



**RIVERSIDE COUNTY EMS AGENCY
PATIENT CARE CONTINUUM REPORT
FY 2020 - 2021**

SEPTEMBER 23TH, 2021

PREPARED BY RIVERSIDE COUNTY EMS AGENCY, EMERGENCY MANAGEMENT DEPARTMENT

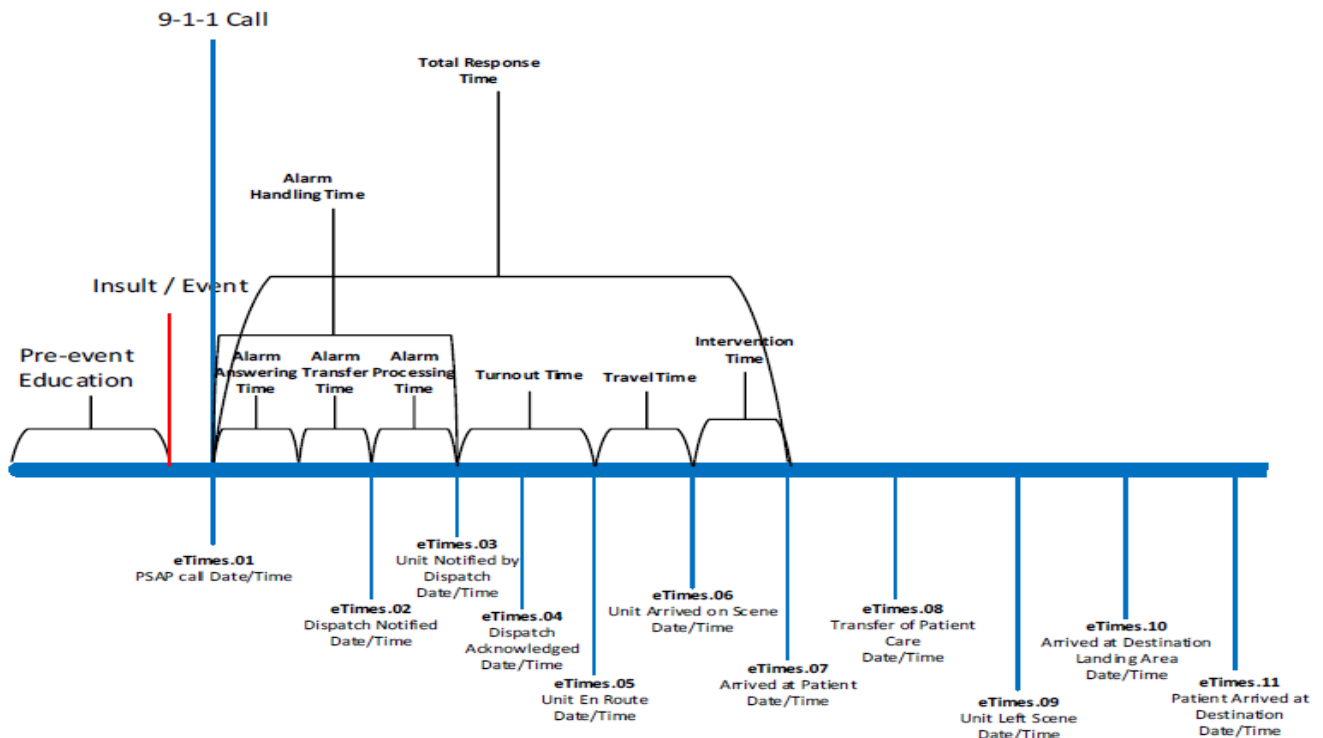
PATIENT CARE CONTINUUM REPORT

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

411,109 ePCRs (electronic patient care reports) were initially identified on ImageTrend® Elite Report Writer between 7/1/2020 and 6/30/2021. *Sixty-seven* fields were generated for each ePCR utilized, resulting in a possible **27,544,303 datapoints** for analysis. **256,777 (62.5% 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 **17,204,059 datapoints**.

Exclusions

154,332 (37.5% 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.

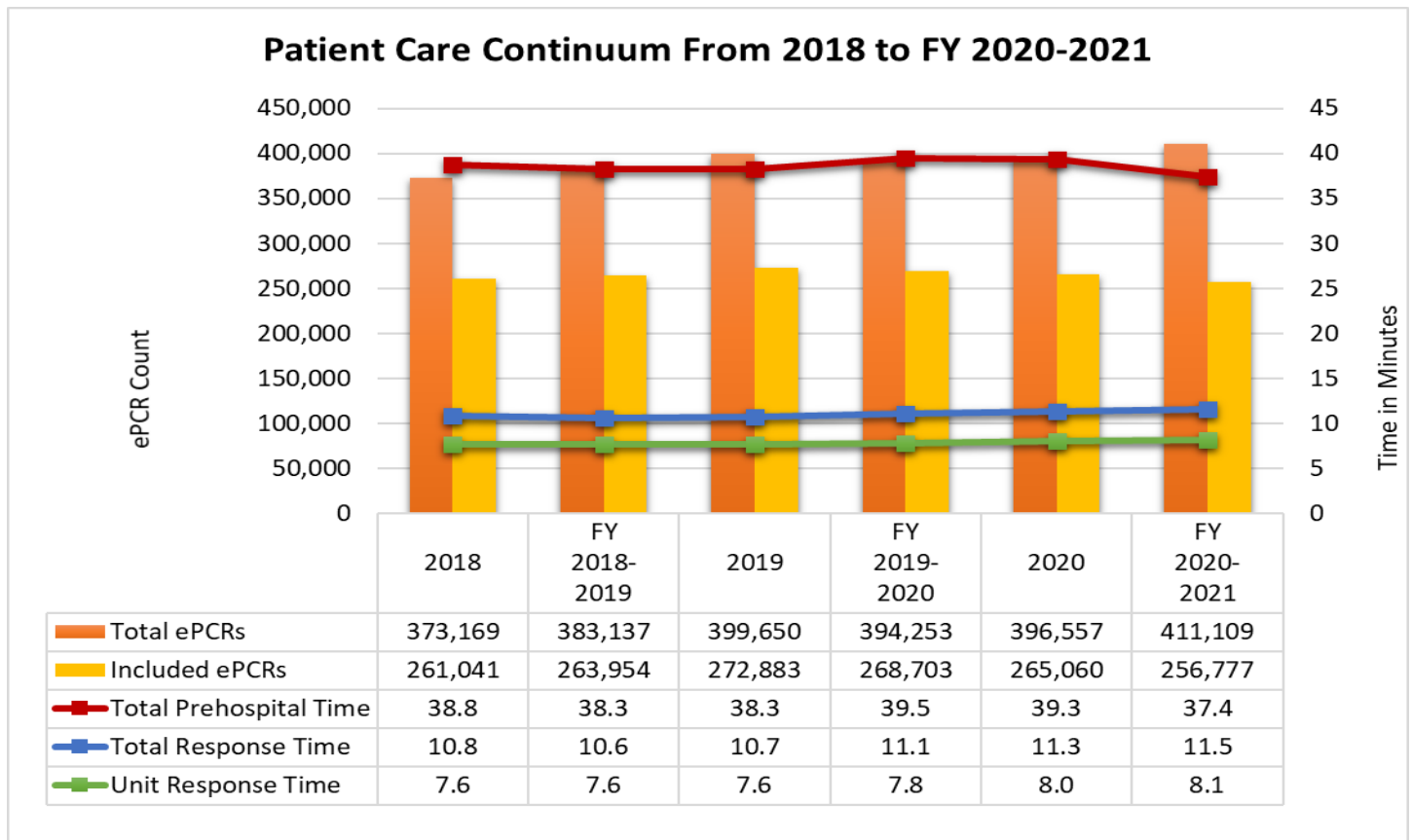
The tables below contain time interval statistics for all fire department and transport agencies providing 9-1-1 services in Riverside County. The intervals are listed at the top of the tables along with their corresponding NEMSIS 3.4 timestamps.

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.

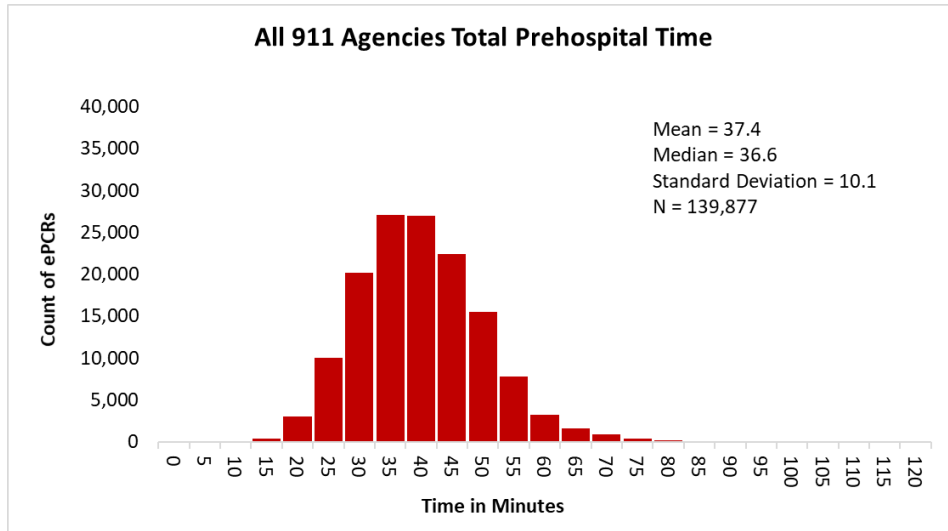
Change in Patient Care Continuum Over Time

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 10.2% between 2018 and FY 2020-2021. Mean Total Prehospital Time increased by 1 minute (2.6%) between 2019 and 2020 and decreased by 1.9 minutes (4.8%) between FY 2019-2020 and FY 2020-2021. Mean Total Response Time has slightly but consistently increased since FY 2018-2019 with a total mean increase of 0.9 minutes (8.5%) between FY 2018-2019 and FY 2020-2021. Mean Unit Response Time stayed consistent between 2018 and 2019 and gradually increased by 0.5 minutes (6.6%) between 2019 and FY 2020-2021.

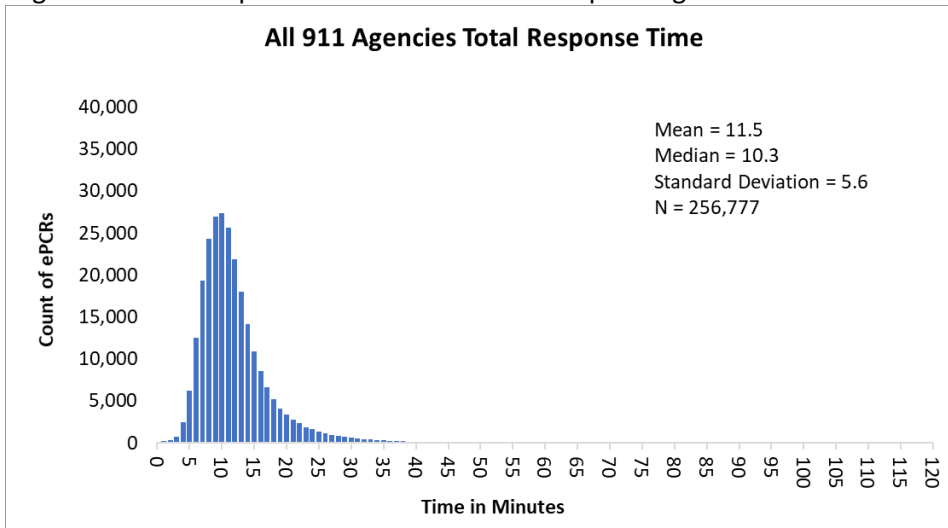


Timeline and Findings

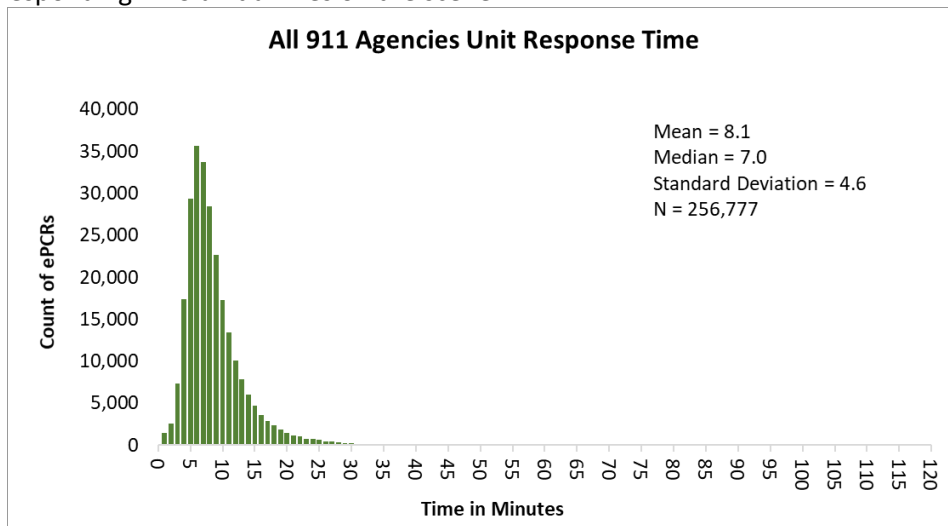
Histogram I. Total Prehospital Time – eTimes.01 to eTimes.11 begins when a 9-1-1 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrives with the patient at the hospital or alternate destination.



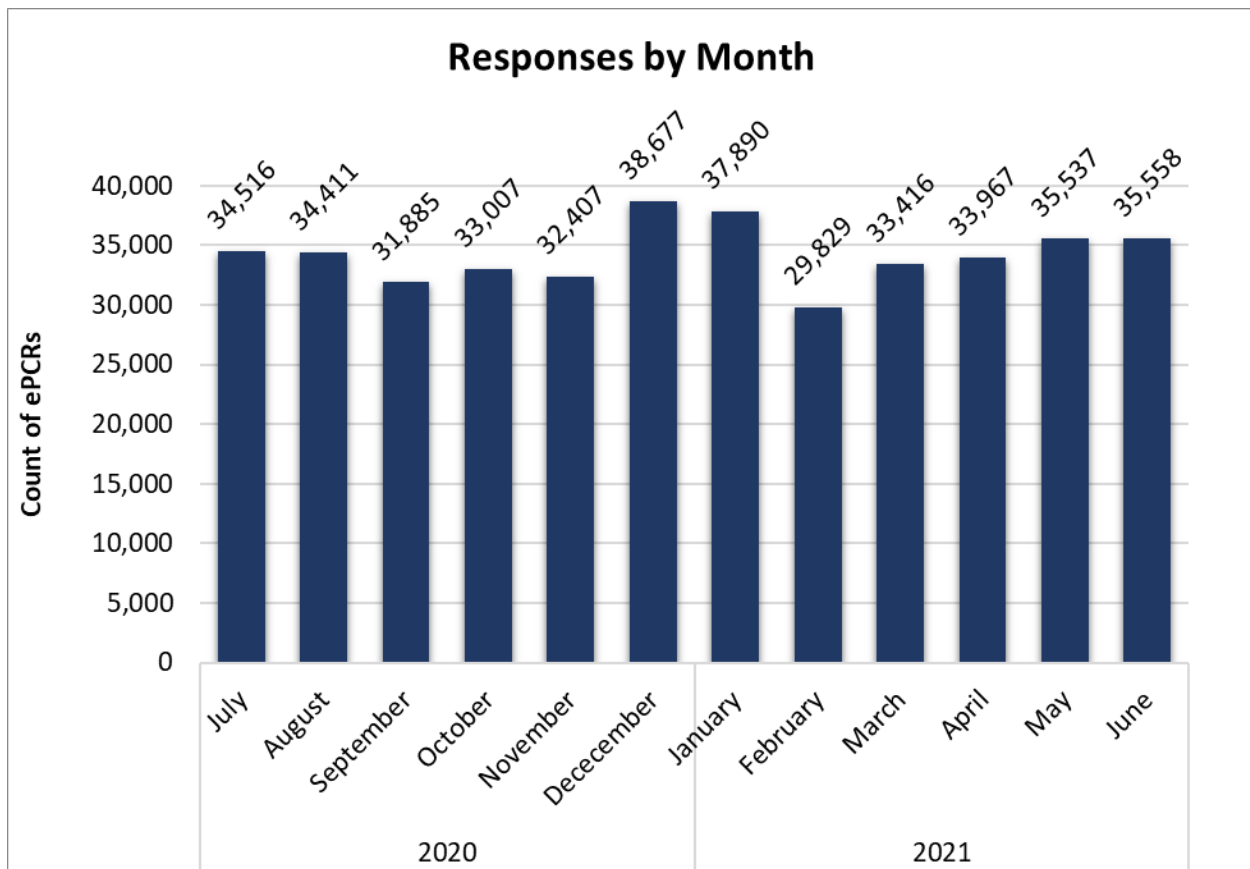
Histogram II. Total Response Time – eTimes.01 to eTimes.07 begins when a 9-1-1 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrive at the patient's side.



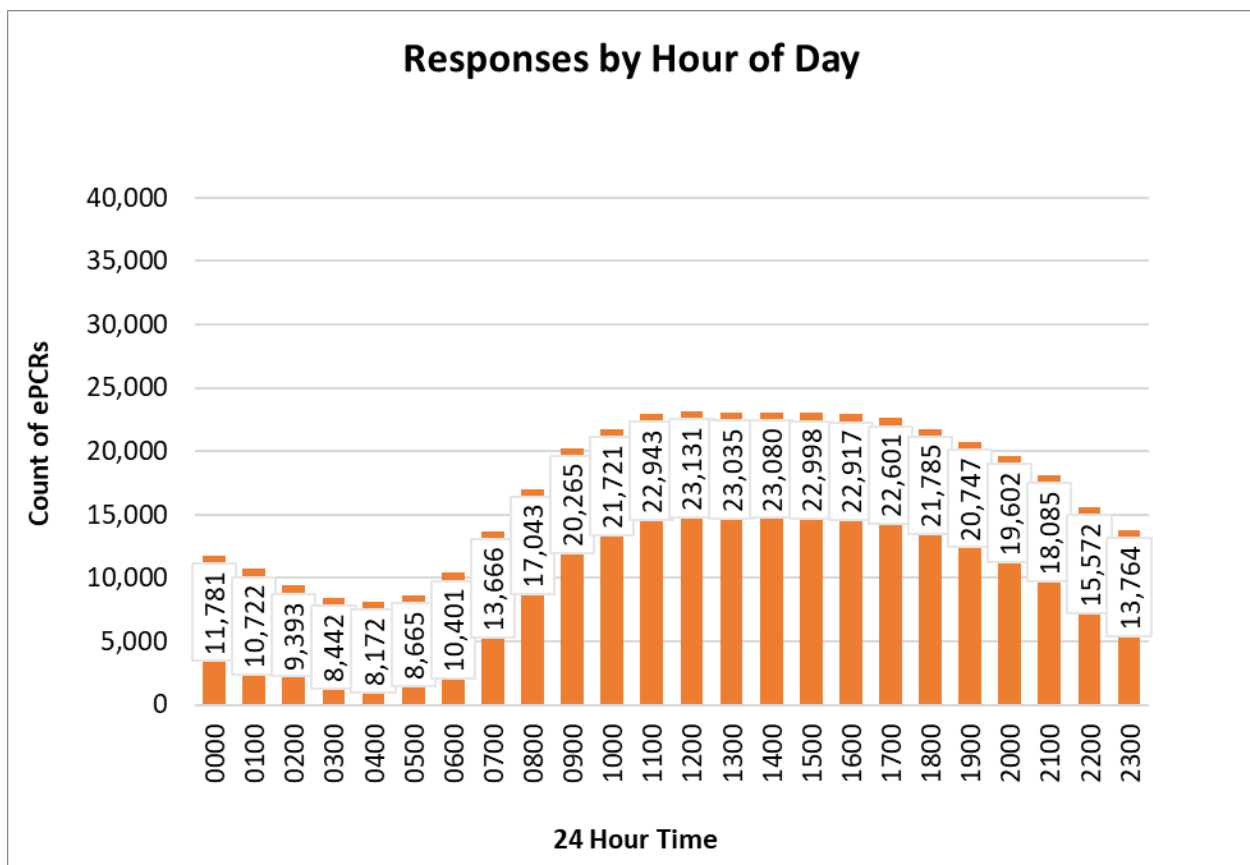
Histogram III. Unit Response Time – eTimes.03 to eTimes.06 begins when the responding EMS unit is notified by dispatch and ends when the responding EMS unit arrives on the scene.



Graph I. Responses by Month shows ePCR volume by month and allows for a month-to-month comparison of volume.



Graph II. Responses by Hour shows call volumes by time-of-day and indicates which hours are busiest on average.



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	411,109	411,109	411,109	411,109	411,109
	Valid	235,569	256,682	256,777	256,777	256,777
	Invalid	87,237	96,233	150,287	153,466	132,459
	Missing	88,303	58,194	4,045	866	21,873
Mean		0.8	1.6	0.9	1.0	7.1
Median		0.0	0.7	0.3	0.7	5.9
Standard Deviation		1.3	2.4	2.2	1.0	4.7
90th Percentile		2.6	3.5	1.7	2.3	12.9
95% Confidence Interval for Mean		(0.78-0.8)	(1.59-1.61)	(0.9-0.92)	(1.01-1.02)	(7.08-7.12)

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	411,109	411,109	411,109	411,109	411,109
	Valid	256,777	256,777	256,777	140,482	140,482
	Invalid	53,456	132,476	24,047	27,291	25,955
	Missing	100,876	21,856	130,285	243,336	244,672
Mean		1.7	8.1	11.5	13.9	12.3
Median		1.3	7.0	10.3	13.2	11.6
Standard Deviation		1.9	4.6	5.6	5.8	5.6
90th Percentile		3.0	13.6	17.9	21.6	19.8
95% Confidence Interval for Mean		(1.74-1.75)	(8.1-8.13)	(11.43-11.48)	(13.87-13.93)	(12.23-12.29)

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	411,109	411,109	411,109	411,109	411,109
	Valid	139,802	139,876	139,876	139,876	139,877
	Invalid	25,285	25,163	25,304	25,305	20,763
	Missing	246,022	246,070	245,929	245,928	250,469
Mean		12.8	25.1	26.7	36.0	37.4
Median		12.0	24.8	26.4	35.4	36.6
Standard Deviation		6.3	7.7	7.8	9.7	10.1
90th Percentile		21.6	35.7	37.4	48.5	50.1
95% Confidence Interval for Mean		(12.78-12.85)	(25.02-25.1)	(26.66-26.74)	(35.95-36.05)	(37.32-37.42)

Total Response Time by Unit 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	204,202	204,202	204,202	204,202	204,202	204,202	204,202	204,202
	Valid	82,642	103,746	103,814	103,814	103,814	103,814	103,814	103,814
	Invalid	40,157	49,128	98,381	99,763	88,825	28,175	88,838	3,249
	Missing	81,403	51,328	2,007	625	11,563	72,213	11,550	97,139
Mean		1.9	2.0	0.6	1.6	5.0	1.9	6.6	10.5
Median		1.9	2.0	0.3	1.5	4.6	1.5	6.1	9.9
Standard Deviation		1.4	1.9	1.2	1.0	2.8	2.1	3.0	4.2
90th Percentile		3.2	3.7	1.4	2.7	8.2	3.4	10.0	15.2
95% Confidence Interval for M		(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/ 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	206,904	206,904	206,904	206,904	206,904	206,904	206,904	206,904
	Valid	152,927	152,936	152,963	152,963	152,963	152,963	152,963	152,963
	Invalid	47,080	47,105	51,906	53,703	43,634	25,281	43,638	20,798
	Missing	6,897	6,863	2,035	238	10,307	28,660	10,303	33,143
Mean		0.2	1.3	1.1	0.7	8.5	1.6	9.2	12.1
Median		0.0	0.4	0.4	0.3	7.3	1.1	8.0	10.7
Standard Deviation		0.8	2.7	2.7	0.9	5.2	1.8	5.2	6.3
90th Percentile		0.0	3.1	2.2	1.6	15.0	3.0	15.6	19.8
95% Confidence Interval for M		(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	11.2	11.3	12.7	8.0	11.9
Median	9.3	9.5	11.4	7.3	11.2
Standard Deviation	6.8	6.7	6.3	3.4	4.0
90th Percentile	19.6	19.0	20.7	11.4	16.2
95% Confidence Interval for Mean	(11.1-11.29)	(11.18-11.34)	(12.7-12.78)	(7.97-8.06)	(11.84-11.9)

Total Response Time (eTimes.01 to eTimes.07)	Agency 6	Agency 7	Agency 8	Agency 9	Agency 10
Mean	9.5	9.4	9.6	9.4	8.5
Median	8.6	8.6	9.1	8.9	7.8
Standard Deviation	4.0	3.9	3.4	3.2	3.6
90th Percentile	13.5	12.6	13.2	13.0	11.9
95% Confidence Interval for Mean	(9.34-9.56)	(9.31-9.5)	(9.42-9.77)	(9.35-9.51)	(8.37-8.54)

Total Response Time (eTimes.01 to eTimes.07)	Agency 11	Agency 12	Agency 13	Agency 14	Agency 15	Agency 16
Mean	11.7	11.9	6.5	12.8	11.7	10.6
Median	11.4	10.8	6.3	12.6	11.1	10.2
Standard Deviation	3.6	5.0	5.0	4.1	4.1	3.9
90th Percentile	16.3	19.8	11.7	16.7	15.9	14.2
95% Confidence Interval for Mean	(11.42-11.98)	(10.57-13.19)	(3.33-9.68)	(12.51-13.16)	(11-12.41)	(10.11-11.07)

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