RIVERSIDE COUNTY EMS AGENCY
# **PATIENT CARE CONTINUUM REPORT**
2020

PATIENT CARE CONTINUUM REPORT

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 destination. *Adapted from REMSA Policy 2203.*
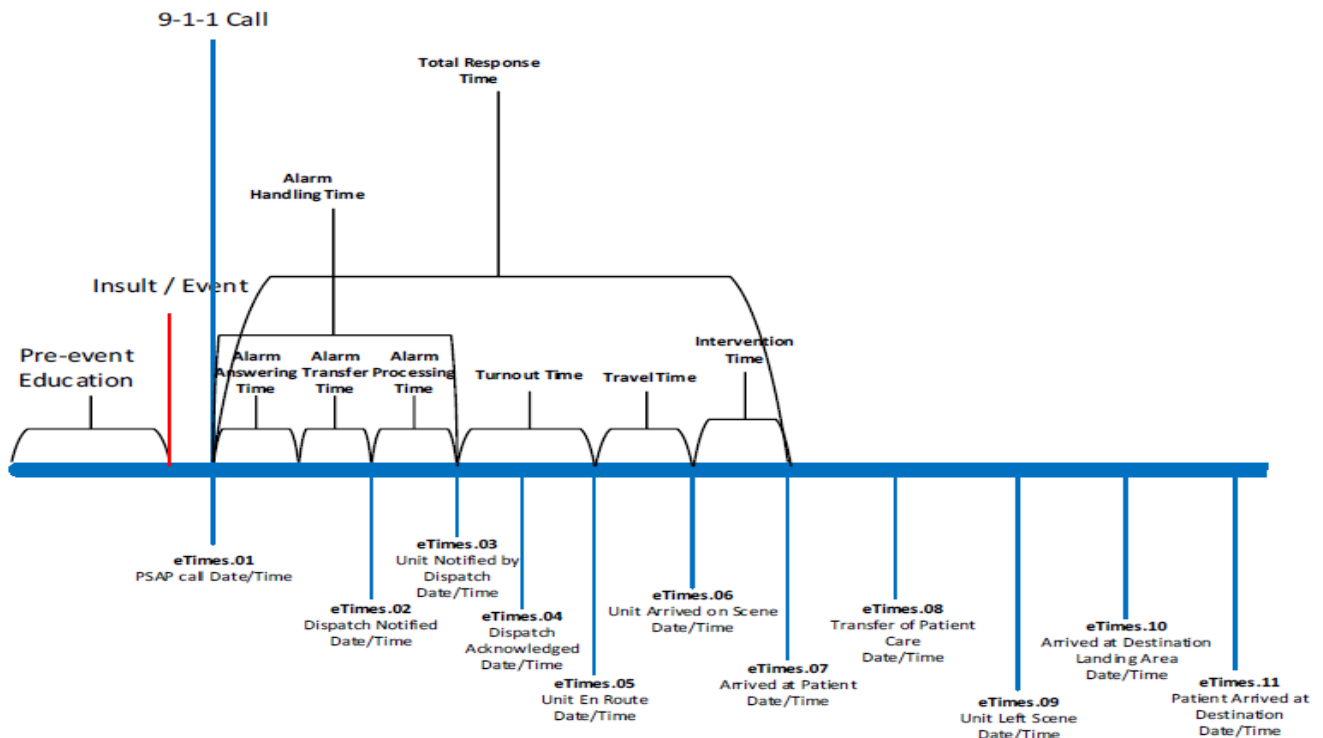
Methodology

Data

396,557 ePCRs (electronic patient care reports) were initially identified on ImageTrend® Elite Report Writer between 1/1/2020 and 12/31/2020. *Sixty-five* fields were generated for each ePCR utilized, resulting in a possible **25,776,205 datapoints** for analysis. **265,060 (66.8% of total) ePCRs** were then identified for use in time interval analysis after downloading, compiling, and cleaning the raw data. The final dataset was created utilizing **17,228,900 datapoints.**

Exclusions

131,497 (33.2% 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 **10 timestamps** were included and used to create the time intervals from REMSA Policy 2203 as well as the additional intervals created. **Sixteen (16) 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 9-1-1 services in Riverside County. Disposition and EMD card data were also included in the dataset.
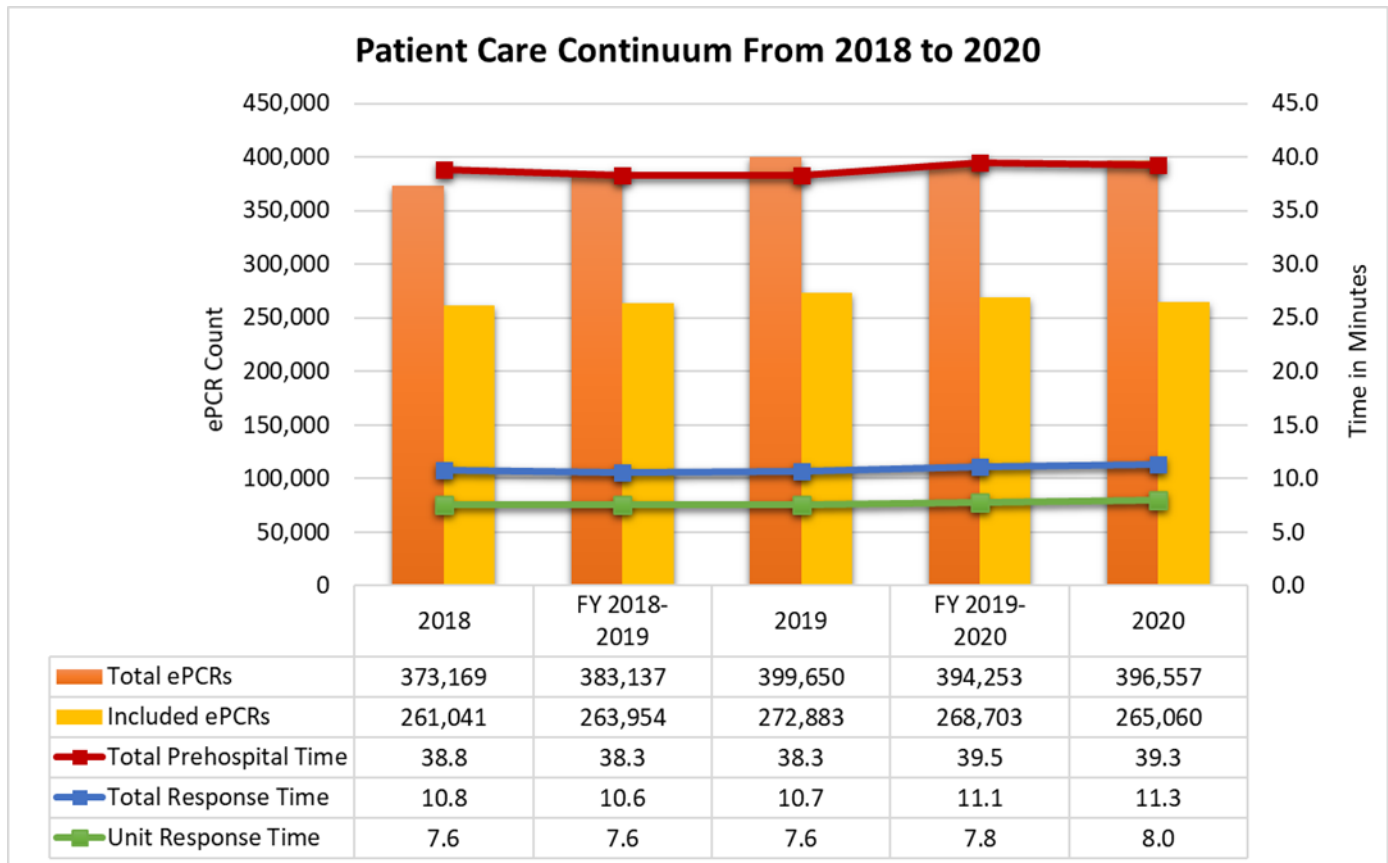
The tables below contain time interval statistics for all fire department and transport agencies providing 9-1-1 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

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** measures distribution of the data in minutes.
- **90th Percentile** 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.

Change in Patient Care Continuum Over Time

The combination bar and line chart below show the change over time in key response intervals as recorded in our semiannual Patient Care Continuum Reports. Total ePCR count has grown by 6.2% between 2018 and 2020. Mean Total Prehospital Time decreased by 0.5 minutes (1.3%) between 2018 and 2020 and increased by 1 minute (2.6%) between 2019 and 2020. Mean Total Response Time decreased by 0.1 minutes (0.9%) between 2018 and 2019 and increased by 0.6 minutes (5.6%) between 2019 and 2020. Mean Unit Response Time stayed consistent between 2018 and 2019 and increased by 0.4 minutes (5.3%) between 2019 and 2020.

Patient Care Continuum From 2018 to 2020

|	2018	FY 2018-2019	2019	FY 2019-2020	2020
Total ePCRs	373,169	383,137	399,650	394,253	396,557
Included ePCRs	261,041	263,954	272,883	268,703	265,060
Total Prehospital Time	38.8	38.3	38.3	39.5	39.3
Total Response Time	10.8	10.6	10.7	11.1	11.3
Unit Response Time	7.6	7.6	7.6	7.8	8.0

Timeline and Findings

Histogram I. *Total Prehospital Time – eTimes.01 to eTimes.11* begins when a 9-1-1 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

Mean = 39.3
Median = 37.4
Standard Deviation = 12.5
N = 153,332
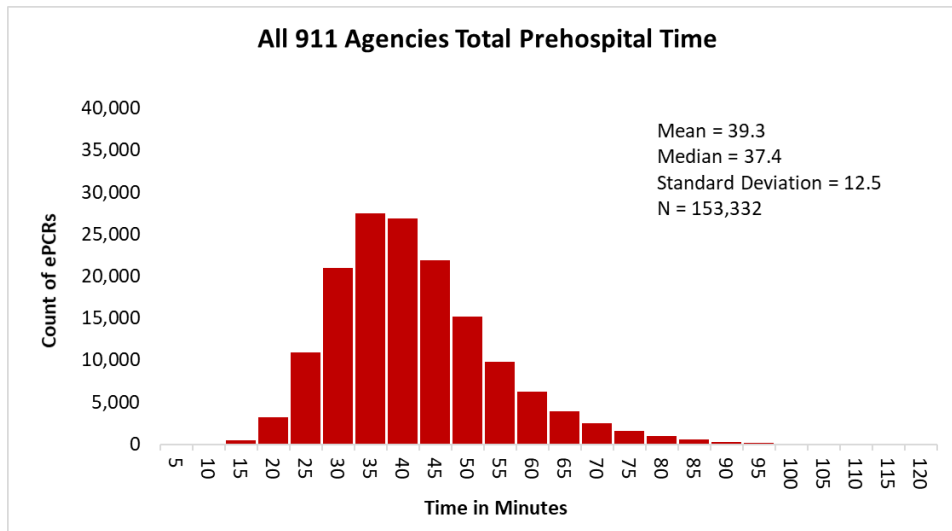
Histogram II. *Total Response Time – eTimes.01 to eTimes.07* begins when a 9-1-1 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrive at the patient's side.

All 911 Agencies Total Response Time

Mean = 11.3
Median = 10.1
Standard Deviation = 5.6
N = 265,025
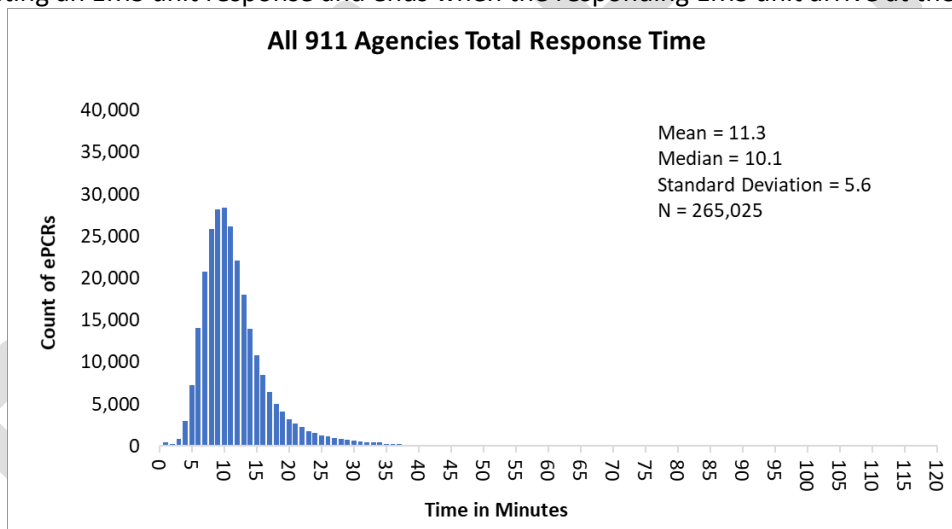
Histogram III. *Unit Response Time – eTimes.03 to eTimes.06* begins when the responding EMS unit is notified by dispatch and ends when the responding EMS unit arrives on the scene.

All 911 Agencies Unit Response Time

Mean = 8.0
Median = 7.0
Standard Deviation = 4.6
N = 265,045
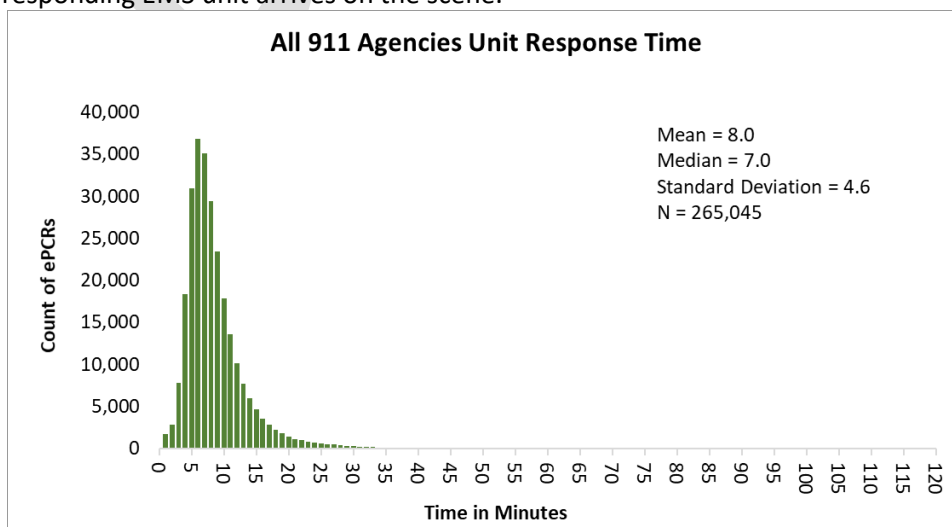
Graph I. *Responses by Month* shows ePCR volume by month and allows for a month-to-month comparison of volume.

Responses by Month

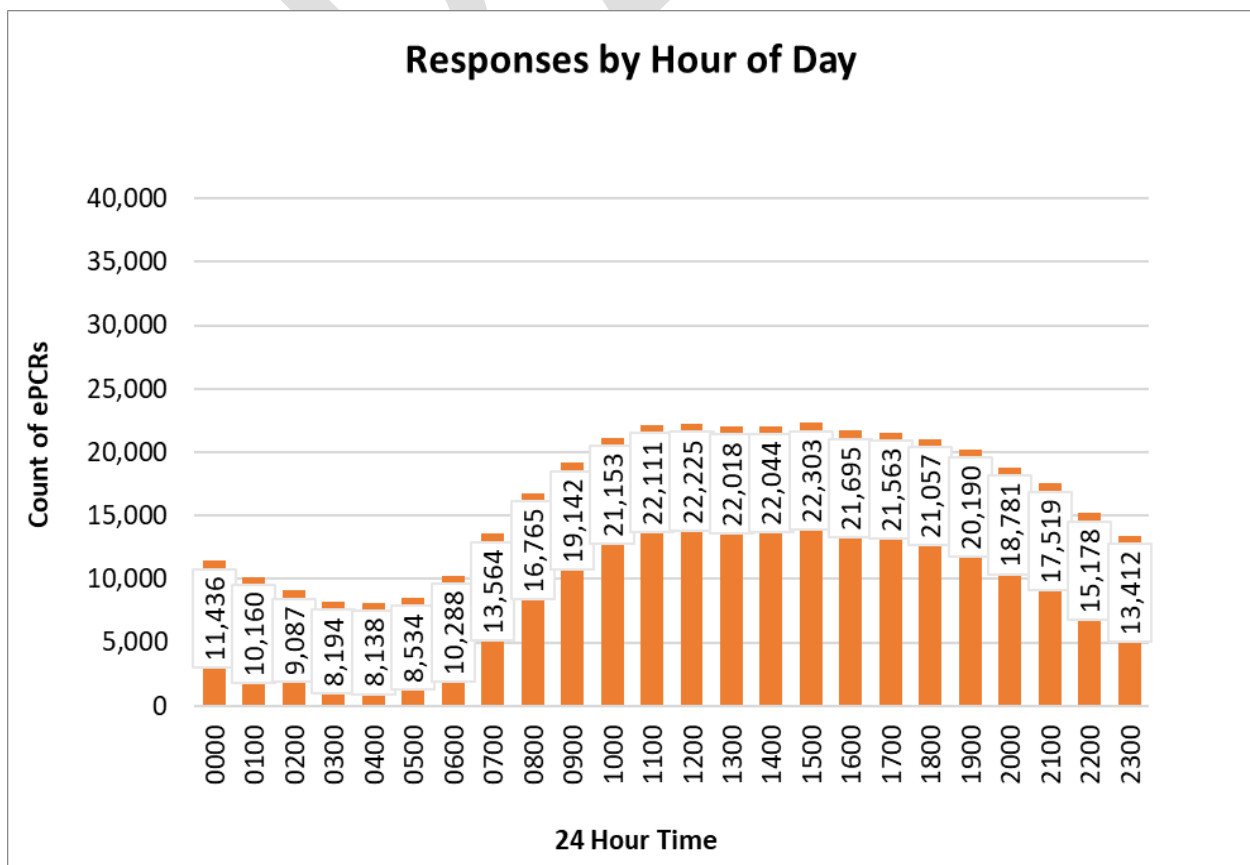| Month	Count of ePCRs
January 2020	36,211
February 2020	34,037
March 2020	32,402
April 2020	27,592
May 2020	30,021
June 2020	31,976
July 2020	34,455
August 2020	34,344
September 2020	31,817
October 2020	32,898
November 2020	32,318
December 2020	38,486
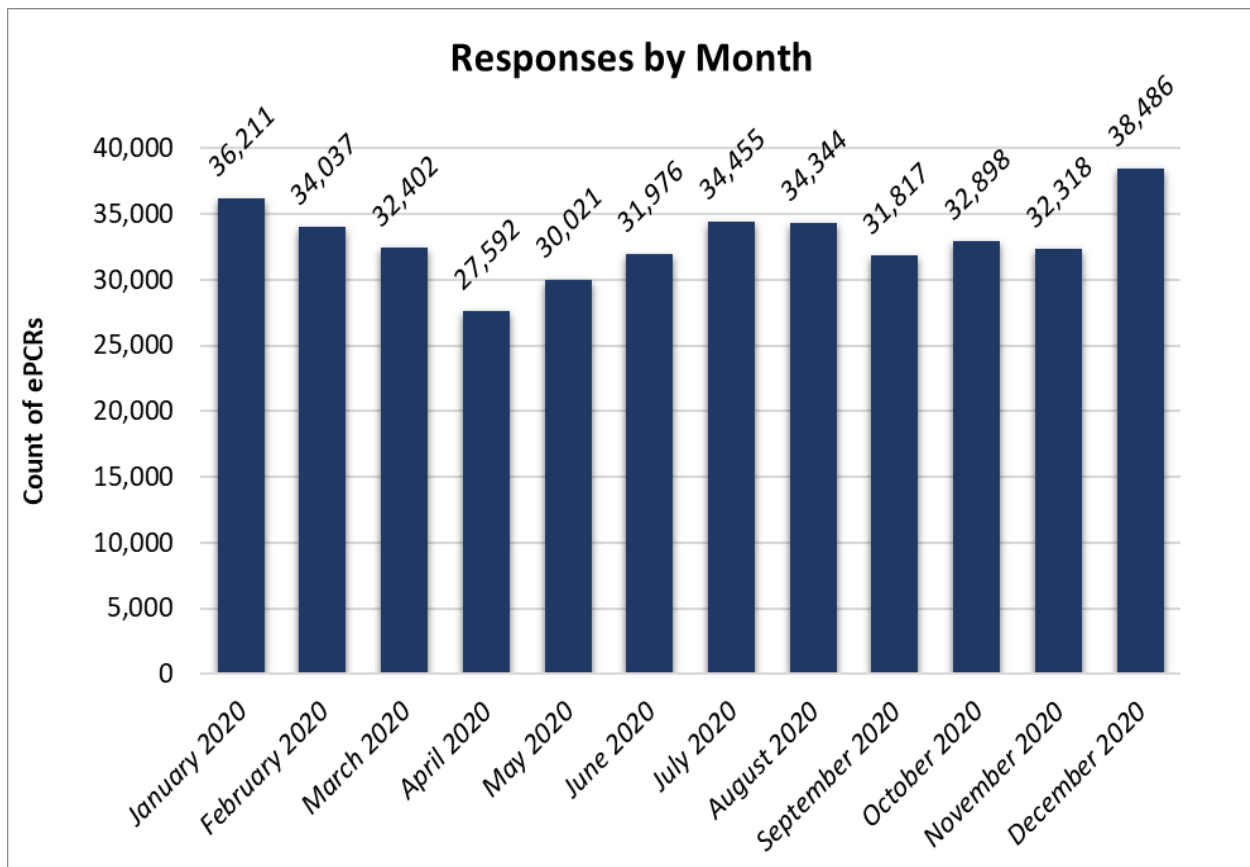
Graph II. *Responses by Hour* shows call volumes by time-of-day and indicates which hours are busiest on average.

Responses by Hour of Day

24 Hour Time	Count of ePCRs
0000	11,436
0100	10,160
0200	9,087
0300	8,194
0400	8,138
0500	8,534
0600	10,288
0700	13,564
0800	16,765
0900	19,142
1000	21,153
1100	22,111
1200	22,225
1300	22,018
1400	22,044
1500	22,303
1600	21,695
1700	21,563
1800	21,057
1900	20,190
2000	18,781
2100	17,519
2200	15,178
2300	13,412

Time Interval Analysis

Tables I, II, & III. *All 9-1-1 Agencies* shows the time interval statistics for all fire department and transport agencies providing 9-1-1 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/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	396,557	396,557	396,557	396,557	396,557
	Valid	243,877	264,933	265,060	265,060	265,045
	Invalid	68,831	77,603	128,667	130,559	110,705
	Missing	83,849	54,021	2,830	938	20,807
Mean		0.7	1.5	0.9	1.0	7.1
Median		0.0	0.6	0.3	0.7	5.9
Standard Deviation		1.3	2.4	2.2	1.0	4.7
90th Percentile		2.5	3.4	1.6	2.2	12.7
95% Confidence Interval for Mean		(0.72-0.73)	(1.50-1.52)	(0.87-0.88)	(0.98-0.99)	(7.04-7.08)

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	396,557	396,557	396,557	396,557	396,557
	Valid	264,883	265,045	265,025	153,987	153,986
	Invalid	33,138	110,721	6,832	10,122	8,451
	Missing	98,536	20,791	124,700	232,448	234,120
Mean		1.7	8.0	11.3	14.7	13.1
Median		1.2	7.0	10.1	13.8	12.1
Standard Deviation		2.0	4.6	5.6	6.6	6.4
90th Percentile		3.0	13.5	17.7	23.4	21.5
95% Confidence Interval for Mean		(1.73-1.75)	(8.03-8.06)	(11.27-11.31)	(14.67-14.73)	(13.02-13.09)

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	396,557	396,557	396,557	396,557	396,557
	Valid	153,243	153,333	153,333	153,333	153,332
	Invalid	7,690	7,579	7,691	7,691	3,790
	Missing	235,624	235,645	235,533	235,533	239,435
Mean		14.18	27.22	28.87	37.99	39.25
Median		12.62	25.80	27.40	36.30	37.43
Standard Deviation		8.05	10.41	10.53	12.25	12.50
90th Percentile		24.77	40.93	42.75	54.05	55.68
95% Confidence Interval for Mean		(14.14-14.22)	(27.17-27.28)	(28.82-28.92)	(37.93-38.05)	(39.19-39.31)

Total Response Time by Agency Type

Table IV. *Non-Transport Units* shows time interval statistics from *dispatch to patient contact* for all *units* that respond to 9-1-1 calls but do not provide transport services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

Non-Transport Units		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	195,653	195,653	195,653	195,653	195,653	195,653	195,653	195,653
	Valid	78,236	99,285	99,378	99,378	99,364	99,202	99,364	99,354
	Invalid	39,682	48,436	95,081	95,562	84,589	24,630	84,601	2,249
	Missing	77,735	47,932	1,194	713	11,700	71,821	11,688	94,050
Mean		1.9	2.0	0.6	1.5	5.0	1.9	6.5	10.4
Median		1.9	2.0	0.3	1.5	4.5	1.5	6.0	9.8
Standard Deviation		1.5	1.9	1.3	1.0	2.8	2.1	3.0	4.2
90th Percentile		3.3	3.7	1.4	2.7	8.1	3.5	9.9	15.1
95% Confidence Interval for Mean		(1.84-1.87)	(2.00-2.02)	(0.62-0.64)	(1.52-1.54)	(4.94-4.97)	(1.90-1.93)	(6.47-6.51)	(10.37-10.42)

Table V. *Transport Units* shows time interval statistics from *dispatch to patient contact* for all *units* providing 9-1-1 transport services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

Transport Units		Alarm Answering/ 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	200,902	200,902	200,902	200,902	200,902	200,902	200,902	200,902
	Valid	165,641	165,648	165,682	165,682	165,681	165,681	165,681	165,671
	Invalid	29,148	29,166	33,585	34,996	26,115	8,508	26,119	4,583
	Missing	6,113	6,088	1,635	224	9,106	26,713	9,102	30,648
Mean		0.2	1.2	1.0	0.7	8.3	1.6	9.0	11.8
Median		0.0	0.4	0.3	0.4	7.2	1.0	7.8	10.4
Standard Deviation		0.7	2.6	2.6	0.9	5.2	1.8	5.2	6.2
90th Percentile		0.0	2.9	1.9	1.6	14.6	3.0	15.2	19.3
95% Confidence Interval for Mean		(0.19-0.20)	(1.20-1.23)	(1.01-1.04)	(0.65-0.66)	(8.30-8.35)	(1.63-1.65)	(8.95-9.00)	(11.80-11.86)

Total Response Time by Agency

Table VI, VII, & VIII. *Total Response Time – eTimes.01 to eTimes.07* begins when a 9-1-1 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 9-1-1 services in Riverside County.

Total Response Time (eTimes.01 to eTimes.07)	Agency 1	Agency 2	Agency 3	Agency 4	Agency 5
Mean	11.5	11.0	12.3	7.9	11.8
Median	9.4	9.4	11.0	7.3	11.1
Standard Deviation	7.2	6.5	6.2	3.4	4.0
90th Percentile	20.9	18.2	20.0	11.2	16.2
95% Confidence Interval for Mean	(11.38-11.57)	(10.9-11.04)	(12.3-12.38)	(7.83-7.92)	(11.78-11.84)

Total Response Time (eTimes.01 to eTimes.07)	Agency 6	Agency 7	Agency 8	Agency 9	Agency 10
Mean	9.4	9.5	9.1	8.8	8.4
Median	8.7	8.6	8.6	8.3	7.8
Standard Deviation	3.7	4.0	3.2	3.3	3.5
90th Percentile	13.2	13.1	12.5	12.5	11.7
95% Confidence Interval for Mean	(9.25-9.46)	(9.38-9.57)	(8.88-9.21)	(8.71-8.87)	(8.29-8.46)

Total Response Time (eTimes.01 to eTimes.07)	Agency 11	Agency 12	Agency 13	Agency 14	Agency 15	Agency 16
Mean	11.3	10.4	6.3	12.7	12.0	10.7
Median	10.9	9.9	6.6	12.4	10.6	10.2
Standard Deviation	3.4	4.6	2.9	3.8	5.3	4.3
90th Percentile	16.0	15.7	10.6	16.5	17.4	14.6
95% Confidence Interval for Mean	(10.98-11.57)	(9.26-11.56)	(3.62-8.96)	(12.34-12.97)	(11-12.98)	(10.23-11.26)