RIVERSIDE COUNTY EMS AGENCY

PATIENT CARE CONTINUUM REPORT

FISCAL YEAR 2018-19

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The purpose of this report is to provide analysis of the prehospital time intervals identified in REMSA Policy 2203-Patient Care Continuum Time Standards. Additional time intervals were added to the analysis to further measure the prehospital continuum of patient care from dispatch to hospital arrival.

Below are time interval definitions and their corresponding NEMSIS 3.4 timestamps. Time intervals in italics are intervals not currently in Policy 2203.

- Alarm Answering Time – eTimes.01 to eTimes.02
- Alarm Transfer Time – eTimes.01 to eTimes.02 (when the call is transferred to another designated entity)
- Alarm Handling Time – eTimes.01 to eTimes.03
- Alarm Processing Time – eTimes.02 to eTimes.03
- Turnout Time – eTimes.03 to eTimes.05
- Travel Time – eTimes.05 to eTimes.06
- Intervention Time – eTimes.06 to eTimes.07
- *Unit Response Time – eTimes.03 to eTimes.06*
- Total Response Time – eTimes.01 to eTimes.07
- *Arrived On Scene To Arrived At Destination Time – eTimes.06 to eTimes.11*
- *Total On Scene Time – eTimes.06 to eTimes.09*
- *Total Time On Scene With Patient – eTimes.07 to eTimes.09*
- *Transport Time – eTimes.09 to eTimes.11*
- *Unit Prehospital Time With Patient – eTimes.07 to eTimes.11*
- *Total Unit Prehospital Time – eTimes.03 to eTimes.11*
- *Total Prehospital Time – eTimes.01 to eTimes.11*

Pre-hospital Patient Care Continuum from dispatch to arrival at patient. *Adapted from REMSA Policy 2203.*
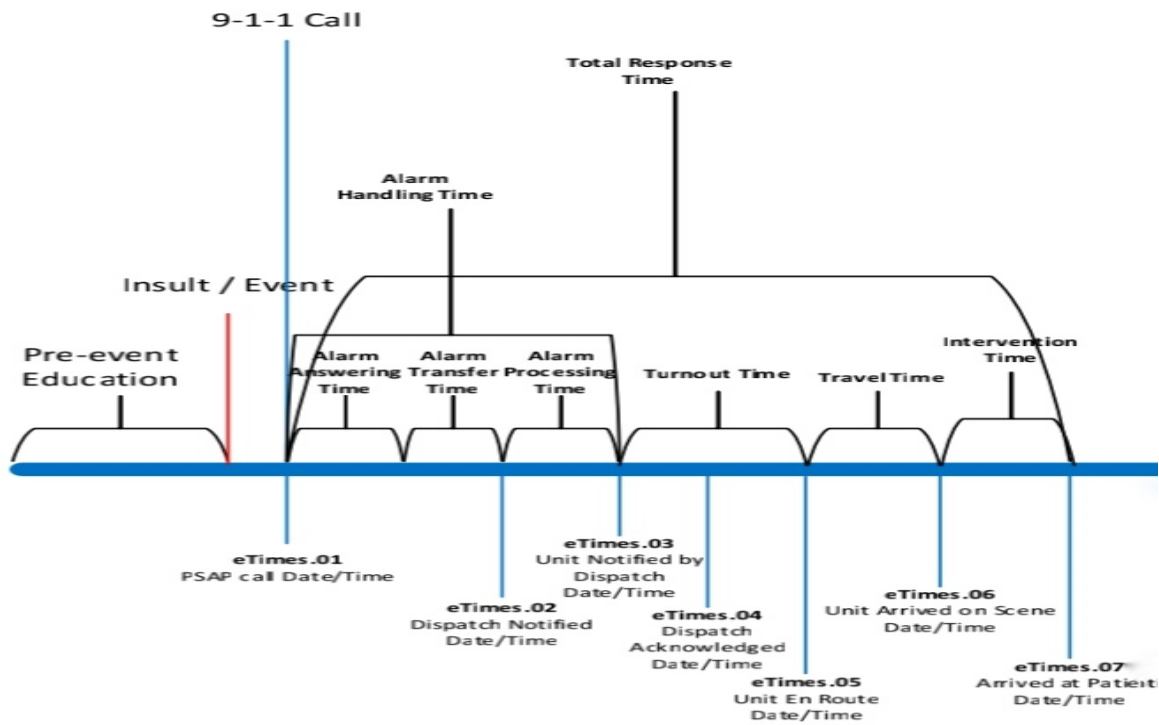
Methodology

Data
383,137 ePCRs (electronic patient care reports) were initially identified on ImageTrend® Elite ReportWriter between 7/1/2018 and 6/30/2019. *Forty-two* fields were generated for each ePCR utilized, resulting in a possible **16,091,754 datapoints** for analysis. **263,954 ePCRs** were then identified for use in time interval analysis after downloading, compiling, and cleaning the raw data. The final dataset was created utilizing **11,086,068 datapoints.**

Exclusions
119,183 (31.11% of total) ePCRs were excluded due to missing data points, incorrect times, disposition, or a combination of these. ePCRs were excluded for the following dispositions: Canceled Prior to Enroute, Canceled Enroute, Canceled at Scene by Another Unit, No Patient Contact, No Patient Found, Standby: No Services or Support Provided, Standby: Public Safety, Fire, or EMS Operational Support Provided, or for leaving the disposition field blank. ePCRs were excluded for missing time stamps for eTimes.01, eTimes.02, and eTimes.07. Additional ePCRs were excluded due to having any time interval greater than three standard deviations above the mean for each time interval.

Inclusions:
Data from **8 timestamps** were included and used to create the time intervals from REMSA Policy 2203 as well as the additional intervals created. **Fifteen (15) time intervals** were included in this dataset. Data from 16 agencies were included in the dataset. To be included, the agency had to be a fire department or transport agency providing 911 services in Riverside County. Disposition and EMD card data were also included in the dataset.

The tables below contain time interval statistics for all fire department and transport agencies providing 911 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

Statistics Definitions Used
- **N Total** is the total number of ePCRs.
- **N Valid** is the number of cases which met criteria for the time interval analysis.
- **N Invalid** is the number of cases excluded from the **N Valid** cases for calculation of the time interval due to incorrect or erroneous data points.
- **N Missing** is the number of cases excluded from the **N Valid** cases for calculation of the time interval due to missing data points.
- **Mean** represents the average of the data in minutes.
- **Median** represents the midpoint in the data in minutes.
- **Standard Deviation (Std. Deviation)** measures distribution of the data in minutes.
- **90th Percentile (Percentile 90)** represents time in minutes at which 90% of the responses fall under.
- **95% Confidence Interval for Mean** is the range for which we are 95% confident the true value of the mean exists.

Timeline and Findings

Histogram I. *Total Prehospital Time – eTimes.01 to eTimes.11* begins when a 911 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrives with the patient at the hospital or alternate destination.

All 911 Agencies Total Prehospital Time - eTimes.01 to eTimes.11

Mean = 38.29
Median = 36.30
Standard Deviation = 12.53
N = 157,900
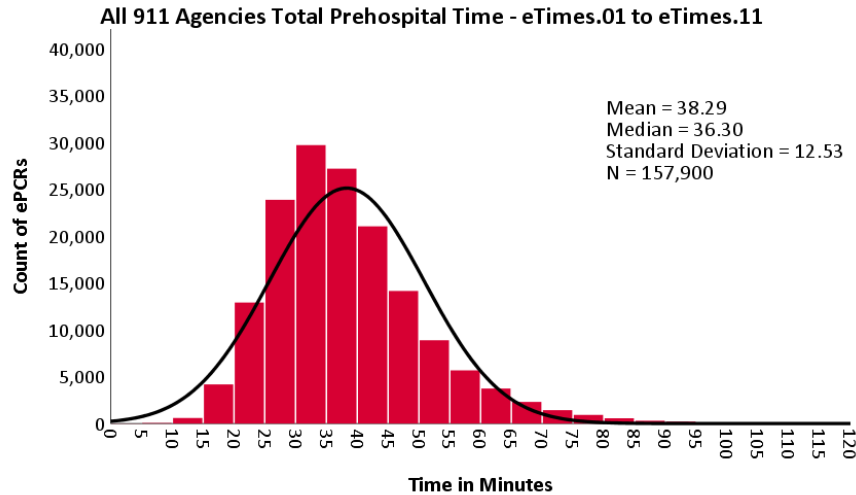
Histogram II. *Total Response Time – eTimes.01 to eTimes.07* begins when a 911 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrive at the patient's side.

All 911 Agencies Total Response Time - eTimes.01 to eTimes.07

Mean = 10.60
Median = 9.53
Standard Deviation = 5.34
N = 263,921
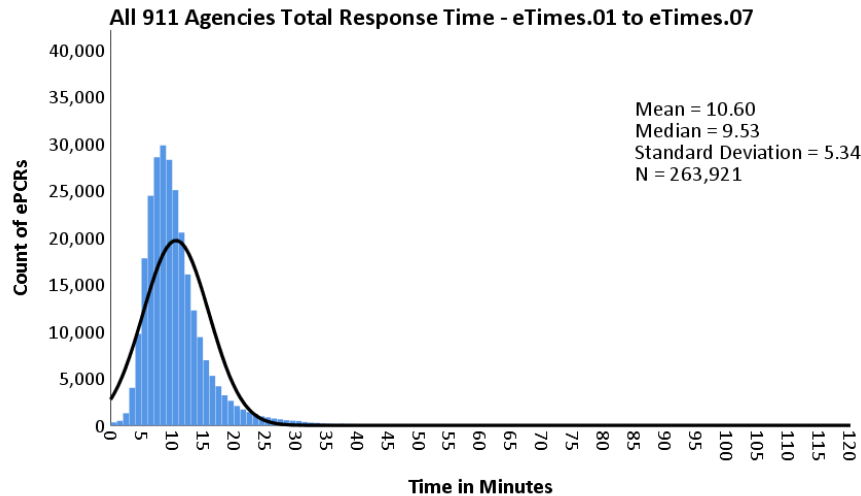
Histogram III. *Unit Response Time – eTimes.03 to eTimes.06* begins when the responding EMS unit is notified by dispatch and ends when the responding EMS unit arrives on the scene.

All 911 Agencies Unit Response Time - eTimes.03 to eTimes.06

Mean = 7.55
Median = 6.60
Standard Deviation = 4.36
N = 263,910
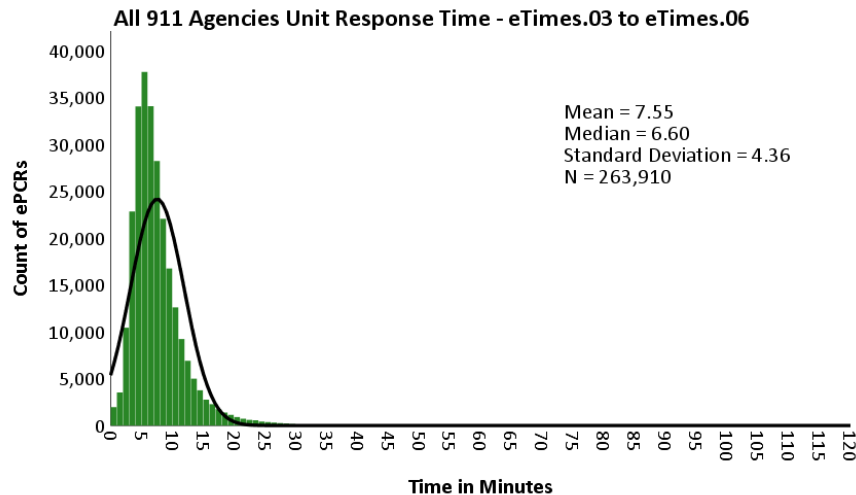
Graph I. *Responses by Month* shows ePCR volume by month and allows for a month-to-month comparison of volume.

Responses by Month

Month	Count of ePCRs
July 2018	31,284
August 2018	30,834
September 2018	30,576
October 2018	30,909
November 2018	30,212
December 2018	31,531
January 2019	32,770
February 2019	30,748
March 2019	34,408
April 2019	33,523
May 2019	33,131
June 2019	33,210
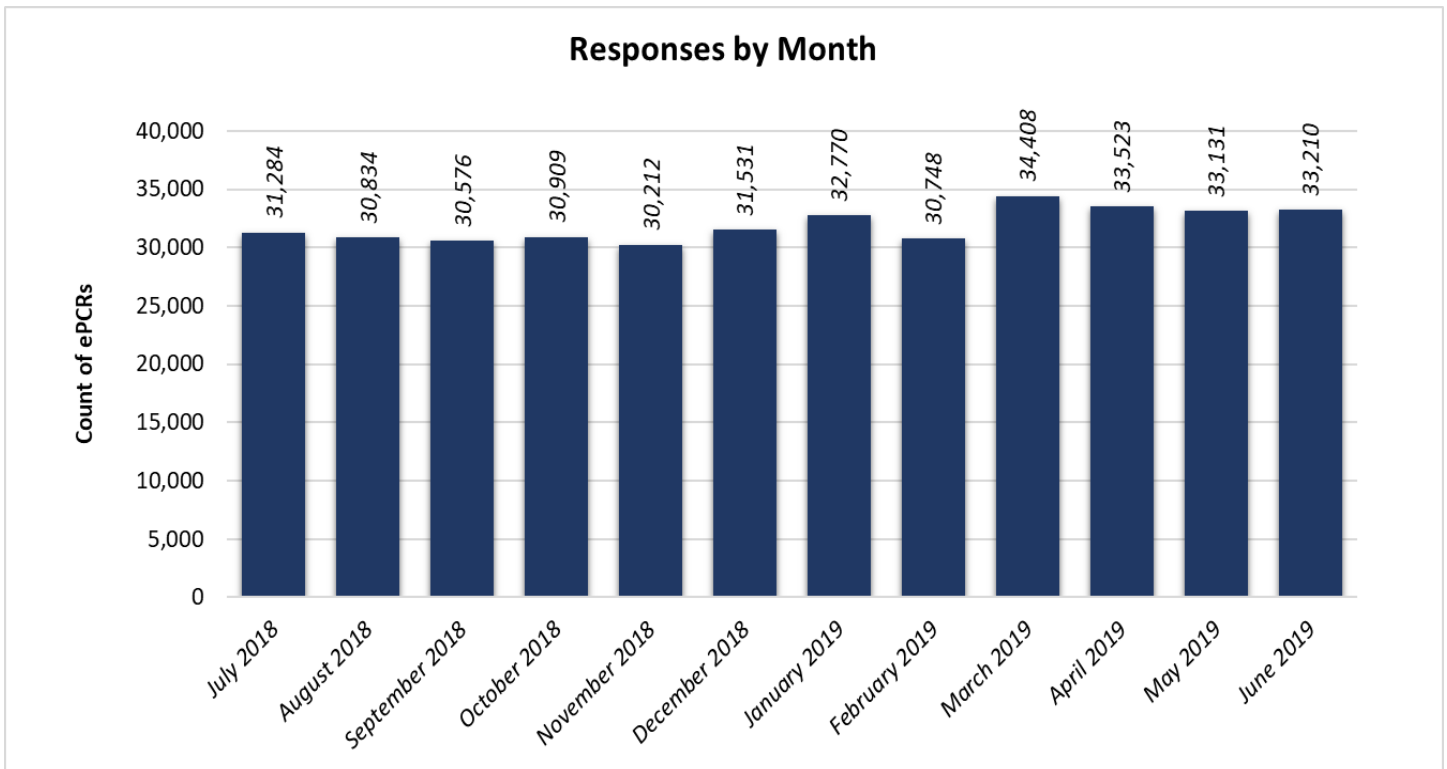
Graph II. *Responses by Hour* shows call volumes by time-of-day and indicates which hours are busiest on average.
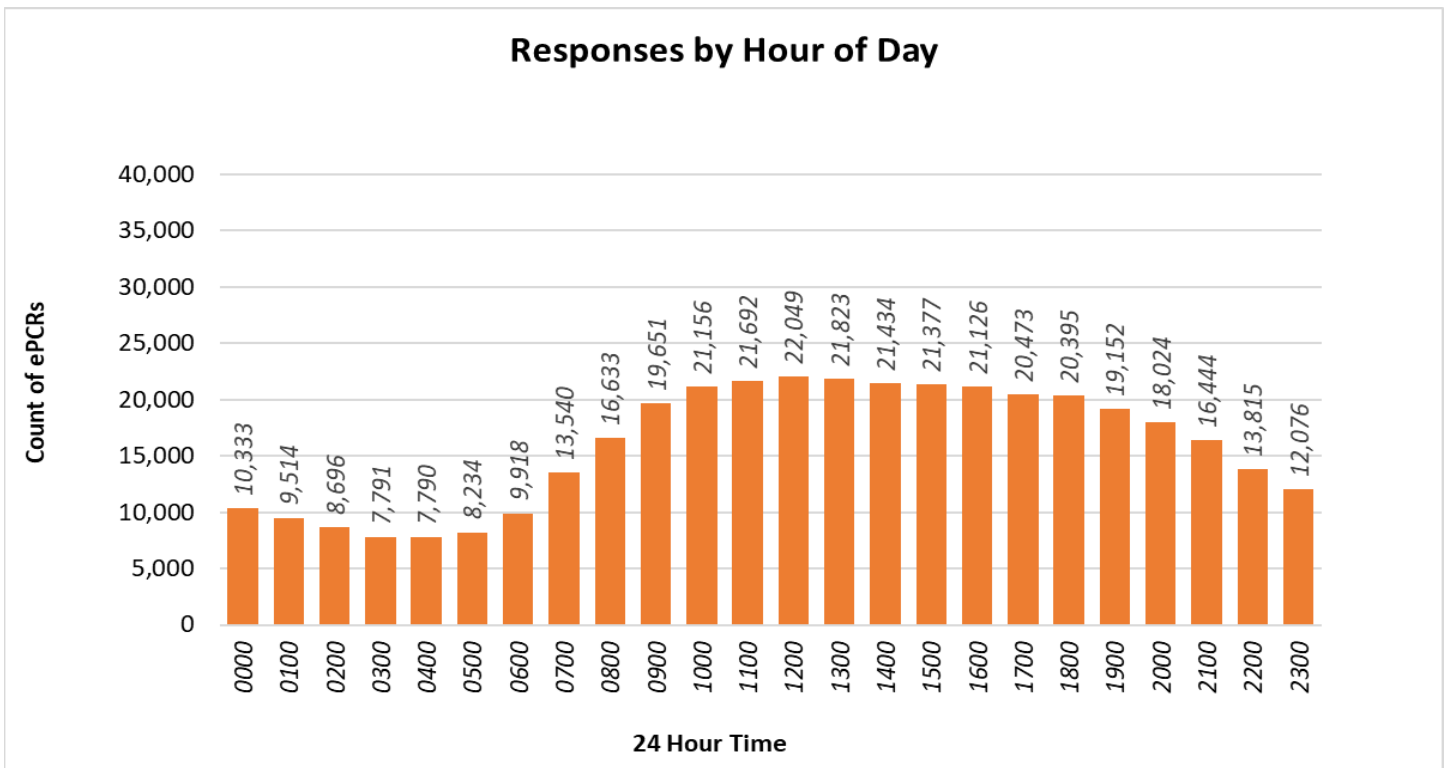
Responses by Hour of Day

24 Hour Time	Count of ePCRs
0000	10,333
0100	9,514
0200	8,696
0300	7,791
0400	7,790
0500	8,234
0600	9,918
0700	13,540
0800	16,633
0900	19,651
1000	21,156
1100	21,692
1200	22,049
1300	21,823
1400	21,434
1500	21,377
1600	21,126
1700	20,473
1800	20,395
1900	19,152
2000	18,024
2100	16,444
2200	13,815
2300	12,076

Time Interval Analysis

Tables I, II, & III. *All 911 Agencies* shows the time interval statistics for all fire department and transport agencies providing 911 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

All 911 Agencies		Alarm Answering/Alarm Transfer Time (eTimes.01 to eTimes.02)	Alarm Handling Time (eTimes.01 to eTimes.03)	Alarm Processing Time (eTimes.02 to eTimes.03)	Turnout Time (eTimes.03 to eTimes.05)	Travel Time (eTimes.05 to eTimes.06)
N	Total	383,137	383,137	383,137	383,137	383,137
	Valid	242,292	263,768	263,954	263,953	263,910
	Invalid	59,121	66,562	116,559	118,471	101,541
	Missing	81,724	52,807	2,624	713	17,686
Mean		0.7	1.4	0.8	0.9	6.6
Median		0.0	0.5	0.3	0.7	5.6
Standard Deviation		1.3	2.4	2.1	0.9	4.4
90th Percentile		2.4	3.2	1.3	2.1	11.7
95% Confidence Interval for Mean		(0.70-0.71)	(1.37-1.39)	(0.76-0.78)	(0.93-0.93)	(6.61-6.64)

All 911 Agencies		Intervention Time (eTimes.06 to eTimes.07)	Unit Response Time (eTimes.03 to eTimes.06)	Total Response Time (eTimes.01 to eTimes.07)	Total On Scene Time (eTimes.06 to eTimes.09)	Total Time On Scene With Patient (eTimes.07 to eTimes.09)
N	Total	383,137	383,137	383,137	383,137	383,137
	Valid	263,907	263,910	263,921	161,328	161,328
	Invalid	33,591	101,545	5,612	10,842	9,272
	Missing	85,639	17,682	113,604	210,967	212,537
Mean		1.7	7.6	10.6	14.6	12.9
Median		1.2	6.6	9.5	13.6	12.0
Standard Deviation		1.9	4.4	5.3	6.6	6.5
90th Percentile		3.0	12.5	16.5	23.1	21.3
95% Confidence Interval for Mean		(1.66-1.68)	(7.54-7.57)	(10.58-10.62)	(14.56-14.62)	(12.91-12.97)

All 911 Agencies		Transport Time (eTimes.09 to eTimes.11)	Unit Prehospital Time With Patient (eTimes.07 to eTimes.11)	Arrived On Scene To Arrived At Destination Time (eTimes.06 to eTimes.11)	Total Unit Prehospital Time (eTimes.03 to eTimes.11)	Total Prehospital Time (eTimes.01 to eTimes.11)
N	Total	383,137	383,137	383,137	383,137	383,137
	Valid	157,889	157,897	157,899	157,900	157,900
	Invalid	7,182	7,112	7,180	7,179	2,805
	Missing	218,066	218,128	218,058	218,058	222,432
Mean		14.2	27.0	28.7	37.1	38.3
Median		12.4	25.5	27.1	35.3	36.3
Standard Deviation		8.3	10.7	10.8	12.3	12.5
90th Percentile		25.0	41.0	42.8	53.2	54.7
95% Confidence Interval for Mean		(14.11-14.19)	(26.97-27.08)	(28.62-28.73)	(37.08-37.20)	(38.23-38.35)

Total Response Time by Agency Type

Table IV. *First Response Agencies shows* time interval statistics from *dispatch to patient contact* for all *fire departments* providing 911 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

First Response Agencies		Alarm Answering/Alarm Transfer Time (eTimes.01 to eTimes.02)	Alarm Handling Time (eTimes.01 to eTimes.03)	Alarm Processing Time (eTimes.02 to eTimes.03)	Turnout Time (eTimes.03 to eTimes.05)	Travel Time (eTimes.05 to eTimes.06)	Intervention Time (eTimes.06 to eTimes.07)	Unit Response Time (eTimes.03 to eTimes.06)	Total Response Time (eTimes.01 to eTimes.07)
N	Total	208,166	208,166	208,166	208,166	208,166	208,166	208,166	208,166
	Valid	91,372	112,840	112,996	112,995	112,952	112,951	112,952	112,969
	Invalid	36,846	44,271	94,194	94,606	84,117	28,674	84,121	2,205
	Missing	79,948	51,055	976	565	11,097	66,541	11,093	92,992
Mean		1.9	2.0	0.5	1.4	4.8	1.7	6.2	9.9
Median		1.9	2.0	0.3	1.3	4.3	1.3	5.8	9.3
Standard Deviation		1.4	1.8	1.1	0.9	2.7	1.9	2.9	4.0
90th Percentile		3.2	3.6	1.1	2.5	7.9	3.1	9.6	14.3
95% Confidence Interval for Mean		(1.86-1.87)	(1.95-1.97)	(0.51-0.53)	(1.42-1.44)	(4.77-4.80)	(1.69-1.71)	(6.20-6.23)	(9.84-9.88)

Table V. *Transport Agencies* shows time interval statistics from *dispatch to patient contact* for all *transport agencies* providing 911 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

Transport Agencies		Alarm Answering/Alarm Transfer Time (eTimes.01 to eTimes.02)	Alarm Handling Time (eTimes.01 to eTimes.03)	Alarm Processing Time (eTimes.02 to eTimes.03)	Turnout Time (eTimes.03 to eTimes.05)	Travel Time (eTimes.05 to eTimes.06)	Intervention Time (eTimes.06 to eTimes.07)	Unit Response Time (eTimes.03 to eTimes.06)	Total Response Time (eTimes.01 to eTimes.07)
N	Total	174,971	174,971	174,971	174,971	174,971	174,971	174,971	174,971
	Valid	150,958	150,958	150,958	150,958	150,958	150,958	150,958	150,958
	Invalid	22,237	22,261	22,365	23,865	17,424	4,915	17,424	3,401
	Missing	1,776	1,752	1,648	148	6,589	19,098	6,589	20,612
Mean		0.0	1.0	1.0	0.6	8.0	1.7	8.6	11.2
Median		0.0	0.3	0.3	0.3	7.0	1.0	7.5	9.8
Standard Deviation		0.1	2.6	2.6	0.7	4.9	1.9	5.0	6.1
90th Percentile		0.0	1.7	1.7	1.3	13.8	3.0	14.4	18.2
95% Confidence Interval for Mean		(0.00-0.00)	(0.94-0.97)	(0.94-0.97)	(0.55-0.56)	(7.98-8.03)	(1.64-1.66)	(8.53-8.58)	(11.13-11.19)

Total Response Time by Agency

Table VI, VII, & VIII. *Total Response Time – eTimes.01 to eTimes.07* begins when a 911 call is made to a public safety answering point (PSAP) requesting EMS services and ends when the responding EMS unit arrive at the patient's side. The tables below show Total Response Times by each agency providing 911 services in Riverside County. One agency has been excluded from the analysis due to all ePCRs missing the initial timestamps.

Total Response Time (eTimes.01 to eTimes.07)	Agency 1	Agency 2	Agency 3	Agency 4	Agency 5
Mean	11.3	10.2	11.5	7.4	11.1
Median	9.2	8.8	10.2	6.7	10.5
Standard Deviation	7.3	5.8	5.9	3.4	3.8
90th Percentile	20.6	16.2	18.4	10.6	15.3
95% Confidence Interval for Mean	(11.20-11.39)	(10.09-10.22)	(11.42-11.49)	(7.32-7.41)	(11.08-11.14)

Total Response Time (eTimes.01 to eTimes.07)	Agency 6	Agency 7	Agency 8	Agency 9	Agency 10
Mean	9.6	8.8	8.4	7.7	8.4
Median	8.9	8.5	8.0	7.2	7.7
Standard Deviation	4.1	2.7	2.9	2.8	3.7
90th Percentile	13.8	11.4	11.8	10.7	12.2
95% Confidence Interval for Mean	(9.52-9.76)	(8.69-8.84)	(8.25-8.49)	(7.58-7.72)	(8.28-8.46)

Total Response Time (eTimes.01 to eTimes.07)	Agency 11	Agency 12	Agency 13	Agency 14	Agency 15
Mean	11.3	5.0	12.1	10.7	9.9
Median	10.7	4.6	12.1	9.9	9.2
Standard Deviation	3.8	3.4	3.3	4.0	3.5
90th Percentile	16.3	10.0	15.5	15.3	13.7
95% Confidence Interval for Mean	(11.01-11.65)	(2.64-7.25)	(11.79-12.32)	(9.98-11.36)	(9.12-10.65)