(Grandfathered) Springs Ambulance Service

provided emergency ambulance services to the Desert Zone from 1966 to 1996. In 1996, AMR purchased Springs Ambulance Service, and then merged with Laidlaw/MedTrans in 1997. The Desert Zone exclusivity was established via the “grandfathering” provisions of California Health and Safety Code, §1797.224, as the County established that AMR and its predecessor companies maintained uninterrupted service in the same scope and manner since prior to January 1, 1981. Riverside County entered into a contract with AMR in September, 1998 for the Desert Zone and six other zones.



Source: Riverside EMSA Compliance Data
Figure 57 - AMR Compliance 2010-2012 for Desert Zone



Desert Zone and Sub-Zones

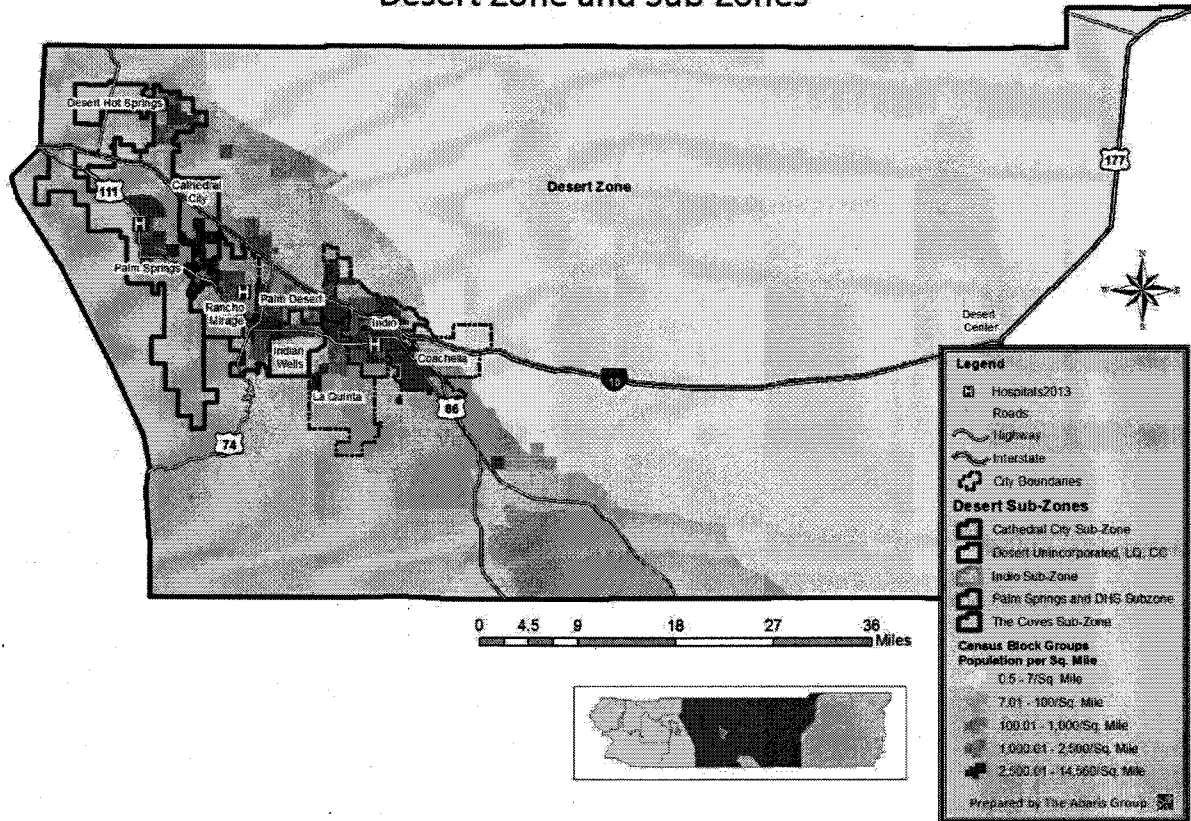


Figure 58 - Desert Zone and Sub-Zones

The Desert Zone is the largest of the zones, and is approximately 4,486 square miles in area, constituting 62.2 percent of the entire County, while containing only about 22 percent of the population. While the western portion of the Interstate 10 corridor is fairly densely populated, most of the remainder of the zone constitutes a wilderness population density. Much of this wilderness area has few roads, and access to many areas is very restricted. As such, nearly 80 percent of this zone has a required response time of 59 minutes and 59 seconds or faster.

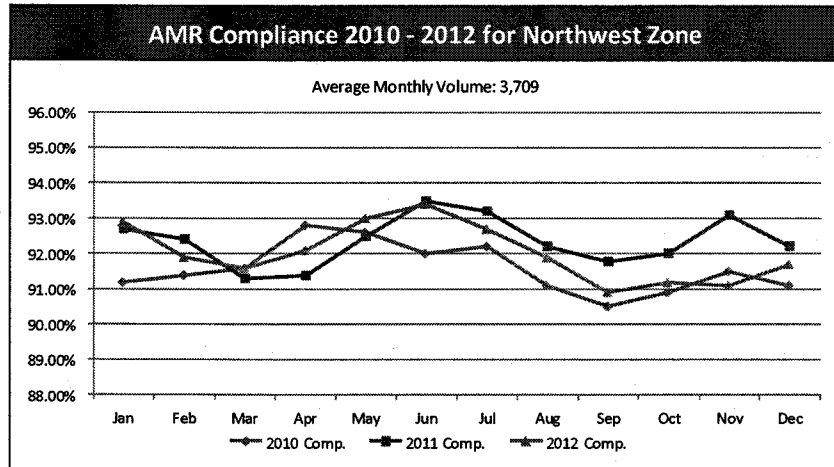
The configuration of this zone and its sub-zones is not ideal from the standpoint of the County franchise or zone coverage. With the Coves Cities, Cathedral City and Indio sub-zones carved out of this very large zone, approximately 198,000 in population (41 percent of the zone population) is served by alternate providers and unavailable to the County contractor, requiring them to cross “dead space” when responding through these sub-zones for calls within its areas of service. This large area of “carve-outs” also creates a sizeable hole in a deployment plan for the populated areas of the zone. Using an estimated utilization rate of 70 responses per 1,000 population,²⁴ this equates to a loss to the franchise of approximately 13,860 responses annually. This becomes more important when one considers the remaining remote to wilderness areas that must be served by the contractor.

²⁴ Estimated using 2.2 million in population and an average of 156,000 responses annually.



Northwest Zone

The Northwest Zone contains the cities of Riverside (population 303,871), Corona (population 152,374), Norco (population 27,063), Eastvale (population 53,670), Jurupa Valley (population 95,004) and the surrounding unincorporated areas (population estimate 86,337). The zone also contains three sub-zones; the Riverside City Sub-zone (population 303,871), the Northwest Unincorporated North Norco Sub-zone (population approximately 191,500 containing the cities of Norco, Eastvale and Jurupa Valley) and the Northwest Unincorporated South Corona Sub-zone (population approximately 222,400 containing the City of Corona and surrounding unincorporated areas).



Source: Riverside EMSA Compliance Data
Figure 59 - AMR Compliance 2010-2012 for Northwest Zone

Northwest Zone Determination – Exclusive (Grandfathered)

Goodhew Ambulance Service provided ALS ambulance services to the Northwest Zone from the 1970s to 1995. In 1995, Laidlaw/MedTrans purchased Goodhew Ambulance Service, and then merged with AMR in 1997, with no interruption in services. The Northwest Zone exclusivity was established via the “grandfathering” provisions of California Health and Safety Code, §1797.224, as the County established that AMR and its predecessor companies maintained uninterrupted service in the same scope and manner since prior to January 1, 1981.

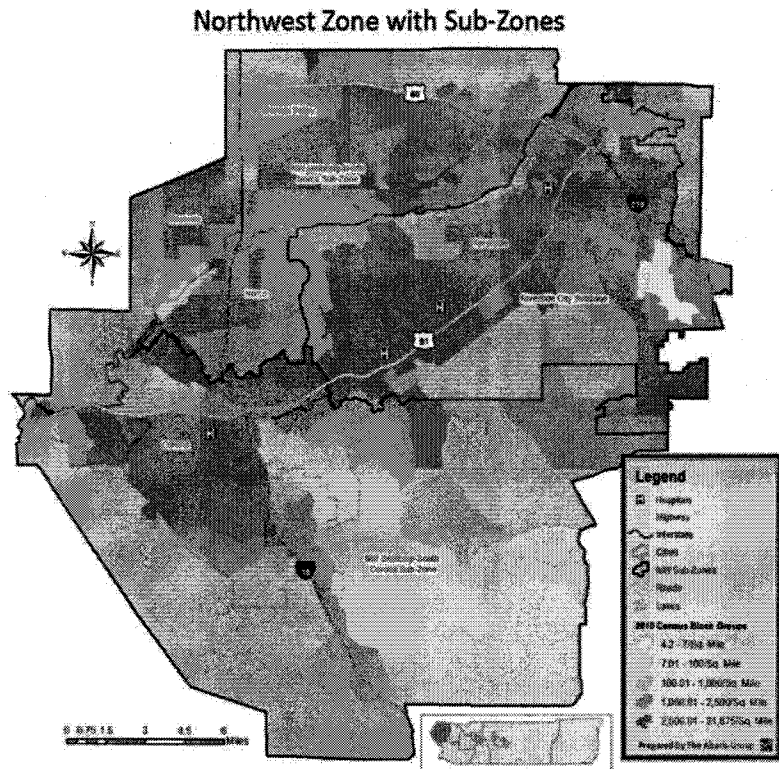


Figure 60 - Northwest Zone with Sub-Zones

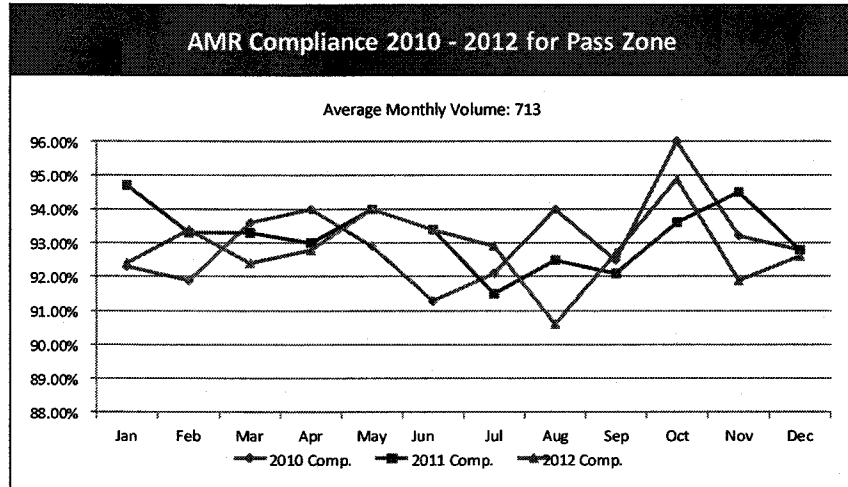


The Northwest Zone has the highest call volume of all the Riverside County zones, averaging 3,709 responses per month, averaged over calendar years 2010-2012. The Riverside City Sub-zone averages 1,913 responses per month with an average response time compliance of 92.1 percent. The Northwest Unincorporated North Norco Sub-zone averages 836 responses per month with an average response time compliance of 91.6 percent. Finally, the Northwest Unincorporated South Corona Sub-zone averages 958 responses per month with an average response time compliance of 91.8 percent.

The Northwest Zone contains primarily metropolitan/urban population densities, and maintains most areas with response-time requirements of 9:59 or better. Based on the previously referenced zone configuration standards, The Abaris Group finds that the Northwest Zone has historically been configured to conduct response-time compliance analysis, particularly when broken out to the sub-zone analysis.

Pass Zone

The Pass Zone is comprised of the incorporated cities of Beaumont (population 36,877), Banning (population 29,603) and Calimesa (population 7,879) and surrounding unincorporated areas (population estimate 14,436). There are no sub-zones within the Pass Zone, and all areas of the zone are served by AMR.



Source: Riverside EMSA Compliance Data
Figure 61 - AMR Compliance 2010-2012 for Pass Zone

Pass Zone Determination – Exclusive (Grandfathered)

Lifecare Medical Transport (LMT) provided ALS ambulance services to the Pass Zone from prior to 1981 until 1996. In 1995, the County began a Request for Proposal (RFP) process. However, a US District Court preliminary injunction was granted to LMT based on its contention that the RFP and the 1994 EMS Plan violated its rights to be grandfathered pursuant to Health and Safety Code §1797.224 and the RFP process was halted at that time. In 1996 AMR purchased LMT. Following the sale, AMR agreed to drop the lawsuit if the Pass Zone was granted exclusivity under the grandfather provisions of California Health and Safety Code §1797.224. The County agreed and the Pass Zone maintains exclusivity through a written contract with the County.

Based on the total volume, population base, transportation access and overall size of the Pass Zone, The Abaris Group finds it adequate for the purpose of response time compliance analysis.



Pass Zone

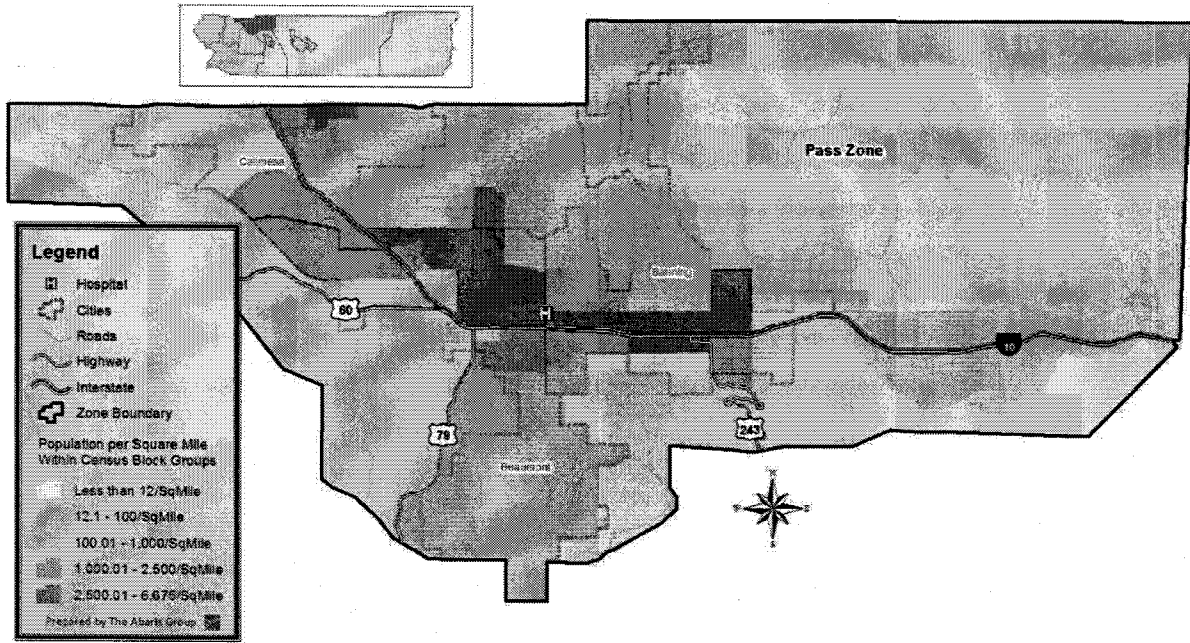
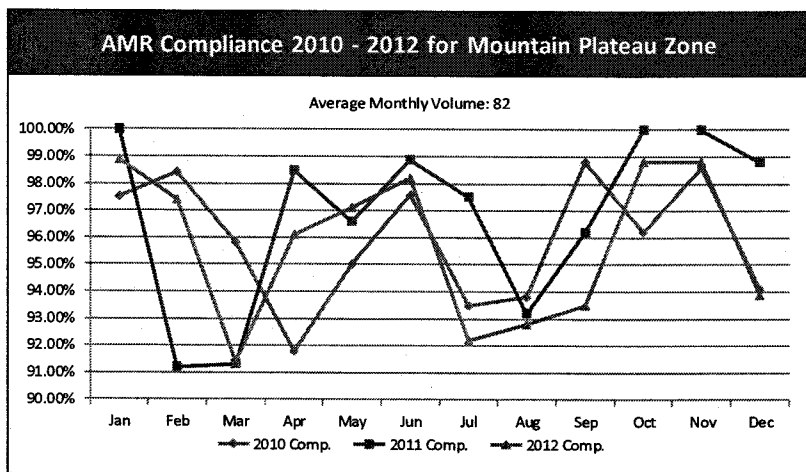


Figure 62 - Pass Zone

Mountain Plateau Zone

The Mountain Plateau Zone contains no incorporated cities, but has five unincorporated communities of note; Idyllwild, Pine Cove, Garner Valley, Pinyon, and Anza. The US Census Bureau has defined Idyllwild-Pine Cove as a single census-designated place (CDP). The population of the CDP was 3,874 at the 2010 census, up from 3,504 as of the 2000 census. The 2010 population of the Anza CDP was 3,014. The overall population of the Mountain Plateau Zone is estimated at 14,392, based on 2010 Census Block data.



Source: Riverside EMSA Compliance Data

Figure 63 - AMR Compliance 2010-2012 for Mountain Plateau Zone



Mountain Plateau Zone

Hemet Valley Ambulance Service provided ALS ambulance services to the Mountain Plateau Zone from the 1970s to 1995. Careline Ambulance won a competitive bid (RFP) in 1995. Careline was purchased by Laidlaw/MedTrans in 1995, which then merged with AMR in 1997. In September 1998, REMSA established its first agreement contract with AMR to provide emergency ambulance service to the Mountain Plateau Zone. Currently, AMR is serving this area pursuant to an agreement with Riverside County. It has been more than ten years since the last RFP for the zone.

The Mountain Plateau Zone has very low volume, with an AMR average monthly volume of just 82 calls. Even if one factors in the monthly volume of the Idyllwild Fire Protection District of 49 calls per month, the overall zone volume is only 131 calls per month.

From the standpoint of response-time compliance analysis, this leaves very little room for error, which is illustrated by Figure 63, with response times varying on a month to month basis. There appear to be few options from the standpoint of geographic consolidations, as merging this zone with a neighboring zone could have a negative impact on the response-time performance of this low volume zone. The possibility includes consideration of extending the compliance analysis period to bi-monthly or even quarterly, to allow sufficient volume to exclude normal month-to-month variation that would not create an unrealistic and statistically invalid shift in compliance analysis.

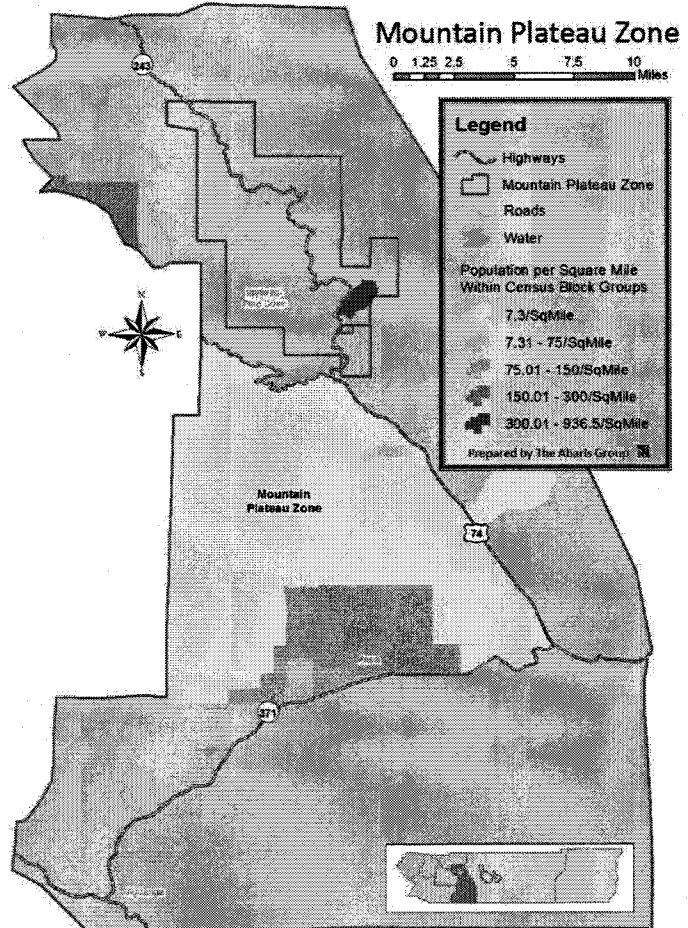


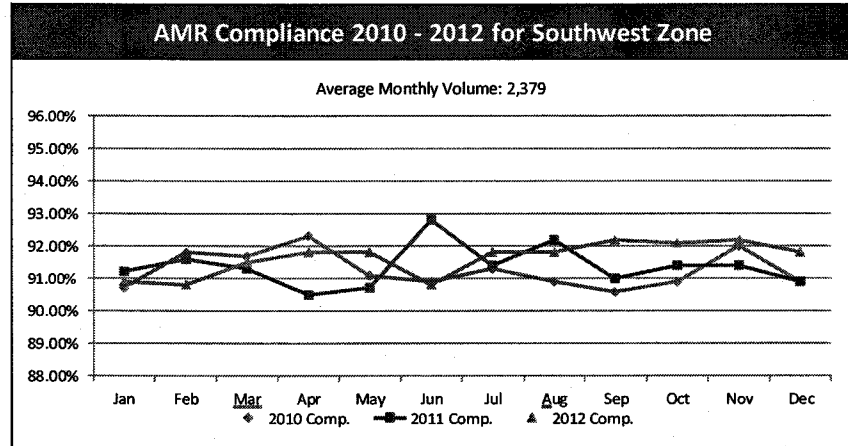
Figure 64 - Mountain Plateau Zone



Southwest Zone

The Southwest Zone has an estimated population of 474,981 and is made up of the incorporated cities of Canyon Lake (population 10,561), Lake Elsinore (population 51,821), Menifee (population 77,519), Murrieta (population 103,466), Temecula (population 100,097), Wildomar (population 32,176) and the surrounding unincorporated areas (population estimate 99,341).

The Southwest Zone is also comprised of two sub-zones; The Murrieta-Temecula Sub-zone and the Southwest Unincorporated Sub-zone. The Murrieta-Temecula Sub-zone consists of the two incorporated cities and has a population of 203,563; an average monthly response volume of 1,006 and an average response time compliance



Source: Riverside EMSA Compliance Data

Figure 65 - Compliance for Southwest Zone

of 92.3 percent. The Southwest Unincorporated Sub-zone consists of the remaining incorporated cities and surrounding unincorporated area and has a population of 271,418; an average monthly response volume of 1,373 and an average response time compliance of 90.7 percent.

Southwest Zone Determination – Exclusive

In 1984, Goodhew Ambulance Service bought John’s Ambulance serving Lake Elsinore and parts of Murrieta. In 1985, Goodhew bought Sun City Ambulance Service serving unincorporated areas in the Southwest Zone. In 1995, Laidlaw/MedTrans purchased Goodhew Ambulance Service and then merged with AMR in 1997, with no interruption in service. REMSA determined that ALS ambulance service delivery to this zone was consistent with the standards required under Health and Safety Code, §1797.224 for “grandfathering” as an EOA.

With the existing population base, population density, call volume, transportation access and available hospital resources, The Abaris Group finds that this zone has historically been adequate for the purpose of response-time compliance analysis.

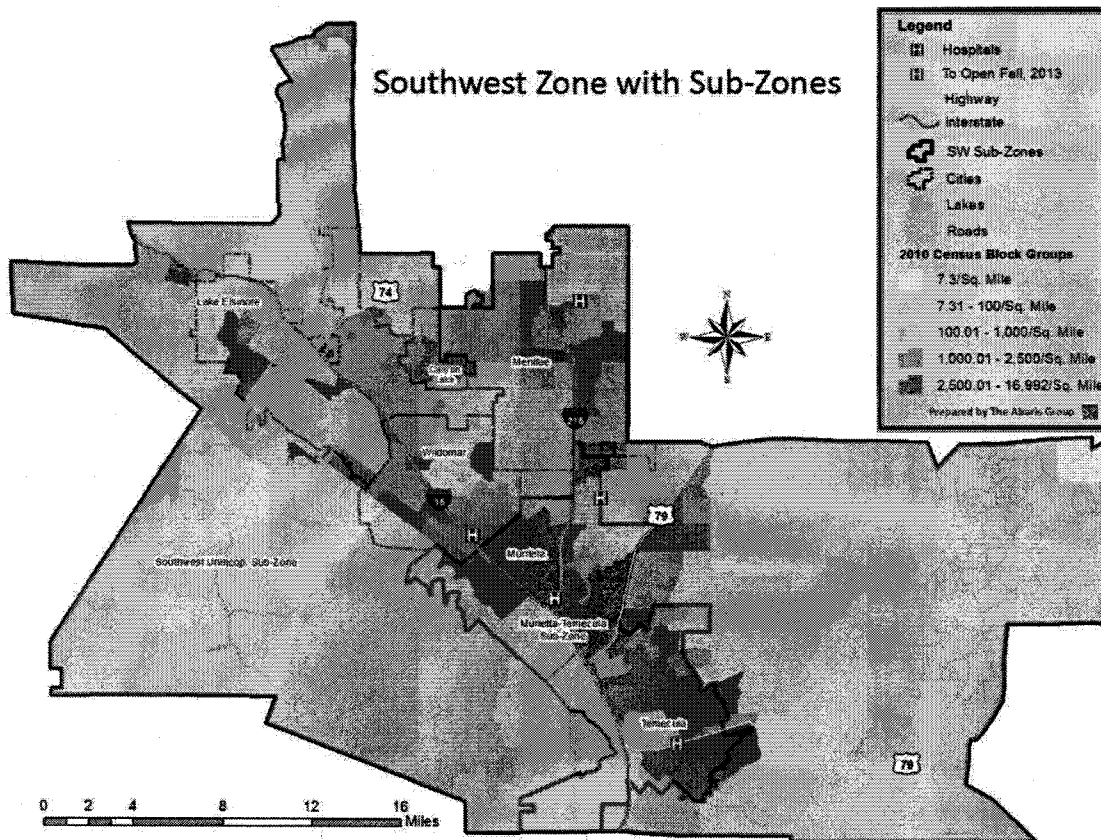
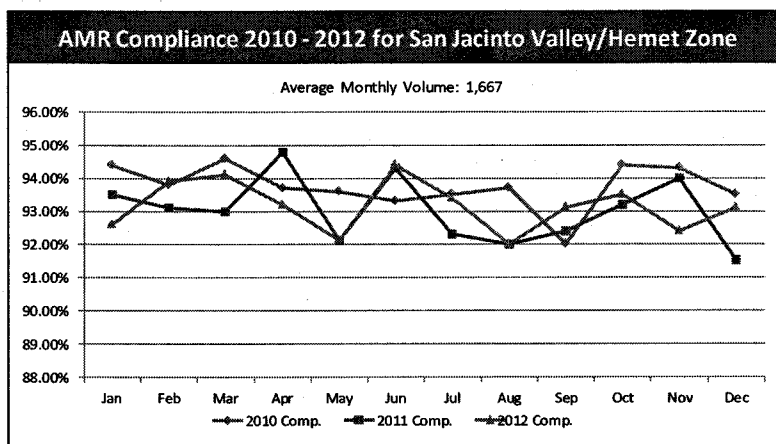


Figure 66 - Southwest Zone with Sub-Zones

San Jacinto Valley/Hemet Zone

The San Jacinto Valley/Hemet Zone contains the incorporated cities of San Jacinto (population 44,199) and Hemet (population 78,657) and the surrounding unincorporated areas (population estimate 55,268). There are two sub-zones within the San Jacinto Valley/Hemet Zone; The Hemet Sub-zone (population 78,657), which has a monthly average response volume of 1,048 and an average response time



Source: Riverside EMSA Compliance Data
Figure 67 - AMR Compliance 2010-2012 for San Jacinto Valley/Hemet Zone

compliance of 93.5 percent, and the San Jacinto Unincorporated Sub-zone (population estimate 99,467), which has an average monthly response volume of 619, with an average response time compliance of 92.9 percent.



San Jacinto Valley/Hemet Zone Determination – Exclusive

Hemet Valley Ambulance Service provided ALS ambulance services to the San Jacinto Valley Zone from the 1970s to 1997. In 1997, Laidlaw/MedTrans purchased Hemet Valley Ambulance Service and then merged with AMR with no interruption in service.

The REMSA determined that ALS ambulance service delivery to this zone was consistent with the standards required under Health and Safety Code, §1797.224 for “grandfathering” as an EOA.

With the existing population base, population density, call volume, transportation access, The Abaris Group finds that this zone has been adequate for the purpose of response-time compliance analysis. It is notable that there is a substantial difference in volume between the two sub-zones, and it would be justified to evaluate the configuration of these sub-zones to better distribute the volume equitably.

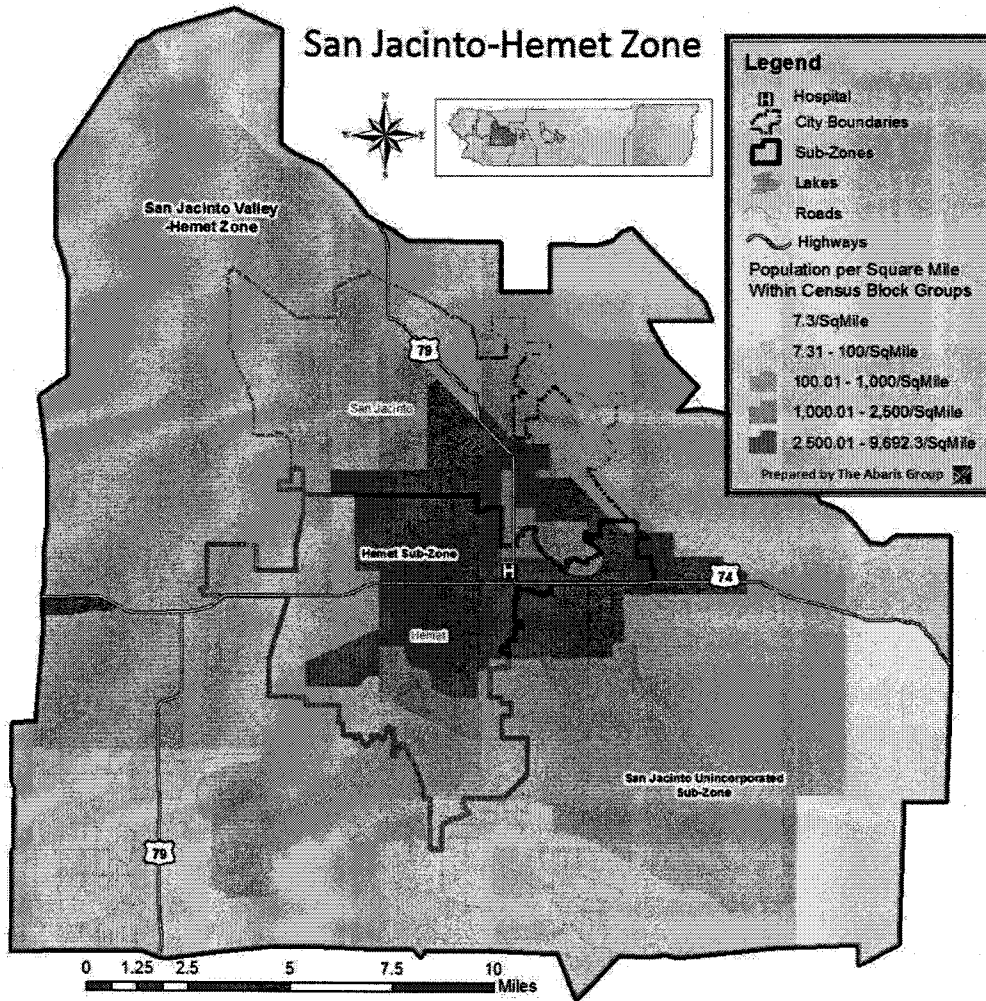
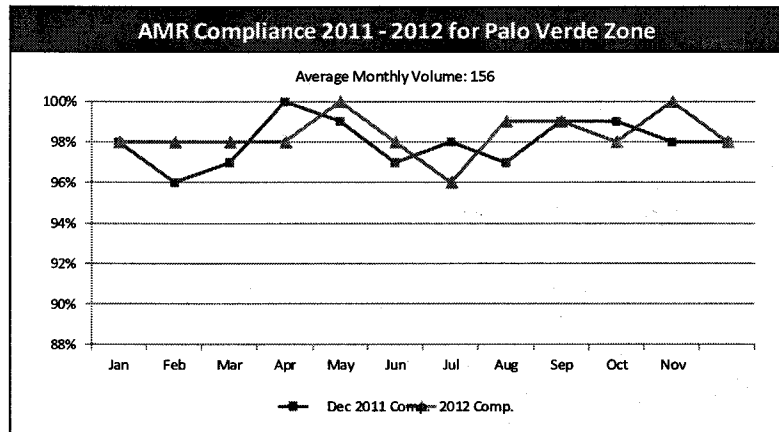


Figure 68 - San Jacinto-Hemet Zone



Palo Verde Valley Zone

The Palo Verde Valley Zone contains the incorporated city of Blythe (population 20,817), and surrounding unincorporated areas (population estimate 3,028), stretching from the Eastern-most edge of the County to Desert Center. The zone is extremely isolated and very sparsely populated. Blythe lies at the border with Arizona, and more than 165 miles from the City of Riverside. There are no sub-zones within the Palo Verde Valley Zone, and nearly 90 percent of the zone is designated as a “Best Effort” response time requirement, due to its isolation and very limited roadway access.



Source: Riverside EMSA Compliance Data

Figure 69 - AMR Compliance 2011-2012 for Palo Verde Zone

Palo Verde Zone Determination – Exclusive

Blythe Ambulance Service has been providing emergency ambulance services from 1979 to the present. On July 1, 2002, Blythe Ambulance Service entered into its first contract with Riverside County to provide emergency ambulance services for the Palo Verde Valley Zone. On January 1, 2011 AMR finalized the purchase of Blythe Ambulance Service, with no interruption in services. The REMSA determined that ALS ambulance service delivery to this zone was consistent with the standards required under Health and Safety Code, §1797.224 for “grandfathering” as an EOA. Riverside County Fire Department provides three ALS assessment engines in Palo Verde Valley, which supplement the EMS service.

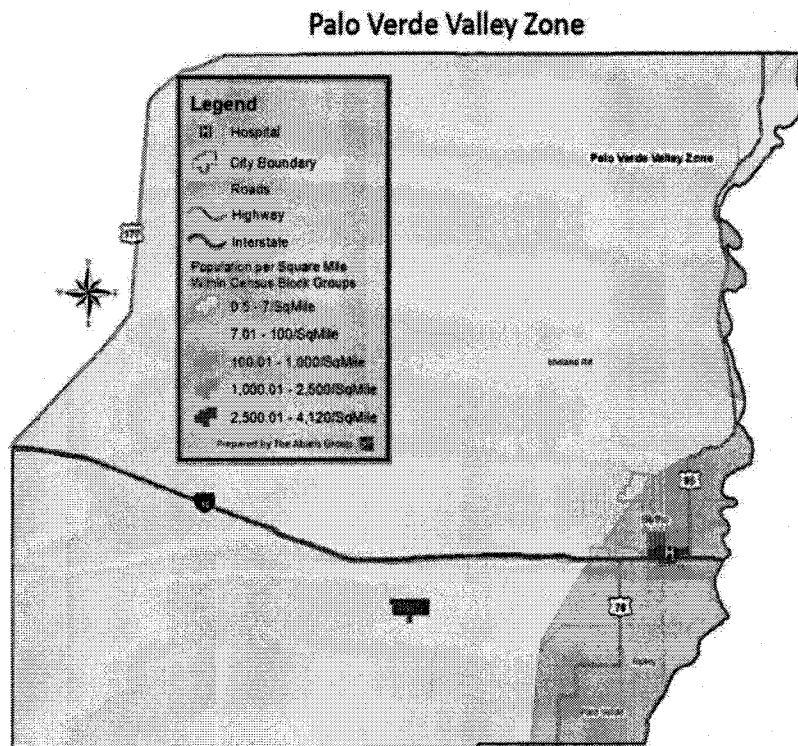
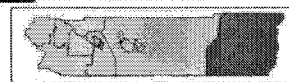


Figure 70 - Palo Verde Valley Zone



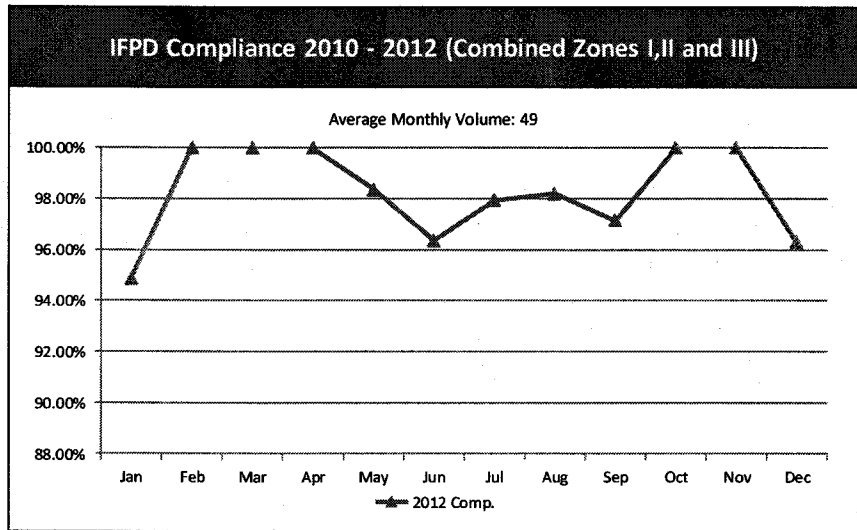


It is difficult to describe the Palo Verde Valley Zone as “adequate” for the purpose of response time compliance analysis, as its monthly volume is quite low and most areas of the zone have a simple “best-effort” response-time expectation. There are few options for reconfiguring this zone, due to its location and isolation within the County and its overall population and low density.

Idyllwild Fire Protection District (IFPD) Zone

There are three areas called zones (I, II and III) serviced by IFPD. Zone I is the IFPD boundaries and recognized by the County as its EOA under Health and Safety Code, §1797.224. Zones II (Pine Cove – CSA-38) and Zone III (north of CSA-38) are actually County areas that are part of the Mountain Plateau Zone. When the bid for the Mountain Plateau Zone was awarded in the 1990s, the contractor defaulted and the Mountain Plateau Zone then went to the County ambulance contractor except for Zones II and III, which the County entered into an agreement with IFPD to serve.

The IFPD Zone contains no incorporated cities, but does contain the Idyllwild-Pine Cove census-designated place and is located in the San Jacinto Mountains, within the Mountain Plateau Zone. Calculating the population of the IFPD is a bit complicated, due to the very rural and sparsely populated nature of the area (i.e., it only contains three census block groups), and the District is estimated at 3,100. However, during the summer tourist season, the population can more than double.



Source: Riverside EMSA Compliance Data

Figure 71 - IFPD Compliance 2010-2012 (Combined Zones I, II, and III)

The three IFPD zones combine for an average response volume of 49 calls per month, and their monthly compliance analysis averages approximately 98.2 percent.

Idyllwild Fire Protection District (IFPD) Zone Determination – Exclusive

IFPD has been providing uninterrupted ALS ambulance services since 1980. IFPD entered into its first contract with Riverside County for ALS ambulance services on July 1, 1997. REMSA determined that ALS ambulance service delivery to IFPD Zone I was consistent with the standards required under Health and Safety Code, §1797.224 for “grandfathering” as an EOA. Zones II and III are non-exclusive.



As noted in other low volume zones, it is difficult to justify carving out isolated areas within low-volume zones for separate service delivery; however, in these difficult to serve areas, there are some advantages in using a tax-supported operation to supplement the limited revenue generated by ambulance transports.

Cathedral City Zone

The Cathedral City Zone contains only the incorporated city of Cathedral City (population 51,200). It is surrounded by Rancho Mirage to the Southeast, and Palm Springs to the West.

Cathedral City Zone Determination – Non-exclusive

Cathedral City was originally served by Springs Ambulance Service from 1966 to 1988. Cathedral City Fire Department began providing ALS ambulance service to its city in 1988, and therefore does not qualify for the specifications of Health and Safety Code, §1797.224.

No data has been provided to The Abaris Group for analysis of the Cathedral City Zone.

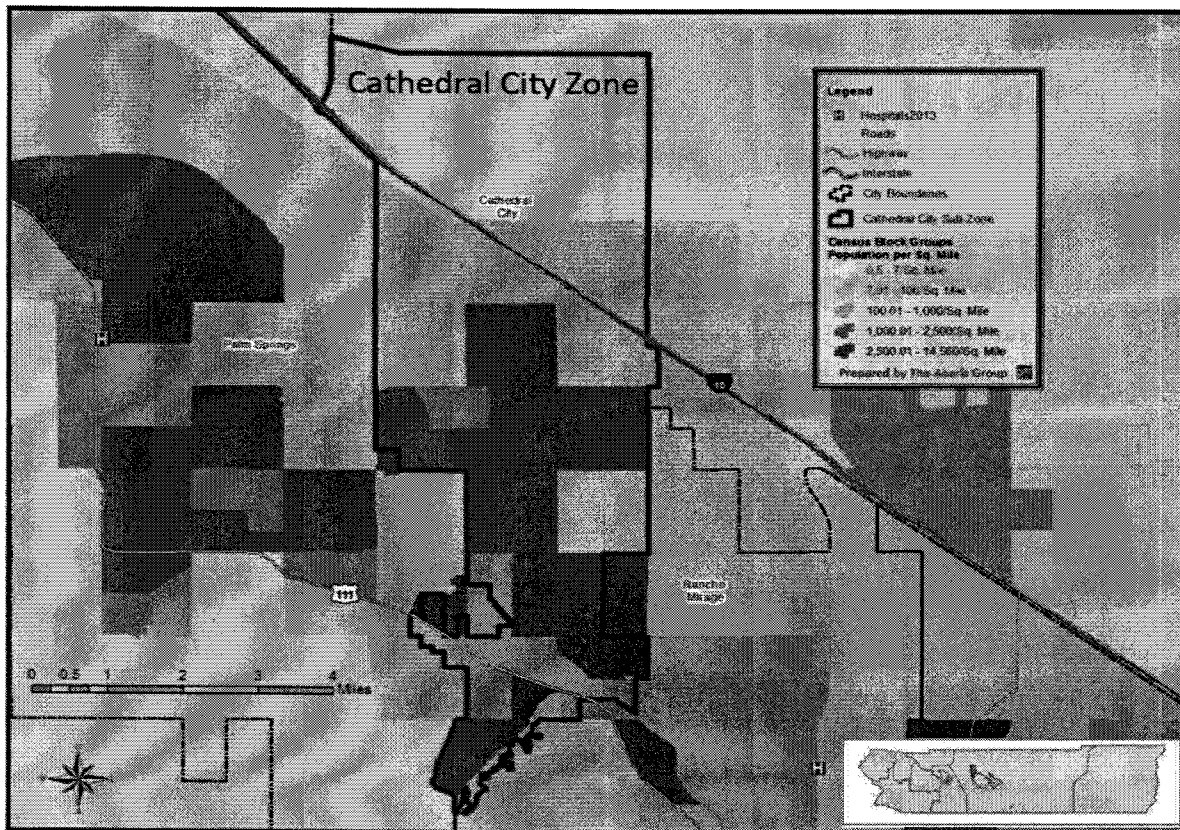


Figure 72 - Cathedral City Zone



Indio City Sub-Zone

Indio City Sub-Zone contains only the incorporated city of Indio (population 76,036). The Abaris Group has not received any data regarding response volume nor compliance information for this report.

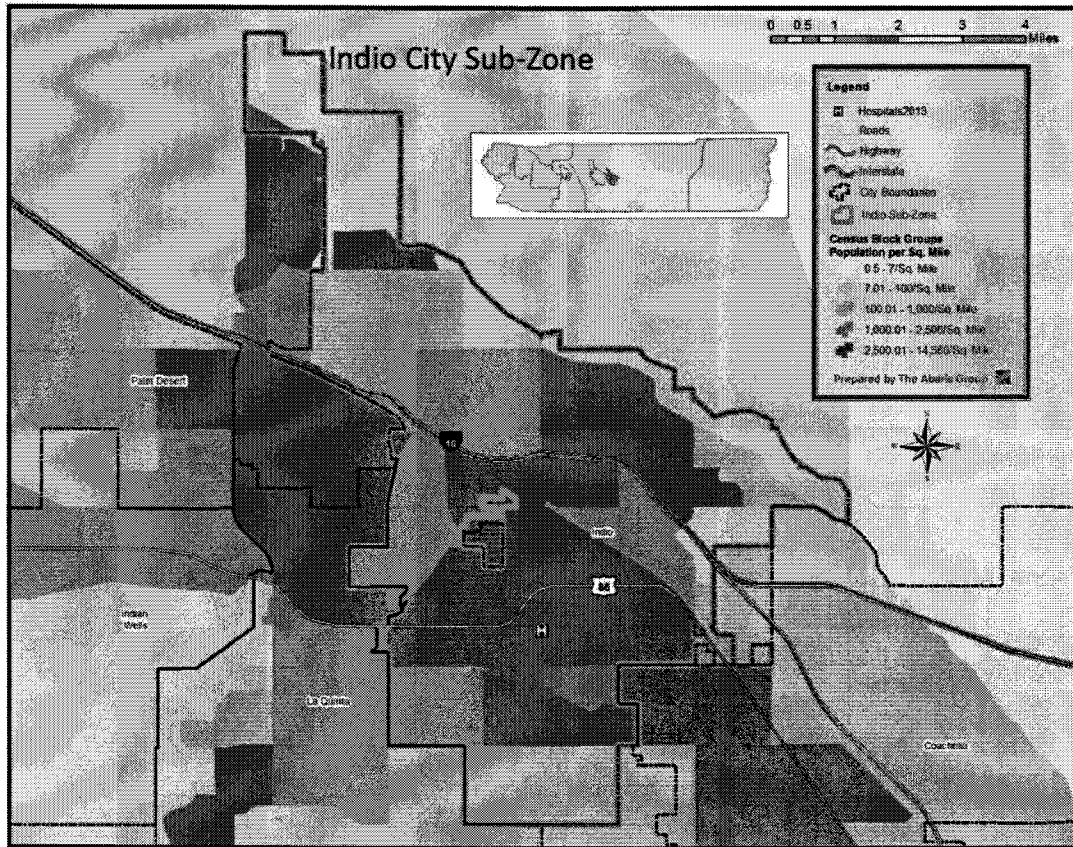


Figure 73 - Indio City Sub-Zone

Indio City Zone Determination – Non-exclusive

The zone is served through a cooperative agreement with Riverside County Fire Department. While it has been providing ALS ambulance services since 1997, they are not eligible for the specifications under Health and Safety Code, §1797.224.

The Indio City Sub-zone is also problematic as a stand-alone zone from the standpoint of the county EOA make-up. It removes a head count of 76,036 people from the Desert Zone (approximately 16 percent), and using a response ratio of 70 per 1,000 population, thus constitutes a loss of 5,320 responses annually. As with any carve-out, it creates a hole in the response area of the Desert Zone provider and negatively impacts its deployment plan.



The Coves Cities Sub-Zone

The Coves Cities Sub-zone contains the incorporated cities of Rancho Mirage, Palm Desert and Indian Wells, combined population of 70,621. The Abaris Group has not received any data regarding the response volume or response time compliance of the provider for this sub-zone.

The Coves Cities Zone Determination – Exclusive (Grandfathered)

Springs Ambulance Service provided emergency ambulance service to this area prior to 1981. The cities of Rancho Mirage, Indian Wells and Palm Desert combined to form the Cove Communities Services Commission in order to provide municipal emergency ambulance service to these three cities.

Prior to 1981, the Cove Communities Services Commission contracted with Riverside County Fire Department in order to provide municipal emergency ambulance services. In 1984, Springs Ambulance Service filed a lawsuit claiming the Cove Communities Services Commission violated federal antitrust laws. Springs Ambulance Service lost the lawsuit.

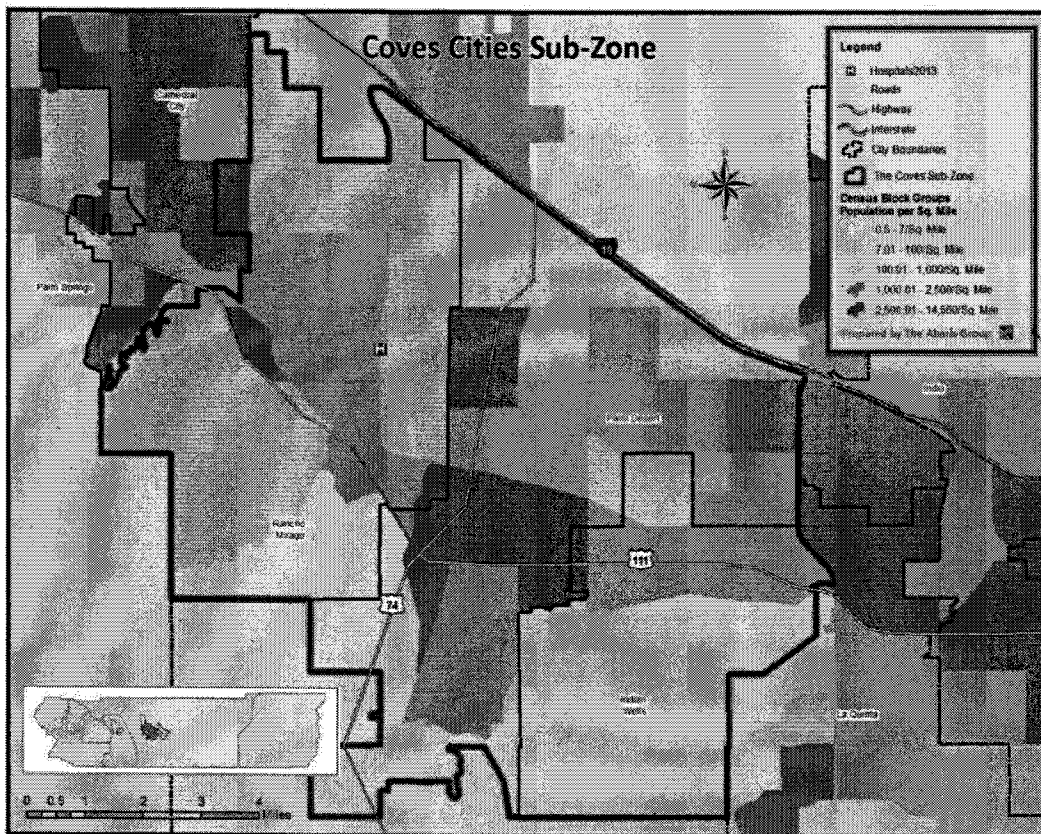


Figure 74 - Cove Cities Sub-Zone



Response Times

Among the most highly scrutinized components of any EMS system are the ambulance response-time standards. Response time includes time from unit alerted to unit on scene, turnout time is included. The Riverside County ambulance response times are generally consistent with those reviewed from other systems and industry-accepted standards. The only exception is the metro/urban ALS transport time of 9:59 minutes for emergencies; most systems have adopted the National Fire Protection Association (NFPA) guideline of 7:59 minutes. Variances are typically seen in systems where first responders are ALS trained, which can extend the response time by two to six minutes.

The extended transport response times, when there is ALS first response, are supported because early defibrillation is one of the few proven benefits of a short response time. In fact, the Seattle EMS system, which has one of the highest cardiac arrest survival rates, only has EMT/firefighters with automated external defibrillators (AEDs) as first responders.

The Abaris Group also contrasted the current response time requirements against the population density within existing Riverside County 2010 Census Block Groups, and found that the currently expected response-time allocations (e.g., urban, suburban, rural, etc.) are appropriate, given the underlying population base and density. However, it does not appear that Riverside County is currently using a specific density/mile standard for determining response time standards, which becomes important as populations shift.

Current Response Zones & Time Standards

Response Times – Emergency					
Region	Metro	Urban	Suburban	Rural	Wilderness
Population Density/Sq. Mile	> 2,500	1,000-2,500	100-1,000	7-100	< 7
Current Required Response Standard					
Transport	9:59		13:59	19:59	59:59 or Best Effort
Transport with 1 st Resp. ALS	11:59		None	None	None
1 st Response ALS	None/9:59*		None	None	None

Source: NFPA Standard (2009), CA EMS Authority Guidelines & The Abaris Group experience (unit alert to ambulance on scene)

Notes: * Riverside and Corona have a 9:59 standard, but response times are not reported to REMSA.

Figure 75 - Response Times - Emergency



In addition, The Abaris Group evaluated the actual required EMS performance standard with other industry standards and found the current standard is not consistent with national (e.g., NFPA) standards and state guidelines adopted by the California EMS Authority (EMSA).

Response Times – Non-Emergency					
Region	Metro	Urban	Suburban	Rural	Wilderness
Density/Sq. Mile	> 2,500	1,000-2,500	100-1,000	7-100	< 7
Current Response Standard					
Transport	None	None	None	None	None
Transport with 1 st Resp. ALS	None	None	None	None	None
1 st Resp. ALS	None	None	None	None	None

Figure 76 - Response Times - Non-Emergency

Other Response Standards/Penalties

Riverside County currently dispatches all ambulances as an emergency and does not have a non-emergency response time standard established in its ambulance contracts. While the majority of communications centers stated they utilize EMD, it is unclear how this is translating into prioritizing medical calls. Most EMS systems have adopted both emergency and non-emergency standards when EMD is available. This reduces the risk of an accident, which provides for a safer EMS system. All jurisdictions that provide EMD in Riverside County offer pre-arrival instructions.

Taking advantage of the high degree of first responder training that has developed in the last 15 years, allows an EMS system to better allocate resources. By relaxing the response times of ambulances, the system can fund other priorities; this can include a Countywide training program, consolidated CQI program, standardized equipment, common ePCR data platform, dispatch nurse triage, alternate transportation, community paramedics, and other innovative best practices. Key to this practice should be an underlying and documented ALS first response standard, which is not in place within the County at this time. Care should be taken when extending response times as this could reduce the total number of available ambulances during a disaster.

Contemporary EMS system agreements include financial penalties when transport response times exceed the predetermined thresholds established in the contract. The objective is to create a financial incentive to mitigate late response times and deliver a high-performance system. Response time outliers, typically defined as 150 percent of the defined standard, should have a significant financial penalty above and beyond a per-minute penalty. With a substantial fiscal impact, such as \$1,000-5,000 per call, the provider is highly incentivized to eliminate outlier responses.



Response Time Requirements

The current response time requirements are reasonably consistent with industry standards. The only exception would be the most stringent response time standard, which is assumed to be for the major urban areas with the highest population density. Schedule E, Section II (A) of the current agreement defines the response time:

“Response times shall be calculated from the time of the 9-1-1 call notification by City, County or other approved dispatch center to the ambulance or ambulance provider (clock will not begin until the ambulance or ambulance provider has received a verifiable address, nature of call and 15 seconds dispatch processing time) until the time that an ambulance notifies the City or County or other approved dispatch center of its arrival at the scene of the emergency medical service call or staging area or until the ambulance is canceled by the dispatch center. If an ambulance response is downgraded by the dispatcher, the response time will include the time from its initial dispatch until the time it is downgraded.”

The Abaris Group is unaware of what the official “time-stamp” event would be for the clock to start, given this somewhat vague definition. From the quote above, the time stamp event would appear to be the “unit alert” time, as there would be no reason to delay the unit alert once that time frame and activities were concluded.

The California EMSA “System Standards and Guidelines” document, Section 4.05 defines the recommended response-time standard for ALS transport units as “not greater than 8 minutes” from the receipt of the call at the primary PSAP to on-scene for metro/urban areas. While few systems have the ability to track EMS calls from primary PSAP to on-scene, using this standard, the minimum standard for response times for metro/urban areas would not likely be greater than 8 minutes from unit alert to on-scene.

The current response time standard for the metro/urban areas is 9:59 or better, from unit alert to on-scene. For those cities under contract for ALS first response enhancement (i.e., Riverside and Corona), that response time is extended by two minutes, to 11:59 or better.

There is considerable growing interest across the country to re-evaluate “response times” as the sole measure of system performance. Studies on increasing or decreasing response time demonstrate that responses time are a poor indicator of performance.^{25,26,27} Movement away from response times may never occur but other “outcome” measures will continue to emerge and will likely supplement or even take precedent over actual response times for the performance marker to community EMS systems.

²⁵ Myers JB, Slovis CM, Eckstein M, et al. Evidence-based performance measures for EMS systems: A model for expanded EMD benchmarking. A statement developed by the 2007 Consortium U.S. Metropolitan Municipalities’ EMS Medical Directors. *Prehosp Emerg Care.* 2008;12(2):141–151;

²⁶ Blackwell TH, Kline JA, Willis JJ, et al. Lack of association between pre-hospital response times and patient outcomes. *Prehosp Emerg Care.* 2009;13(4):444–450;

²⁷ Pons PT, Haukoos JS, Bludworth W, et al. Paramedic response time: Does it affect patient survival? *Acad Emerg Med.* 2005;12(7):594–600



One cannot understate the community and public sentiment for response times though and thus some anchor on response times will likely remain. However, future system design should entertain other outcome measures in developing and holding their local EMS system accountable for performance.

The maps on the following page reflect the current response time requirements within the various zones in Riverside County.

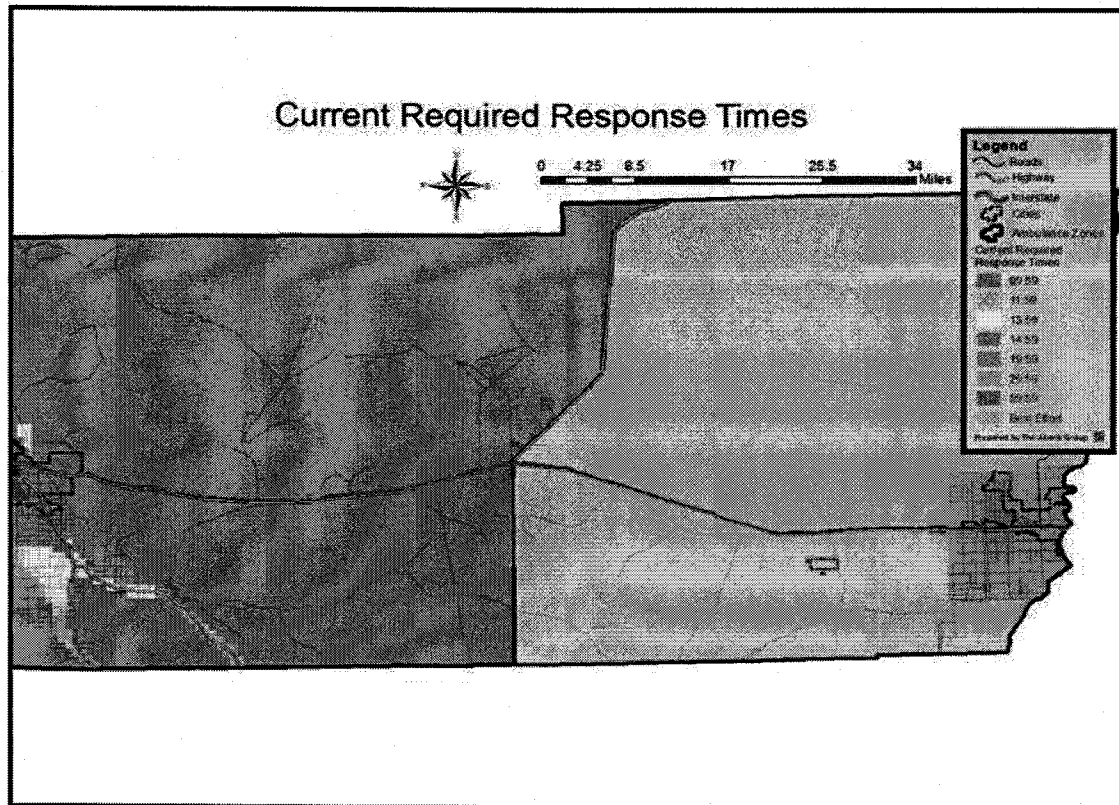
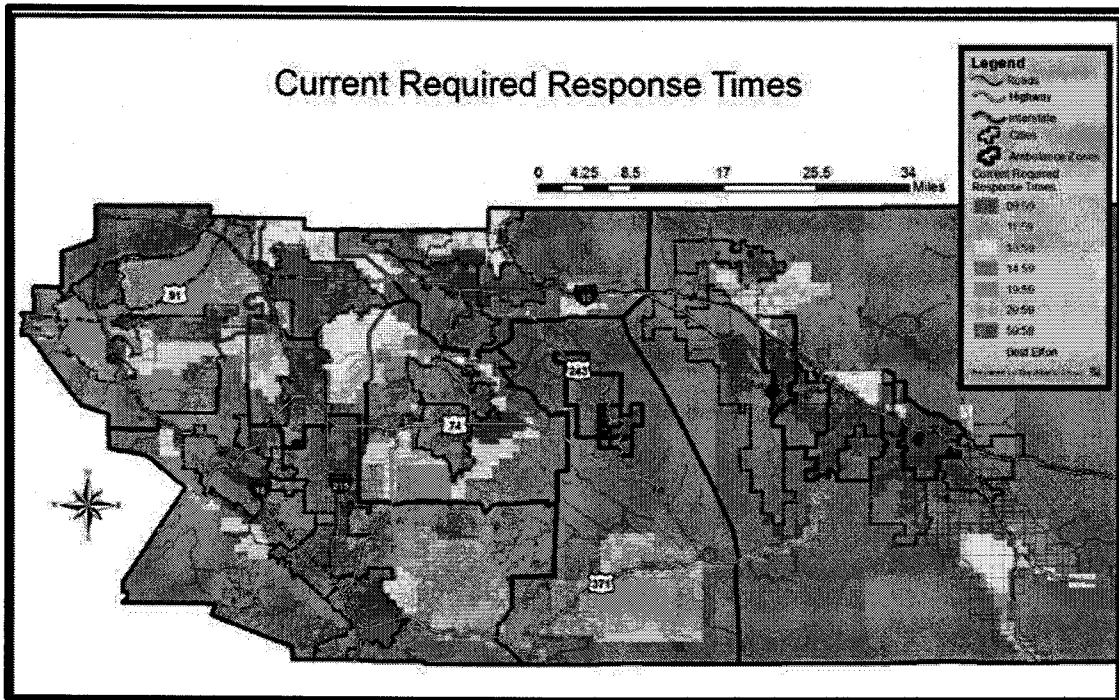


Figure 77 - Current Required Response Times



Emergency Medical Services Patient Receiving Hospitals

There are a total of 16 General Acute Care Hospitals within Riverside County that receive patients from the pre-hospital EMS system. These 16 hospitals are designated as Pre-hospital Receiving Centers (PRC) by REMSA. REMSA is responsible for designating Base Hospitals that assist the EMS Medical Director with the provision of medical control via on-line medical direction to pre-hospital personnel in the field. Additionally, REMSA has established a network of specific hospitals that specialize in the care of trauma, ST-elevated myocardial infarction (STEMI) and pediatric trauma patients. REMSA incorporates state and national guidelines into specialty center requirements (e.g., Society of Chest Pain Centers Accreditation for STEMI Receiving Center Designation). REMSA policies require pre-hospital personnel to be trained and equipped to identify patients who will benefit from specialized care. Pre-hospital personnel collaborate with specialty care Base Hospitals to assure ambulance transport to the closest, designated specialty care hospital. The entire County EMS system is managed through oversight by REMSA.



Specialty Hospital Care

Trauma Centers

Currently, REMSA has identified two areas of specialty care – trauma and STEMI. Stroke destination protocols are planned for implementation by mid-2014. REMSA policies designate specialty receiving hospitals and require ambulance providers to transport 9-1-1 patients only to these specialty centers when applicable. Three Level II trauma centers were established in Riverside County in 1994 – Desert Regional Medical Center, Riverside Community Hospital, and Riverside County Regional Medical Center. Inland Valley Medical Center became a Level III trauma center in 1996 and has announced that it will seek Level II accreditation this year. Riverside County Regional Medical Center also became a Level II pediatric trauma center in 2009, and was verified by American College of Surgeons (ACS) in 2012. Some concerns were raised during the interview process regarding surgical on-call coverage being shared with the other regional pediatric trauma center and the inconsistency of accepting patients to the pediatric intensive care unit (PICU). There have been occasions where pediatric cases are transferred to Riverside County Regional Medical Center and then transferred again to another pediatric trauma center.

The County and its trauma centers have also enjoyed a strong relationship with the two trauma centers in San Bernardino County accredited in 1981 – Arrowhead Regional Medical Center, a Level II trauma center, and Loma Linda University Medical Center, a Level I adult and pediatric trauma center (pediatric trauma designated in 2004). Trauma patients are taken to the closest trauma facility, regardless of where the patient is in either county. Due to the close working relationship, there is one trauma program manager group and one trauma advisory committee (TAC); each meets quarterly to discuss issues and define standardized policies for the trauma systems in both counties. The trauma triage criteria were reviewed in 2010 and closely resemble the ACS; the major difference was a senior age of 65 (versus 55). In reviewing the trauma data (see Figure 78), the incident rate per 1,000 people and percentage of patients discharged from the ED are consistent with other trauma systems in California.

The current trauma system plan was written in 2001; there may be opportunities to review and enhance the plan. However, with close to 20 years of experience, the pre-hospital and hospital approach to trauma care in Riverside County has matured into a well-run system.

Trauma System Volume					
Year	2012	2011	2010	2009	2008
Trauma volume	6,257	5,041	4,353	5,343	4,705
Discharged home (%)	35%	23%	17%	30%	23%
Pediatric (%)	10%	13%	14%	13%	13%
Incident rate per 1,000 population	2.81	2.29	1.99	2.50	2.24

Source: REMSA

Figure 78 - Trauma System Volume



ST Elevation Myocardial Infarction (STEMI) Centers

In 2008, four hospitals became designated receiving centers for STEMI patients. Three of the receiving centers are in the Desert Zone leaving only one for the majority of the county’s population. As such, there are STEMI receiving centers in Loma Linda, Upland, and Escondido that are recognized to receive Riverside County STEMI alerts due to their closer proximity. Loma Linda Medical Center-Murrieta is applying for designation, which will significantly improve capability within the County. STEMI patients are typically identified by the 12-lead EKG interpretation performed by the pre-hospital staff’s heart monitor and transmitted to the receiving centers.

Based on data managed by REMSA, the system has an over-triage rate of 20 percent and door-to-balloon interval times are less than 90 minutes at least 90 percent of the time (see Figure 79), which surpasses the American Heart Association (AHA) recommended guideline. The *Journal of Emergency Medical Services (JEMS)* 200-City Survey identified only 31 (16 percent) systems that are tracking STEMI performance and roughly half are achieving the AHA guidelines.²⁸ The percentage of catheterization lab alerts is increasing as the

system matures, which will further improve interval times as the minimum system savings is 12 minutes when the catheterization lab team is called prior to patient

STEMI System Volume				
Indicator	2012	2010	2009	2008
Total STEMI alerts called	413	349	367	238
False alerts (%)	18%	21%	20%	32%
D2B average (minutes)	63	60	58	68
D2B within 90 minutes	93%	91%	93%	91%

Source: REMSA, 2011 missing due to lack of provider data and REMSA staff time to compile
Notes: D2B = door to balloon
Figure 79 - STEMI System Volume

arrival. The STEMI committee meets bimonthly; one area identified for improvement is the policy education of pre-hospital staff to bypass local hospitals and transport patients to STEMI receiving centers immediately in order to decrease door-to-balloon interval. This specialty committee is specifically focused on STEMI care and does not currently review cardiac-related events, such as cardiac arrest. Some EMS systems have broadened the scope to include more cardiac events and track return of spontaneous circulation (ROSC) rates and cardiac arrest survivability following the uniform standards established by the Cardiac Arrest Registry to Enhance Survival (CARES)²⁹ and the Utstein Style.³⁰

Stroke Centers

REMSA is currently working with local hospitals to establish a stroke program and has been meeting regularly to determine policies, protocols, data registry, and an estimated volume with an ultimate stroke destination protocol by the spring of 2014. Four hospitals have achieved external accreditation as primary stroke centers and two have attained comprehensive stroke center status. REMSA staff estimates that the stroke specialty center designation will be active within the next year.

²⁸ Michael Ward, "Forecast of the Future," *Journal of Emergency Medical Services (JEMS)*, Vol. 38, No. 2 (February 2013): 28.

²⁹ <https://mycares.net>

³⁰ Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett PJ, Becker L, Bossaert L, Deloos HH, Dick WF, Eisenberg MS, et al, "Recommended Guidelines for Uniform Reporting of Data From Out-of-Hospital Cardiac Arrest: The Utstein Style," *American Heart Association Journal*, Vol. 84, No. 2 (August 1991) 960-975.



Continuous Quality Improvement and Clinical Care

Continuous Quality Improvement (CQI)

Background

The concept of CQI traces its roots back to W. Edwards Deming, considered by most as the “father of CQI.” His substantial work in Japan with the auto industry following World War II is legendary. Unfortunately, most of the activities in CQI have been focused on the manufacturing of products, not the delivery of services. Only in the last 15-20 years has there been a concerted effort to move the products-based CQI process into the service delivery arena. Nonetheless, healthcare has fully embraced the concept of CQI and proving the value of an organization’s services is a cornerstone of Health Reform. The Riverside County EMS system was introduced to CQI in 1994 through the California EMS Quality Improvement Project funded by a state grant.

Current CQI Summary

REMSA has an established CQI plan, as required by California Code of Regulations, Title 22, Chapter 12, et seq. It defines the system participants, expectations, policies and procedures of REMSA and key performance indicators. The plan describes what the providers will be expected to submit to REMSA, the frequency of that collection, and the REMSA staff reviewing those submissions. The plan also describes the feedback that will be provided to the system participants.

The REMSA CQI plan was developed in 2007, which also established the CQI committee for on-going collaborative input and direction. Since that time the Countywide CQI focus has been on assuring specialty care programs are producing good patient outcomes, use of Helicopter EMS (HEMS) and assisting provider agencies and Base Hospitals with focus on their individual CQI programs. This includes assisting the fire departments with the successful implementation of the County electronic patient care report (ePCR) system. Also during this time, REMSA developed and implemented a comprehensive set of Clinical Skills Performance Standards as a model for consistency in education/training, concurrent performance evaluations and clinical performance improvement. With this different focus and limited staffing, the CQI Technical Advisory Group (TAG) has not been meeting. The topics of system-wide CQI and advancement of related protocols have been vetted through the Pre-hospital Medical Advisory Committee (PMAC). PMAC has consistently met quarterly since 2004.

It should be noted that two current ambulance companies still do not have an approved CQI plan and there is a requirement that all provider plans should be submitted annually to REMSA, which is not the case as of the preparation of this report.



REMSA staff stated a desire to identify existing and new stakeholders to represent the different provider types, e.g., first response, 9-1-1 transport, inter-facility transport, HEMS, and base hospitals to reestablish the CQI TAG meetings. The priority would be to:

- Establish a collaborative effort to decide what to measure
- Start with the perceived problems until evidently identified through data analysis
- Create one CQI template
- Trend data
- Define specific indicators including the eight mandated by California Title 22
- Eliminate fragmentation of different CQI plans and indicators
- Publish CQI data regularly to system stakeholder



Clinical Care

Protocols and Innovation

The current clinical protocols are overseen by the REMSA Medical Director, which is a part-time position (approximately 0.25 FTE) contracted to a physician licensed in emergency medicine.³¹ Protocols are reviewed and updated annually. Changes are released in December and are effective in April of the following year; this provides three months to educate staff. Currently, the protocol manual is provided electronically and in hard copy. While there are smartphone applications that offer the Riverside protocols, none is endorsed due to concerns about how they are translated into the application and whether users are notified of changes. Some EMS systems have selected a particular application and partnered with the vendor to ensure their protocols are compliant with their needs; this level of access is considered a best practice.

During the review process, it was mentioned that REMSA recently collaborated with system stakeholders to completely redesign their Policy, Protocol and Procedures Manual. This endeavor was widely viewed as a positive and progressive step forward for the EMS system. The collaborative focused on rebuilding policies, protocols and procedures based upon available medical evidence, expert opinion and consensus of the local medical community toward the goal of optimal patient care. This redesign resulted in protocols that now cite the clinical basis for the protocol. While this is not necessarily evidence-based, it is a step towards developing data-driven protocols based on local, regional, or industry clinical studies and outcomes, which is the ideal solution for improving clinical care. Additionally, the collaborative paid attention to operational and financial impacts that would be felt by all system partners. While this process resulted in many improvements, the collaborative was challenged by the lack of robust clinical data from within the County EMS system. This lack of data, in particular patient outcome data, limited the academic level discussions based upon an incomplete view of what is going on within the system. This dynamic was frustrating to the collaborative and prevented full exploration of innovative care opportunities that have been adopted in other EMS systems. A subsequent benefit of the project is that all system participants have committed to focus quality improvement efforts on the cooperative development and implementation of a single, robust County wide ePCR system. The goal of the County's data collection program include future integration with hospital electronic medical records (EMR) and two-way data sharing for "real time" and outcome information. Excellent progress has been made in the ePCR implementation since the protocol updates, particularly by the fire departments.

It was mentioned during the ride-alongs and interviews that the Riverside protocols are fairly moderate, not progressive and not significantly behind compared to other EMS systems. Several advanced life support (ALS) providers mentioned that the new protocol algorithms are well done and easy to follow. Some of the concerns mentioned include the lack of protocol modeling around the 2010 American Heart

³¹ As of the publishing date, the EMS Medical Director position is transitioning to a new 0.5 FTE County employee position.



Association (AHA) guidelines for cardiac care as well as the lack of hypothermic resuscitation. In general, the air ambulance providers are moving forward with a tranexamic acid (TXA) protocol, which has shown to reduce the risk of death from bleeding in traumatic patients and is under review by Riverside County.^{32,33,34}

Many EMS and trauma innovations have been discovered during military combat medicine. A recent innovation has been the use of hemostatic agents within bandages; a 2009 combat trauma study published by the National Institutes of Health identified decreased or stopped bleeding with hemostatic bandages versus a traditional field bandage.³⁵ EMS systems in other areas have included these bandages as either an ALS or basic life support (BLS) skill. Continuous positive airway pressure (CPAP) has been available for the last two years; however, it is limited to only congestive heart failure (CHF) treatment. A January 2011 article in the *Journal of Emergency Medical Services (JEMS)* shared studies and clinical findings for using CPAP to treat asthma/chronic obstructive pulmonary disease (COPD), drowning, carbon monoxide poisoning, and pulmonary infections; some systems have added it as a BLS skill.³⁶

The Trauma Advisory Committee (TAC) is currently advising updates to the determination of death protocol for trauma full arrests in the field; there is an apparent long history of support for this in other systems that have adopted this protocol in the last ten years. The current medical full arrest protocol also requires two rounds of resuscitative medications even if it is an unwitnessed arrest. Other counties have reviewed these cases and determined that checking for a rhythm with a heart monitor in two leads is sufficient to pronounce these patients. Another challenge faced by pre-hospital providers is the patient who has do not resuscitate (DNR) or physician orders for life sustaining treatment (POLST) directives, such as hospice care, but the family is unable to produce DNR/POLST paperwork. Historically, these patients must be treated until the paperwork is produced or death is determined after resuscitative efforts. In 2007, Los Angeles County (in partnership with University of California-Los Angeles) implemented a policy that family members could verbally request DNR in accordance with patient wishes as well as not resuscitating patients found without a heartbeat and at least 10 minutes have elapsed before CPR starts.³⁷ EMS personnel reported considerable satisfaction with the new guidelines; there were no reports of adverse consequences attributable to them. The policy is flexible and allows first responders or ambulance crews to perform resuscitative efforts if there is any concern about the DNR's veracity. Other counties have adopted this policy with similar positive results.

³² <http://www.ncbi.nlm.nih.gov/pubmed/21795884>

³³ <http://drugtopics.modernmedicine.com/drug-topics/news/modernmedicine/modern-medicine-news/txa-reduces-death-bleeding-trauma-patients>

³⁴ <http://www.jems.com/article/patient-care/role-tranexamic-acid-ems-preoperative-tr>

³⁵ <http://www.ncbi.nlm.nih.gov/pubmed/19954487>

³⁶ <http://www.jems.com/article/patient-care/many-benefits-cpap>

³⁷ <http://www.chcf.org/publications/2010/04/in-a-heartbeat-new-resuscitation-protocol-expands-ems-options>



TAC is also advising changes to the spinal immobilization protocols, which, if approved, is a very progressive step. A recent article in JEMS cited a number of studies that indicates there is no evidence of benefit and even some findings that it can cause more harm than good.³⁸ Alameda County (CA) implemented a more liberal immobilization procedure in 2012 that no longer requires spinal immobilization for reliable patients with a normal spine exam and normal motor/sensory findings.³⁹ Other EMS systems have already eliminated immobilization for patients who have self-extricated following a vehicle collision and have no abnormal findings upon spinal exam.

Regardless of which protocols, skills, and equipment are approved, there is a need for uniform training materials and standards to be disseminated to all EMS providers. Having a consistent training approach will elevate the training Countywide and ensure all providers receive identical, reliable education.

Clinical Data and Trending

Riverside County has taken significant strides in developing a standardized data platform. All ALS first responders and transport providers are using ePCRs currently. The County has selected Sansio to be the software platform and all ALS providers must be using it by July 2015 per REMSA Policy 7701. AMR will be migrating to the Sansio vendor by early 2014 and it is expected that Blythe Ambulance (now AMR), Cathedral City, and Palm Springs will do so by the 2015 deadline. Moving to a single data platform for all first responder and transport providers is an industry best practice; this will allow greater access to clinical information to develop data-driven protocols, training, and system decision-making.

Medical Control

Medical Control is maintained by the REMSA Medical Director via standing order protocols and through authorized Base Hospitals for on-line medical direction. REMSA's medical control model utilizes Base Hospitals to assist the REMSA Medical Director with establishment of medical control over the EMS system pursuant to the California Health and Safety Code, Division 2.5. Each Base Hospital is required by REMSA policy to have a Base Hospital Physician Director and a dedicated full time Paramedic Liaison Nurse (PLN). These two positions are responsible for coordinating activities of the Base Hospital within REMSA policies. The PLNs in particular play a very active role in the EMS system, including provider feedback on clinical care, policy and protocol development, participation on REMSA committees and coordination of education/training opportunities within their respective catchment areas. The primary function of the Base Hospitals is to provide on-line medical direction to EMS personnel in the field via two-way voice communication. Six of the 16 General Acute Care Hospitals within Riverside County are authorized by REMSA to function as Base Hospitals. This is a large number of Base Hospitals based upon the demonstrated system need. During focused interviews some stakeholders relayed incidents of inconsistency between Base Hospitals for medical direction thereby creating an environment where field personnel "shop" for a Base Hospital due to this known variation. It is an inherent challenge when so many hospitals within a singular system are designated as Base Hospitals and share overlapping

³⁸ Jim Morrissey, "Spinal Immobilization, Time for a Change," Journal of Emergency Medical Services (JEMS), Vol. 38, No. 3 (March 2013): 28.

³⁹ http://acgov.org/ems/OFM_2011/field_manual/PROCEDURES/SPINAL_IMMOBILIZATION.pdf



geographical areas. A particular system observation followed by concerns expressed by stakeholders was the current policy for patient distribution during Multiple Casualty Incidents (MCIs). This function is currently performed by any one of the six authorized base hospitals. This practice presents a challenge to innovative opportunities for development of a comprehensive, integrated and coordinated regional medical control and patient distribution model.

Emergency Medical Services Committees

The Riverside County EMS system maintains ten committees that are staffed by a combination of system stakeholders and REMSA staff. This is a large array of committees requiring considerable County resources and staff to maintain. There is also overlap for policy review between some of the committees and the potential for missing communication between these committees. Most of these committees are either directly or indirectly involved in some aspect of EMS system review and related quality assurance/improvement activities.

A large sample of the EMS committee meetings were attended by the project consultants and appeared to have well-defined agendas, were managed effectively, and decisions were made in a collaborative manner. However, The Abaris Group noted large attendances at some committees, e.g., the Pre-hospital Medical Advisory Committee (PMAC), and much overlap of stakeholders at most others. It is understood that this level of committee structure also requires substantial REMSA staff engagement in the planning, staffing and post meeting follow up. It was noted that many of the attendees at meetings were the same EMS stakeholders meeting on different topic issues.

The structure for the different REMSA committees includes:

- Pre-hospital Medical Advisory Committee (PMAC) – PMAC serves as an advisory body to the REMSA Medical Director. This stakeholder group is comprised of ED medical directors, ED nurse managers, pre-hospital liaison nurses, first response and transport providers, police representative, EMS training program, and designees from other committees. The size of the committee is quite large as the voting membership is in excess of 45 people with the hospital staff alone comprising 32 members and a total invitee list over 100. The size and predominantly hospital-based membership could impact the effectiveness of the committee.
- Emergency Medical Care Committee (EMCC) – EMCC serves in an advisory capacity to the Riverside County Board of Supervisors (BOS) and REMSA concerning all aspects of emergency medical care within the County. EMCC reports its observations and recommendations on the various aspects of the emergency medical care within the County, including the feasibility and content of emergency medical care in Riverside County. There are 17 voting members and 66 invitees on the EMCC mailing list. The voting membership includes representatives from EMS, fire, law, hospital, physician, city management, PMAC, and a representative from each of the five BOS districts.



- Policy Review Forum (PRF) – The forum allows each organization, as well as each individual system participant, to participate in and observe the annual policy review process. The PRF was formalized in 2011, and was developed during REMSA’s 2010 review of the treatment protocols. It performs a systematic annual review of REMSA policies, protocols, procedures, and standards, and builds a current and consistent basis for regulation of the EMS system via REMSA’s policy manual. It was noted by one of the attendees that the REMSA Medical Director does not attend these meetings.
- Trauma Audit Committee (TAC) – This committee is comprised of various trauma center stakeholders and the EMS medical directors for the region (i.e., REMSA and Inland Counties EMS Agency - ICEMA). Major responsibilities include trauma system performance review and providing recommendations to REMSA and ICEMA. Pre-hospital providers are not currently represented on the committee or invited to attend.
- Trauma Program Manager Committee – This group of trauma program managers and pre-hospital liaison nurses handles many of the day-to-day operational needs of the trauma systems in REMSA and ICEMA. This includes uniform trauma patient criteria, registry data standardization for REMSA needs, chart audit filters, and ensuring effective pediatric care and tracking diversions by adult trauma centers. The meeting is chaired by an elected hospital representative with an elected secretary taking notes; this is considered a best practice when committees are self-governing with the EMS specialists providing support as needed.
- STEMI System Technical Advisory Group – This is a multidisciplinary committee comprised of various system stakeholders. Major responsibilities include STEMI system performance review and providing recommendations to REMSA. Other than some challenges in 2011, the STEMI data is excellent for the last five years and demonstrates an effective program.
- Stroke System – REMSA is close to implementing its stroke program. This committee of hospital stakeholders has been meeting bimonthly to determine the program logistics; it is using the ICEMA stroke program as a template.
- Helicopter EMS (HEMS) Committee – The hospital and air ambulance stakeholders perform a retrospective quality improvement on all transports to ensure proper utilization of air resources. REMSA currently audits 100 percent for not only appropriateness, but also landing zone safety, care and documentation, accurate estimate arrival times, and on scene times. For 2013, it is beginning to review extended ground transport times and inter-facility transfers following a ground ambulance transport to a local ED for possible opportunities to use HEMS more effectively. The objective is to transport the patient the first time to definitive care and not burden a local ED with a complex patient who is going to inevitably require a tertiary center.
- Multi-Casualty Incident (MCI) Committee – This committee has evolved over the last decade as the fire service now plays a significant role in MCI medical operations. The EMS and fire stakeholders are currently reviewing the MCI policy to ensure it is in compliance with the California Emergency Operations Manual (EOM) and identify any necessary improvements. The



committee reviews MCIs submitted by field providers; however, there is no check and balance process to ensure a review form is completed after each MCI.

- Continuous Quality Improvement (CQI) – Originally created in 2005 following the CQI plan rollout, this group is responsible for on-going input and direction to the county EMS CQI plan. However, CQI TAG has not met in the last three years due to competing priorities of REMSA staff. There is a plan to reform the committee, but no meeting date or representatives have been identified.

EMS Zone Meetings

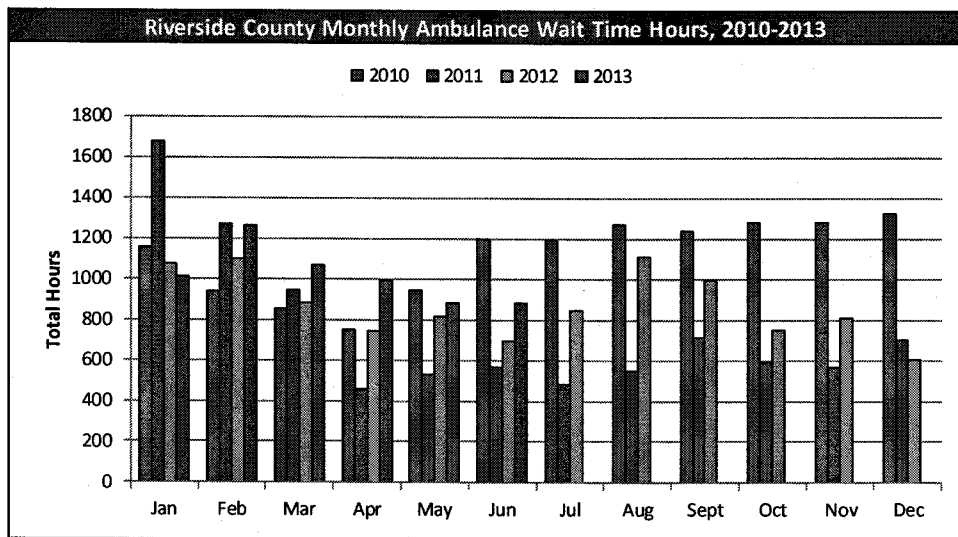
In addition, REMSA staff meets with the first responder and transport stakeholders from each EMS zone two to four times a year as determined by the group. During the meeting, REMSA shares transport compliance information, outliers, penalties assessed, hospital wall times (i.e., off-load delays at the ED), as well as an update on REMSA activities. Stakeholders have an opportunity to ask questions about the reports and other EMS topics that may be pertinent to them. The meetings attended by The Abaris Group were professionally managed, had clear agendas, and the reports provided were excellent. There were few concerns or issues raised during the meetings. However, these meetings seemed excessive and primarily served to reinforce the consistent performance of the private ambulance contractor.



Ambulance Wait Times

Ambulance wait times, or more correctly, ambulance patient off-load delay, occurs when an ambulance transports a patient to the hospital and remains on the ambulance gurney for greater than 30 minutes. This phenomenon can lead to delays in returning ambulances to service, depletion of EMS system resources, delayed ambulance response times and delayed transport of patients to the hospital. In Riverside County, it is not uncommon to have patients remain on the ambulance gurney in the ED for more than an hour. Extreme occurrences have been documented where patients have remained on the ambulance gurney for up to six hours, receiving their entire course of ED care and discharge from the ED while still on the ambulance gurney. REMSA has been tracking and reporting ambulance wait time data since 2005. REMSA recently established a policy stipulating a goal of transferring the patients off the ambulance gurney within 30 minutes of arrival at the Hospital.

As depicted in Figure 80, ambulance wait time for Riverside County continued to vary over the past three years. Increased wait time hours during the fall and winter months may be due to the flu season.



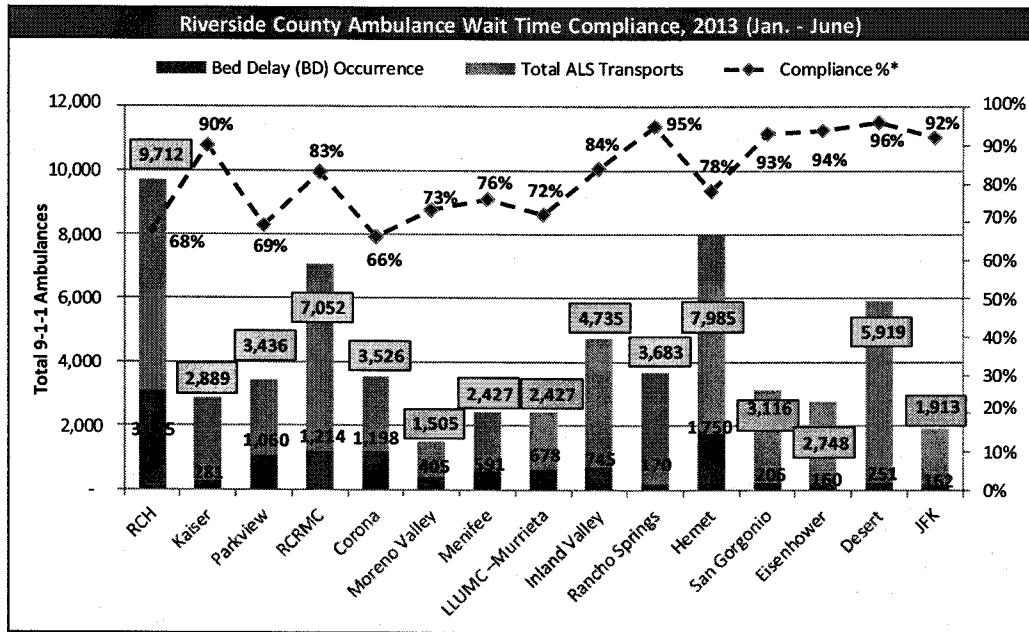
Note: Total hours do not include the first 25 minutes of each "bed delay" occurrence (30 minutes for 2013)
 Source: Riverside County EMS Agency, Department of Public Health, 2013

Figure 80 - Riverside County Monthly Ambulance Wait Time Hours, 2010-2013



Ambulance Wait Time Compliance

Figure 81 plots Riverside County ambulance wait time compliance against total ALS transports and the number of bed delay incidents occurred at each hospital. Compliance was generally high with all but five hospitals falling below 75 percent.



* Compliance% represents the percentage of ALS ambulance transports not on Bed Delay (data includes only 9-1-1 contractual provider).
 Note: 2013 standard for Bed Delay is 30 minutes.

Source: REMSA, 2013

Figure 81 - Ambulance Wait Time Compliance, 2013 (January - June)



System Benchmarks

Overview

As part of the evaluation process, The Abaris Group compared the current Riverside County ambulance performance contracts with similar EMS systems in California. Figure 82 provides the demographic information for the comparable EMS contracts. Overall, the Riverside County contract is consistent with most parameters found in other contracts.

Ambulance Contract Comparison - Area					
Area	Riverside County*	Santa Clara County	San Diego City	Alameda County	Contra Costa County
Population, 2010	2,244,399	1,781,642	1,307,402	1,510,271	1,049,025
9-1-1 Responses, 2010	172,700	95,092	98,021	89,606	78,580
Responses/1,000 pop.	76.9	53.4	75.0	59.3	74.9
EMD Coverage (%)	93.2%	100%	100%	100%	100%
Response Time Zones	8	5	4	5	5

Sources: US Census, EMS agencies

Note: * Riverside population and responses are 2012

Figure 82 - Ambulance Contract Comparison - Area

Ambulance Contract Fees

The majority of current EMS agreements require some level of fees for cost recovery. Common subsidy requirements include first responder, dispatch, and compliance monitoring. Contra Costa County has the only contract not requiring any fees; however, it is the oldest agreement included in this benchmark process. Riverside County fees are typically lower than the EMS agreements awarded in the last three years. Figure 83 provides a breakdown by EMS system of the current fees required.

Ambulance Contract Comparison - Fees					
Fees	Riverside County	Santa Clara County	San Diego City	Alameda County	Contra Costa County
First Responder	\$1,880,216	\$5,000,000	Consolidated Operational Fee	\$4,600,000	
Dispatch/Communications	\$125,000	\$1,500,000		\$1,500,000	
Compliance Monitoring	\$350,000	\$1,500,000			
Data Management	\$420,000				
Total	\$2,775,216	\$8,000,000	\$10,000,000	\$6,100,000	\$0

Source: Provider/REMSA agreements

Figure 83 - Ambulance Contract Comparison - Fees



First Responder Response Times

While REMSA does not track first response performance, some of the fire departments interviewed indicated that their goal is to meet the National Fire Protection Association (NFPA) guideline of 5:00 minutes at least 90 percent of the time (includes 60-second turnout time and 240-second travel time).⁴⁰ Some EMS systems, such as Santa Clara County and the City of San Diego, have taken the initiative to establish response time (as well as other) standards with the first responder partners and extend the transport response times. A comparison of large EMS systems with ALS first response standards is included as Figure 84.

ALS First Response System Comparison										
Service Area	Riverside County	Santa Clara County	San Diego City	Phoenix (AZ)	Travis County (TX)	Houston (TX)	Memphis (TN)	Fairfax (VA)	Pinellas County (FL)	NFPA
1st Responder ALS	9:59*	7:59	8:00	5:00	5:00	5:00	5:00	8:00	7:30	5:00
Transport ALS	11:59**	11:59	12:00	10:00	10:00	8:00	8:00	8:00	10:00	8:00
1st Responder Notes	Riverside & Corona	Non-compliance impacts fees							Funds available if compliant	Includes 60-second turnout time

* For City of Corona only, pursuant to their subcontracts with AMR

** Applicable in City of Riverside and Corona only. 9:59 everywhere else based in AMR contract.

Source: Riverside and Santa Clara County EMS contracts, 2007 Abaris Group interviews, NFPA-Fire Service Performance Measures, 11/09, pg. 28

Note: Emergency response times based on 90th percent fractile standard in metro/urban area

Figure 84 - ALS First Response System Comparison

Ambulance Response Times

One of the most highly scrutinized components of any EMS contract is the ambulance response time standards. A number of high-performance EMS systems within California and nationwide have adopted the National Fire Protection Association (NFPA - 2010) guideline of 7:59 minutes; this is also the California EMS Authority response time guideline. These same systems have well-developed medical first-responder programs. Variances are typically acceptable in systems where first responders are ALS trained and have defined response times allowing the ambulance response time to be extended by two to six minutes. This is the case in this County (Cities of Riverside and Corona), San Diego, Phoenix, Travis County (TX), and Pinellas County (FL). These systems now rely on these first responder resources when determining ambulance response times. It is more difficult to compare one ambulance contract to another without valuing the first responder standard within the service area. The two examples in the local EMS system are the agreements with Riverside City and Corona fire departments to provide ALS first response that enables an 11:59 transport response time standard.

⁴⁰ NFPA, Fire Analysis and Research, *Fire Service Performance Measures*, 11/09, pg. 28, 2010 Standards



The extended transport response times, when there is ALS first response, are clinically supported as early defibrillation is one of the few proven benefits of a short response time (along with citizen CPR). In fact, the Seattle EMS system, which has one of the highest cardiac arrest survival rates, only has EMT/firefighters with automated external defibrillators (AEDs) as first responders.

The current Riverside County agreement does not have a non-emergency (9-1-1, but ambulance not needed urgently) response-time standard and the current practice is to dispatch all calls as an emergency. While the majority of communications centers stated they utilize EMD, it is unclear how this is translating into prioritizing medical calls. As depicted in Figure 85 below, this is unique for the EMS systems compared and most EMS systems have adopted both emergency and non-emergency standards when EMD is available. This reduces the risk of a responder collision, which lowers the risk of response for an EMS system.

Most EMS systems use a fractile standard of 90 percent compliance with penalties associated when standard is not met. Similar to Santa Clara and Contra Costa counties, Riverside County has agreed to extend ambulance response times when there are ALS first responders who have contracted to meet their own response time standard. Alameda County has taken the further step to breakdown response times by dispatch priority. All EMS systems reviewed have different response times based on population density, from urban to wilderness. A complete breakdown of response time standards for medical calls is included as Figure 85.



Ambulance Contract Comparison - Response Times					
Response Times	Riverside County	Santa Clara County	San Diego City	Alameda County	Contra Costa County
Emergency					
Metro/Urban*	10:00/12:00	7:59/11:59	12:00 Urgent 15:00	Echo 8:30 Delta 10:30	10:00/11:45 NLT 15:00
Suburban*	14:00	16:59		Echo 14:00 Delta 16:00	
Rural	20:00	21:59	Not Applicable		20:00 NLT 30:00
Wilderness	30:00, 60:00 or Best Effort	21:59	Not Applicable	Echo 18:00 Delta 22:00	Not Applicable
Non-Emergency					
Metro/Urban*	None	16:59 Omega 59:59	30:00	15:00 Alpha 30:00	30:00
Suburban*	None	21:59 Omega 89:59		25:00 Alpha 40:00	30:00
Rural	None	41:59 Omega is best effort	Not Applicable		45:00
Wilderness	None		Not Applicable	28:00 Alpha 40:00	Not Applicable

Source: Provider/REMSA agreements

Notes: * If there is no ALS first responder contract, then more stringent response standard applies, BE = best effort, NLT = non-life threatening

Figure 85 - Ambulance Contract Comparison - Response Times

Exemptions

All EMS systems reviewed allow the ambulance provider to request exemptions when it takes longer than the allocated response time to reach a patient due to no fault of the provider. Figure 86 provides a breakdown of the allowable exemptions for each contract entity; a detailed exemption list is included as Appendix A. Common exemptions include incorrect address, dispatch/radio system failure, and multi-casualty incidents (MCIs). Others include staging, trains, and off-road locations. Riverside County and San Diego City both allow exemptions for “unusual system overload” (i.e., when the number of calls exceeds a certain number.) This is less common in large systems as there is sufficient call volume for providers to accurately predict and staff for system demands. A disturbing new trend is permitting exemptions due to prolonged ED hospital off-load (i.e., ED “wall time”) delays. While beyond the control of the ambulance crew, hospital partners are now being asked to be actively engaged to prioritize getting the patient turned over in order to keep the EMS system running smoothly. Locally, this has become by far the most common exemption request.



Ambulance Contract Comparison - Exemptions					
Exemption Types	Riverside County	Santa Clara County	San Diego City	Alameda County	Contra Costa County
Dispatch/Communications e.g., incorrect address, incorrect dispatch information, disrupted voice/data radio transmission, CAD failure	✓	✓	✓	✓	✓
Off-Road Locations	✓	✓	✓		✓
Unusual System Overload e.g., not to exceed 1% of zone volume, ≥ 12 simultaneous calls, delays due to ED diversion or bypass	✓		✓		✓
Hospital Off-Load Delays	✓	✓			
Train Delays	✓				✓
Staging	✓				
MCI e.g., based on MCI level, EMS director/contractor discretion		✓		✓	✓
Local Disaster/ Emergency Proclamation		✓	✓		
Good Cause e.g., non-existent address, patient left scene, accident-related traffic, road construction, inclement weather			✓		✓
Multiple Ambulances e.g., 2nd ambulance or more exempted					✓

Source: Provider/REMSA agreements

Note: Examples provided are available in at least one county, but are not necessarily in every county

Figure 86 - Ambulance Contract Comparison - Exemptions



Many EMS systems are reducing or eliminating exemptions. There is a significant labor cost for both the provider and the EMS agency to capture, compile, review, negotiate, and approve/deny each exemption request. Most exemptions are very infrequent, such as train delay or MCI, with minimal impact on overall system performance. Other exemptions can be eliminated for staging, off-road locations, and incorrect addresses by establishing an on-scene time based on defined protocols and standard response times to apply. The Santa Clara County agreement allows the contract manager to suspend penalties; this could include a local disaster or emergency proclamation.

As part of the evaluation phase, the exemptions claimed in Riverside County were analyzed for the last eight years. Overall, AMR would be in compliance in most zones and nearly compliant for all others if no exemptions existed. Figure 87 shares a breakdown of responses and exemptions claimed and the response time compliance without the exemptions.

Exemptions Claimed								
Year	2012	2011	2010	2009	2008	2007	2006	2005
Central Zone								
Total Responses	22,211	20,822	20,071	20,230	19,368	19,134	18,934	18,261
Exemptions Claimed	346	271	204	91	237	236	225	397
Exemptions (%)	1.6%	1.3%	1.0%	0.4%	1.2%	1.2%	1.2%	2.2%
Compliance w/o Exemptions	90.2%	90.7%	90.0%	90.9%	91.5%	91.0%	92.4%	89.8%
Southwest Zone								
Total Responses	29,829	28,337	27,480	26,456	24,902	24,216	23,706	21,776
Exemptions Claimed	398	450	560	229	356	428	350	520
Exemptions (%)	1.3%	1.6%	2.0%	0.9%	1.4%	1.8%	1.5%	2.4%
Compliance w/o Exemptions	90.3%	89.8%	89.2%	90.0%	90.4%	89.8%	90.1%	89.0%
Northwest Zone								
Total Responses	46,644	43,726	43,159	42,342	42,606	43,136	42,919	42,716
Exemptions Claimed	1,210	777	749	287	868	846	617	997
Exemptions (%)	2.6%	1.8%	1.7%	0.7%	2.0%	2.0%	1.4%	2.3%
Compliance w/o Exemptions	89.4%	90.6%	89.9%	90.7%	90.0%	90.2%	91.7%	90.1%
San Jacinto Zone								
Total Responses	20,894	20,181	18,932	18,655	18,184	18,493	18,219	17,414
Exemptions Claimed	-	-	6	18	192	223	207	310
Exemptions (%)	0.0%	0.0%	0.0%	0.1%	1.1%	1.2%	1.1%	1.8%
Compliance w/o Exemptions	93.2%	93.0%	93.7%	94.3%	93.4%	93.1%	93.1%	91.9%
Pass Zone								
Total Responses	8,996	8,547	8,129	7,839	7,588	8,112	7,775	7,678
Exemptions Claimed	1	-	1	14	43	89	117	145
Exemptions (%)	0.0%	0.0%	0.0%	0.2%	0.6%	1.1%	1.5%	1.9%
Compliance w/o Exemptions	93.2%	93.0%	93.7%	94.3%	93.4%	93.1%	93.1%	91.9%
Desert Zone								
Total Responses	21,548	20,622	20,033	19,067	19,029	19,048	18,520	17,978
Exemptions Claimed	22	21	12	37	153	120	44	249
Exemptions (%)	0.1%	0.1%	0.1%	0.2%	0.8%	0.6%	0.2%	1.4%
Compliance w/o Exemptions	92.3%	92.1%	92.6%	92.7%	92.3%	91.9%	92.6%	90.9%

Source: Riverside EMS Agency

Figure 87 - Exemptions Claimed



Penalties/Fines

All systems reviewed create a financial incentive for providers to meet response times by assessing penalties or fines when the standards are not met (see Figure 88). All systems require penalties when the provider does not meet the 90th percentile standard within an EMS zone; the amount varies per system from \$2,500 up to \$50,000 per zone and how far below 90 percent. Riverside County calculates the penalty differently by multiplying the per-call penalties by two, three, or four depending on the severity. Riverside is also unique in that it offers a performance credit when the provider exceeds 91 percent in a zone (or all zones); and again at 95 percent where all penalties are waived. All contracts reviewed identify non-compliance as a “material breach” of contract; Riverside and Santa Clara counties specify a certain number of months while the remainder only state “repeated failures.”

Riverside and Alameda counties utilize a sliding penalty scale based on the number of minutes in excess of the agreed upon response time. Three of the five systems also track and penalize outlier responses, i.e., those that exceed a certain higher threshold. While Riverside County does not increase the penalty amount, any zone performance credit does not apply to outliers. Typically, the desired contract objective is to eliminate outliers through significant financial penalties. “Per call” penalties are assessed by some systems which include failure to respond, sending a BLS ambulance, not reporting on-scene time, and vehicle failure while transporting a patient.

EMS systems are consistently reviewing penalty models for not only frequency, but also the labor involved to track and enforce. In some instances, the labor cost involved to track exceeds the penalties for infrequent events, such as vehicle failure. Other systems use the next radio transmission when crew’s failure to report on scene time.

It should be noted that following stakeholder input received for the 2009 AMR contract extension, REMSA doubled the fine structure for all response greater than five minutes late. Additionally during this process, REMSA added a sub-zone to the Northwest zone and changed all sub-zone response time criteria for fractal compliance from 89 percent on a three-month rolling average, to 90 percent monthly.



Ambulance Contract Comparison - Penalties					
Penalties	Riverside County	Santa Clara County	San Diego City	Alameda County	Contra Costa County
Zone Compliance	2x fines 88-89%, 3x fines 86-87%, 4x fines < 86%	\$10,000 per zone, per 1% fractile between 90-85%	\$5,000-50,000 based on zone & 0.5% under compliance	\$5,000-50,000 between 90-89% based on MPDS priority	\$2,500-50,000 based on zone & 0.5% under compliance
Performance Credit	15-100% credit for 91-95% (per zone & overall)				
Call Compliance	\$5-2,000 per call	\$250-15,000 per call			
Failure to Respond			Up to \$25,000 per call	\$25,000 per call	
BLS Ambulance Response	\$500 per call		\$500 per call	\$500 per call	
No At-Scene Time	\$360 per call		\$500 per call	\$500 per call	
Loaded Mech. Failure	\$500 per call				
Outlier Times	>10:00 tracked, fines are not subject to any credit		> 200% time, Priority 1 only, \$5,000 per call	≥150% time \$1,000-5,000/ call based on MPDS priority	
Performance Breach	3 consecutive months or 5/12 months	3 consecutive months or 2/6 months	Repeated failures to meet response times	Repeated failures to meet response times	Repeated failures to meet response times

Source: Provider/REMSA agreements

Figure 88 - Ambulance Contract Comparison - Penalties



Performance Indicators

Whether they are called key performance indicators (KPIs), core measures, quality indicators, clinical reports, or system benchmarks, most high performance EMS systems monitor certain variables in order to determine the current level of performance. These may be mandated within a 9-1-1 provider contract, but the specific indicators tracked are most often developed, defined, and regularly updated by a CQI committee. A list of the current KPIs for Riverside County and comparable EMS systems is available in Figure 89.

In 2012, the California EMS Authority (EMSA) received a grant from the California HealthCare Foundation to define and publish a set of core measures that describe the coordination and effectiveness of EMS utilizing regional and local information for California. The purpose of the EMS system core measures project is to increase the accessibility and accuracy of pre-hospital data for public, policy, academic and research purposes to facilitate EMS system evaluation and improvement.⁴¹ Figure 89 shares which metrics EMSA selected to track quality in an EMS system.

REMSA reported its core measure data to EMSA as requested and is determining whether REMSA has the staffing and technical capacity to continue to monitor and report the core measures annually. A number of other KPIs are being tracked by individual agencies, but not collated at a County level at this time.

Key Performance Indicators (KPIs)					
KPI	Riverside County	Santa Clara County	Alameda County	Contra Costa County	CA EMS Authority
Response times					
Ambulance	✓	✓	✓	✓	✓
Quick Response Vehicle				✓	
First Responders		✓			
Call time increments/time on task			✓		
Clinical indicators					
Bystander CPR				✓	✓
Cardiac arrest survival rate			✓	✓	✓
End-Tidal CO ₂ post intubation	✓		✓		✓
First defibrillation			✓		✓
Heart Attack	✓	✓	✓	✓	✓
Intubation success rate	✓		✓		✓
IO success rate	✓	✓			
IV success rate			✓		
Pain management	✓		✓		✓
PCR data compliance	✓		✓		
Pediatric					✓
Protocol/procedures/medication compliance	✓	✓	✓	✓	✓
Respiratory	✓		✓		✓
Stroke		✓	✓	✓	✓
Trauma	✓		✓	✓	✓
Non clinical indicators					
24-hour shift workloads			✓		
Collisions per 100,000 miles			✓	✓	
Critical vehicle/equipment failure per 100,000 miles			✓	✓	
Customer complaints	✓	✓	✓	✓	
Dispatch vs. field impression	✓			✓	
Employee injuries				✓	
Employee satisfaction			✓	✓	
Employee turnover			✓	✓	
Financial statement	✓	✓			
Hospital off-load hours	✓	✓	✓	✓	
Mutual aid requests	✓		✓		
Surveillance data evaluation	✓	✓			

Source: County EMS agencies

Notes: Most agreements include language for additional reports as requested

Figure 89 - Key Performance Indicators (KPIs)

⁴¹ http://www.emsa.ca.gov/systems/Core_Measures.asp



Current System

Data Collection and Reporting

REMSA has created a robust data action plan that includes adopting the vendor Sansio progressively throughout the County. Riverside County Fire Department has been phasing in Sansio's HealthEMS Electronic Patient Care Report (ePCR), Corona and Pechanga Fire Departments have been using the ePCR system since 2011. Sansio's XchangeER product allows EDs to view pre-hospital patient care reports and has been adopted by most hospitals in 2012. Actual commitment for adoption of the Sansio's product has not been universally confirmed by all providers in writing. The goal is to have full implementation of the ePCR system by the end of calendar year 2013. One key missing link will be to achieve patient outcome data from the EDs and hospitals receiving EMS patients. REMSA has this as a goal for this project.

A beta-test, patient wait-time dashboard has been under study at some EDs to help better understand the impact and extent of patient off-load times in the County's EDs.

REMSA's trauma system registry has been in place since 1992 but does not meet the state or other credentialing body's data collection standard. A new registry began implementation in 2012 and full implementation is pending.

Operational Integration and Cooperative Relationships of System Participants

There are many indications of an operational role of integration and cooperation amongst the system stakeholders not the least of which is the significant and collaborative nature of the REMSA's committee structure as witnessed with the recent extensive protocol revision effort. Few reports were heard or witnessed of communication challenges between ambulance and first responder personnel which was a problem historically. The strong cooperative role between the cities of Corona and Riverside on EMS response times and the integration through contract terms of those two models (ambulance plus first response working in tandem) cannot be understated. In fact, overall, the first response and ambulance delivery system enjoys a level of collaboration and cooperation that is substantial and should be recognized.

There are a number of areas that present improvement opportunity to be addressed in the recommendations report. Key areas not fully integrated to date include:

- Case management and cost reduction strategies
- Citizen cardiac arrest survival initiatives
- Continuous Quality Improvement (CQI)
- Dispatch functions (CAD-to-CAD linkages), EMD and dispatch CQI
- Integration of training and retraining programs
- Public education and prevention programs



- Other collaborative initiatives designed to improve outcomes, timeliness and cost appropriate care models

Medical Equipment and Supplies

Medical supplies in the County are not standardized and there is concern from the fire departments about the lack of cost reimbursement for first responders. These two topics are necessarily linked and thus will enhance the ability to provide a sustainable cost recovery system and limit unnecessary redundancies and variation on the supply and equipment side of the delivery model.

Emergency Medical Services Education and Training

REMSA policies are reviewed and revised annually. Any changes are updated by January 1st and public and private agencies have 90 days to train their providers before the policies go live on April 1st. REMSA provides “train-the-trainer” classes to roll out the updates to approved training centers, which includes some of the provider agencies, local colleges, and private ambulance providers.

Other courses are left up to the individual agencies to offer or field providers must find them in the community. The current 9-1-1 ambulance provider has no requirement to offer EMS training. There is no coordinated, standardized training program for Riverside County; however, the County does have a best practice training program with a centralized, regional training center for fire and public safety services. A number of interviewees expressed an interest in developing an equivalent EMS training center to benefit all field providers, ensure standardized training, and allow first responder and transport providers to train side-by-side.

Patient Satisfaction and Customer Service

Patient satisfaction and customer service measures have not been a part of ambulance performance contracts in the past as is true in many contemporary EMS delivery systems. In addition, these parameters are not prevalent with first responders as well and thus no measure can be found for the Countywide satisfaction or other measure of “service” within the EMS delivery system.⁴²

The Abaris Group is working with AMR to conduct focus groups in regard to patient satisfaction. Further details to will be provided.

⁴² A separate customer-service survey through user focus groups will be completed and the results will be available under separate cover.



System Review

Overall, the EMS delivery and support systems for Riverside County operates at a credible level with system performance at or close to the level of performance that most stakeholders indicated they have historically desired for the system. The ambulance delivery system operates within the performance levels set for the County contracted ambulance (AMR) using objective response-time measures and is stated to operate well for the four other public agencies although their responses are not reported or independently reviewed publicly. System clinical protocols, recently updated, have not embraced all of the care opportunities adopted by other populated EMS delivery systems. There are no system initiatives around public integration on awareness, appropriate use of EMS and on focused initiatives (e.g., witnessed cardiac arrests, injury prevention, etc.).

The County's ambulance contract itself is in need of significant modification to include any assumptions adopted on ambulance zones, communication and dispatch, CQI, data interfaces and response times. Other system initiatives under consideration (e.g., community paramedics, case management, care innovations, etc.) will also necessarily need to be incorporated in the County contract. The current contract does not encourage or reward the current provider to provide leadership around system modernizations particularly around education, CQI, best practice hospital capacity innovations, data leverage (e.g., publications, research, etc.) or system initiatives (e.g., public engagement initiatives). Missing from the contract are key disincentive strategies that would enhance system stakeholder understanding and assure County monitoring (e.g., approval for ambulance system resource changes, audited and other detailed financial statements, more precise penalties and elimination of exceptions, etc.).

A sample of key strengths and improvement opportunities of the current system are as follows:

Riverside County EMS System – Key Strengths

- AMR is meeting current expected response-time compliance
- Excellent working relationship amongst all stakeholders
- Exceptionally engaged fire first-response system
- Most first responders are ALS
- Ambulance providers have been serving the same community for decades
- Renewed system CQI focus
- Single contracted ambulance provider
- Specialty hospital network (i.e., trauma, cardiac and upcoming stroke protocols)



Riverside County EMS System – Improvement Opportunities

- All ambulances are dispatched as an emergency response (i.e., lights and siren), regardless of need
- All EMS providers conduct training independently
- Ambulance off-load delays at EDs is a persistent and rising problem
- Current ambulance contract lacks language for innovation, service excellence and outcome initiatives
- EMD coverage is not countywide (~93 percent) with an industry expectation of 100 percent
- EMD is not fully deployed as a tool in many communities including call resource tiering
- ePCR system implementation is occurring but potential barriers exist
- Historical Countywide CQI focus remains a resource challenge
- Lack of EMS equipment standardization and cost-reimbursement systems for fire ALS first responder providers
- Limited contractual obligation for first responders to provide information, including response times, data reporting or guaranteed involvement in with county-wide initiatives
- Permissive list of response-time exemptions (6)
- Response time requirements are not generally consistent with industry-accepted standards (i.e., metro/urban)
- The system lacks a culture of advancement and thus has not benefited from many innovations across the country
- There are a number of fire department and ambulance mutual-aid issues
- Advisory committee process is too complex



Glossary of Acronyms

ACA/PPACA

Affordable Care Act/ Patient Protection and Affordable Care Act

ACO

Accountable Care Organization

AED

Automated External Defibrillator

AEMT

Advanced EMT

ALS

Advanced Life Support - the services provided by paramedics for life-threatening medical emergencies

AMR

American Medical Response

AQUA

Advanced Quality Assurance

BH

Base Hospitals

BLS

Basic Life Support - services provided by Emergency Medical Technicians

CAD

Computer Aided Dispatch

CAHF

California Association of Healthcare Facilities

CCT

Critical Care Transportation

CHP

California Highway Patrol

CMS

Centers for Medicare and Medicaid Services

CPR

Cardiopulmonary Resuscitation



CQI

Continuous Quality Improvement

CVAG

Coachella Valley Association of Governments

DHCS

California Department of Health Care Services

DOPH

Department of Public Health

DTMF

Dual Tones – Multi-Frequency

ECC

Emergency Communications Center

ED

Emergency Department

EMCC

Emergency Medical Care Committee

EMD

Emergency Medical Dispatch

EMSA

State EMS Authority

EMS

Emergency Medical Services

EMT

Emergency Medical Technician

EOA

Exclusive Operating Area

HASC

Hospital Association of Southern California

HEMS

Helicopter Emergency Medical Services



IFPD

Idyllwild Fire Protection District

IFT

Inter-Facility Transfer

LEMSA

Local EMS Agency

LMT

Lifecare Medical Transport

LOU

Letter of Understanding

MCI

Multiple Casualty Incident

MPDS

Medical Priority Dispatch System

NAED

National Association of Emergency Dispatch

OSHPD

Office of Statewide Health Planning and Development

PLN

Paramedic Liaison Nurse

POST

Peace Officers Standards and Training

PRC

Pre-hospital Receiving Hospitals

PSAP

Primary Public Safety Answering Point (can be primary or secondary)

PSEC

Public Safety Enterprise Communication

RCFCA

Riverside County Fire Chiefs Association

RCLEAA

Riverside County Law Enforcement Administrators Association