



**RIVERSIDE COUNTY EMS AGENCY  
PATIENT CARE CONTINUUM REPORT  
2022**

**JUNE 28<sup>TH</sup>, 2023**

PREPARED BY RIVERSIDE COUNTY EMS AGENCY, EMERGENCY MANAGEMENT DEPARTMENT

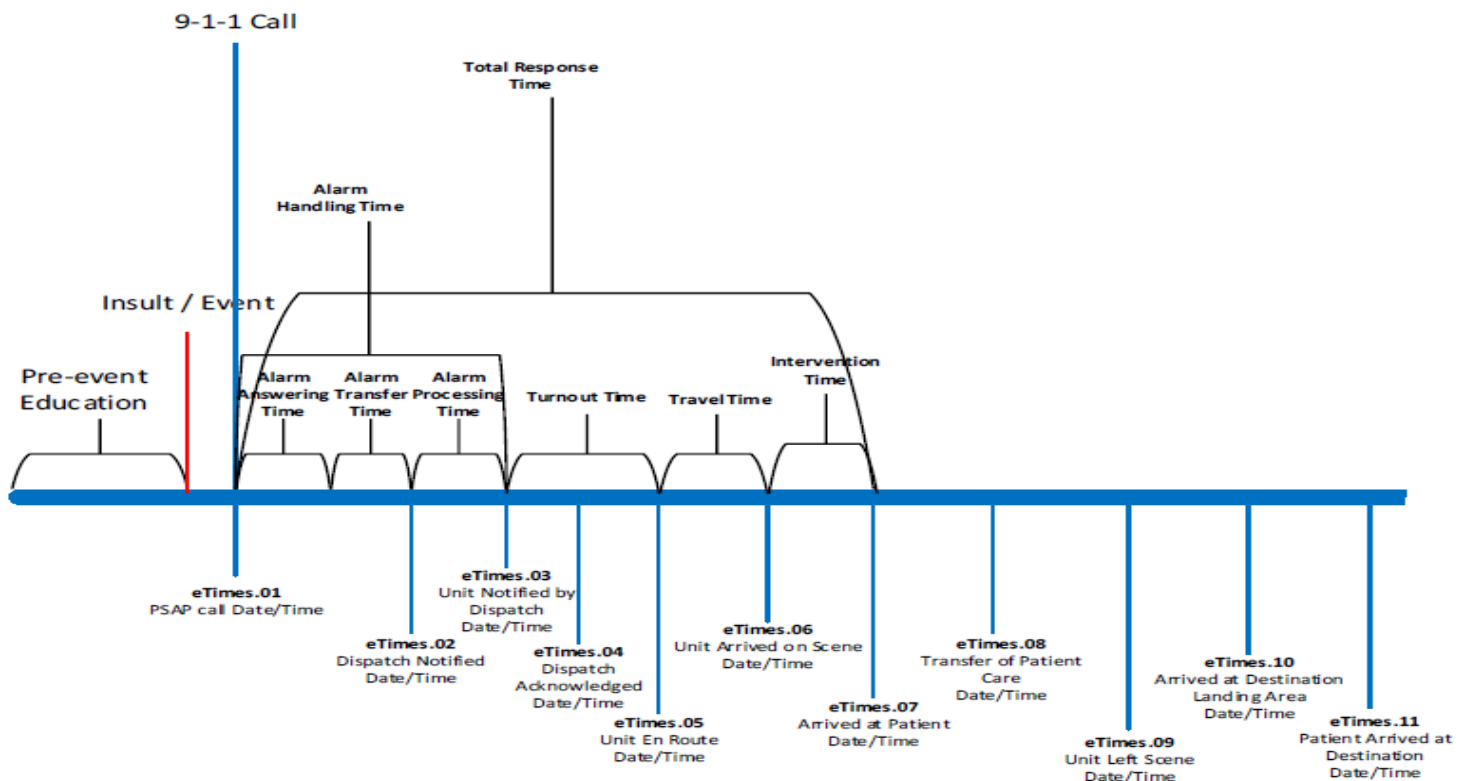
# PATIENT CARE CONTINUUM REPORT

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

**493,083 ePCRs** (electronic patient care reports) were initially identified on ImageTrend® Elite Report Writer between 1/1/2022 and 12/31/2022. **322,081 (65.3% of total ePCRs)** were then identified for use in time interval analysis after downloading, compiling, and cleaning the raw data.

### Exclusions

**171,002 (34.7% 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. Any response outside of Riverside County was excluded. 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** defined by the National Emergency Medical Information System (NEMSIS) were included and used to create the time intervals from REMSA Policy 2203 as well as additional relevant intervals. **Sixteen (16) time intervals** were included in this dataset. Data from 17 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.
- **90<sup>th</sup> 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.

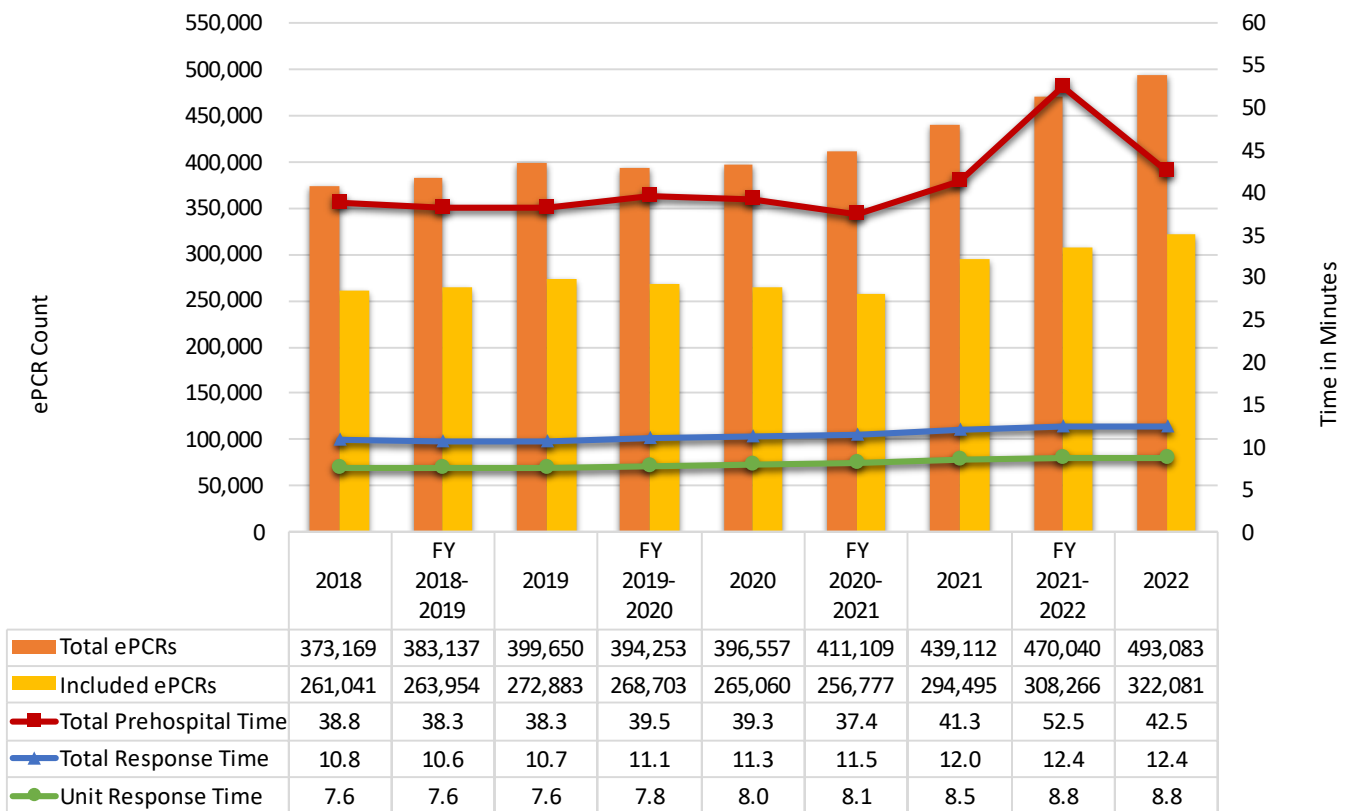
## Change in Patient Care Continuum Reporting Over Time

**Combination Chart I.** This combination bar and line chart below shows change over time in key metrics as recorded in the semiannual Patient Care Continuum Reports.

The data shows that total ePCR count has increased by 32.1% between 2018 and 2022. This is due in part to County population growth but also influenced by closer adherence to policy guidelines around EMS response documentation.

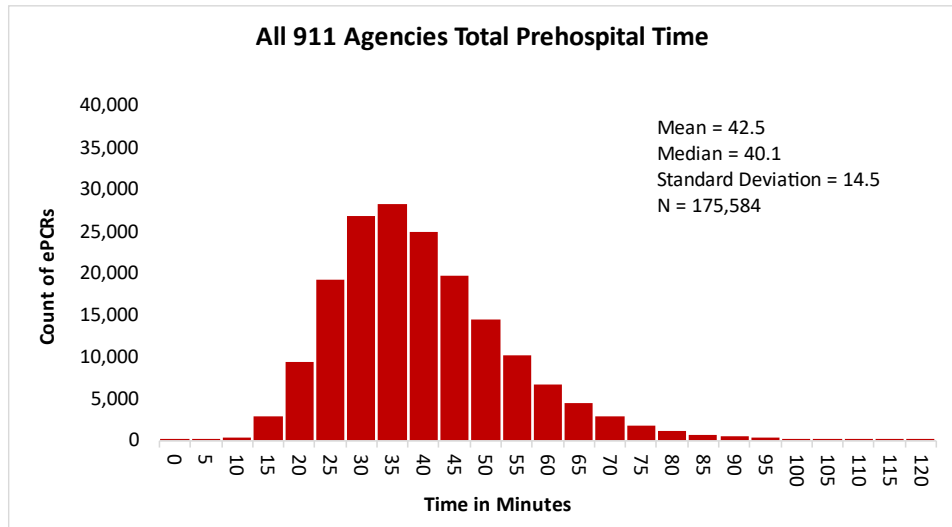
Mean Total Prehospital Time (NEMSIS eTimes.01 to eTimes.11), Total Response Time (NEMSIS eTimes.01 to eTimes.07) and Unit Response Time (NEMSIS eTimes.03 to eTimes.06) intervals remained mostly stable from 2018 through 2020; however, the Covid-19 pandemic marked a significant increase in these time intervals from 2021 through fiscal year 2021-2022. In 2022, these time interval increases appear to have returned to near pre-Covid-19 averages despite an increase in the overall volume of records.

**Patient Care Continuum From 2018 to 2022**

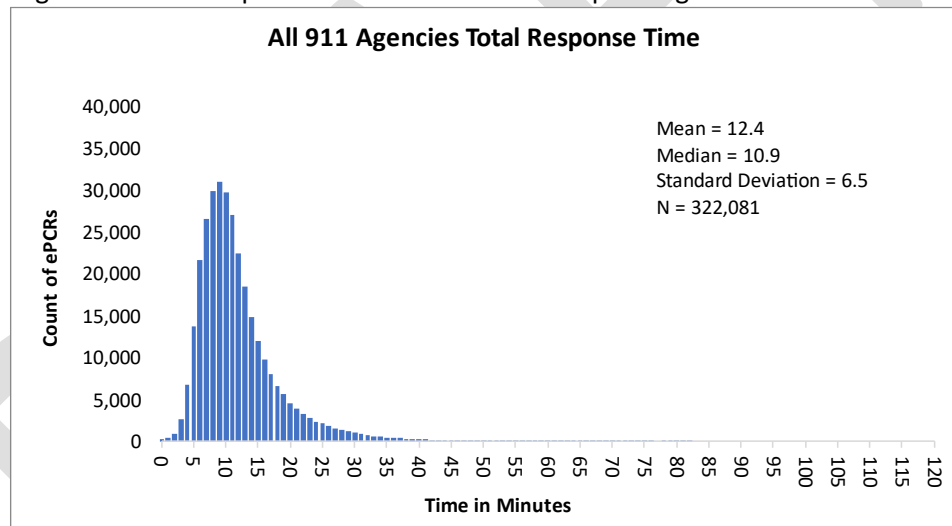


## Timeline and Findings

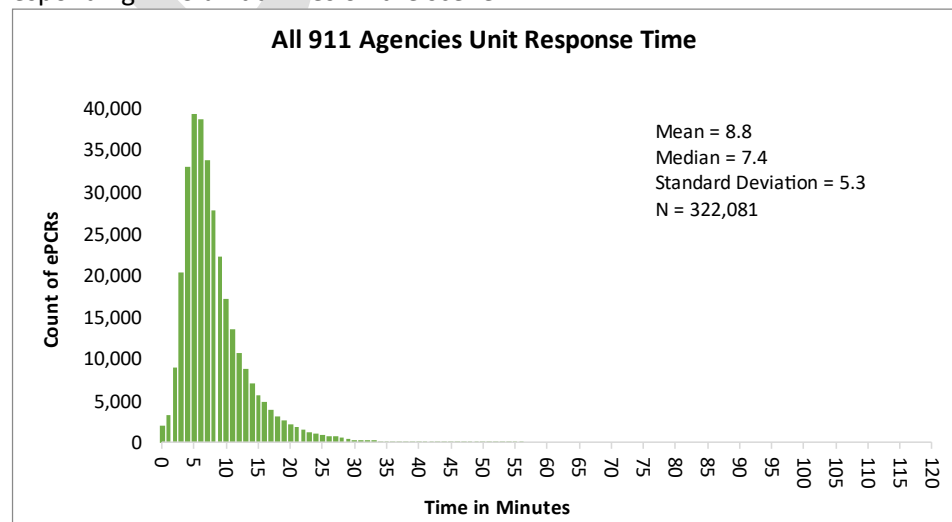
**Histogram I.** *Total Prehospital Time – eTimes.01 to eTimes.11* begins when a 9-1-1 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrives with the patient at the hospital or alternate destination.



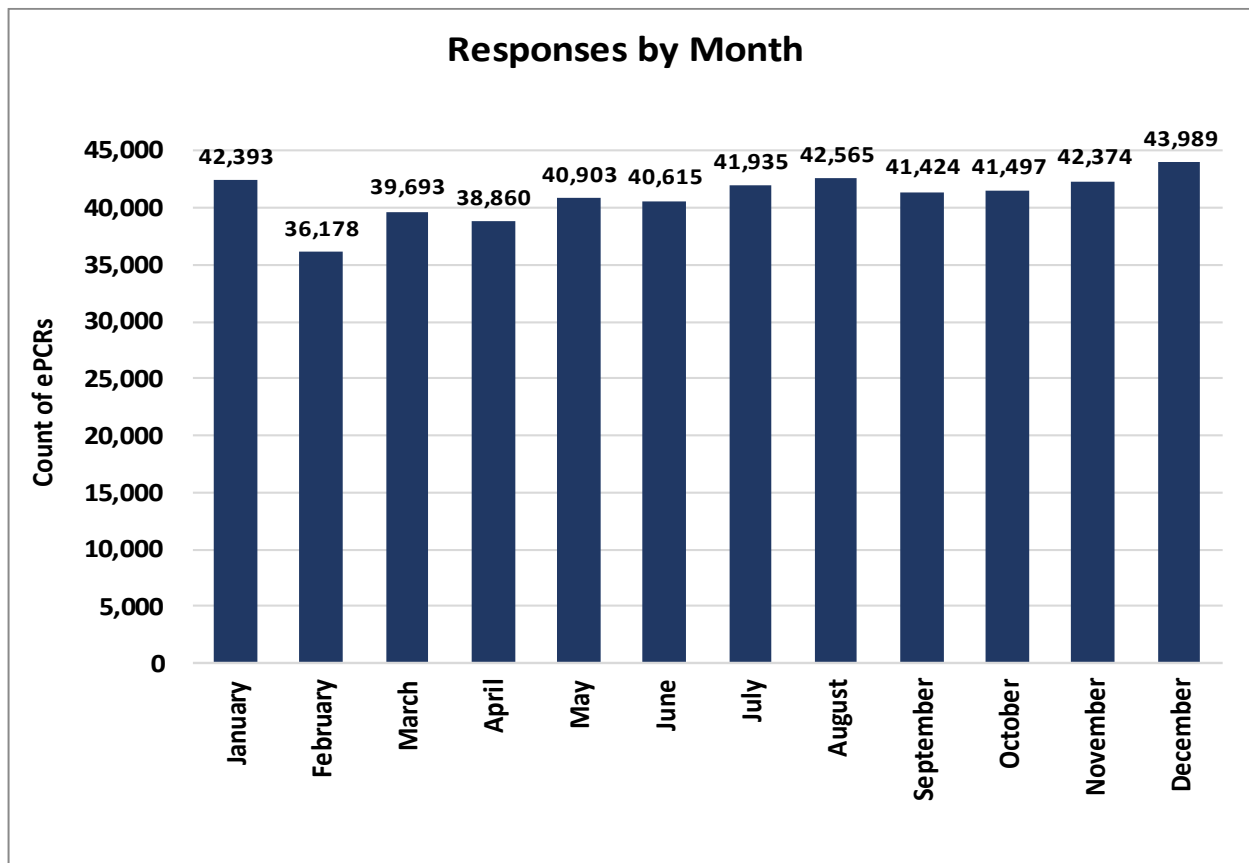
**Histogram II.** *Total Response Time – eTimes.01 to eTimes.07* begins when a 9-1-1 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrive at the patient's side.



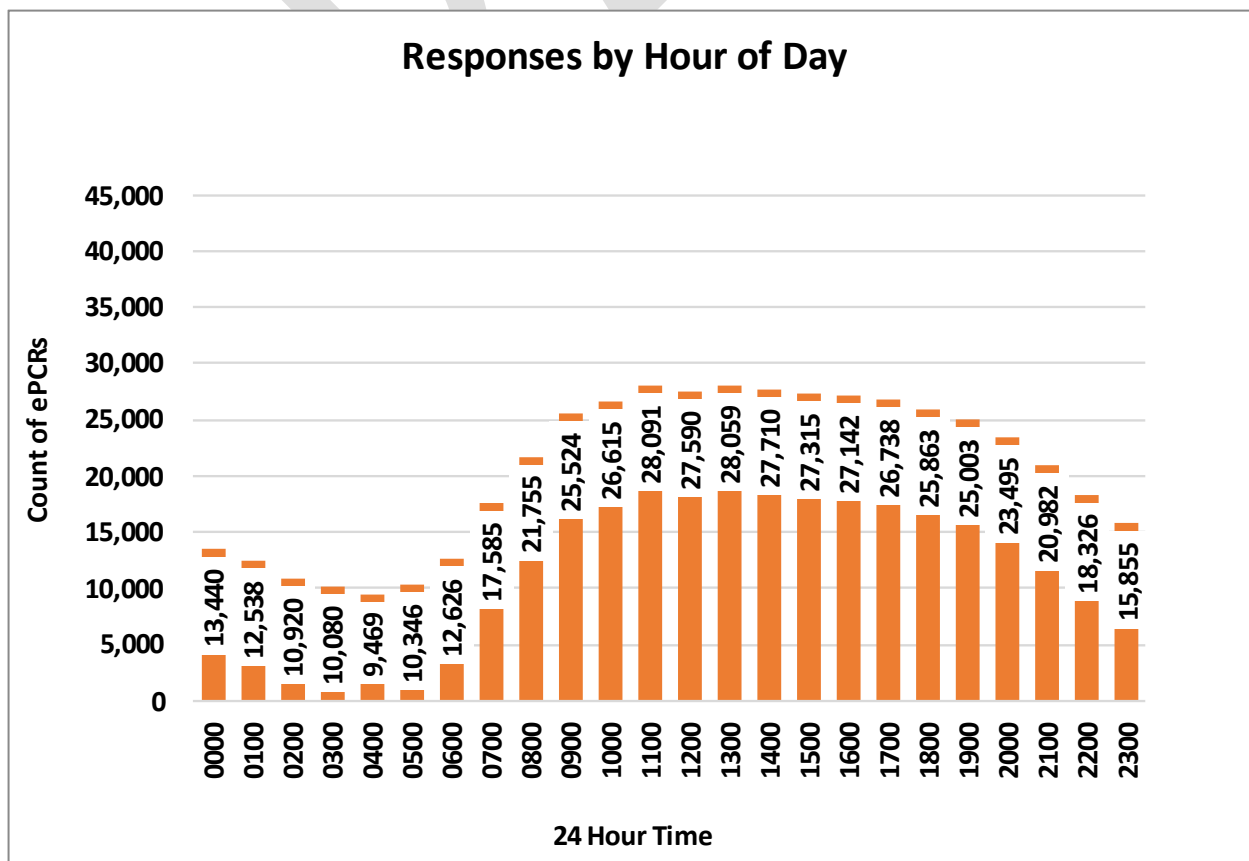
**Histogram III.** *Unit Response Time – eTimes.03 to eTimes.06* begins when the responding EMS unit is notified by dispatch and ends when the responding EMS unit arrives on the scene.



**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	493,083	493,083	493,083	493,083	493,083
	Valid	322,081	322,081	322,081	322,081	322,081
	Invalid	112,334	166,323	112,400	169,098	134,979
	Missing	58,668	4,679	58,602	1,904	36,023
Mean		0.8	1.1	1.9	1.1	7.6
Median		0.0	0.4	1.0	0.8	6.2
Standard Deviation		1.3	2.8	3.0	1.2	5.4
90th Percentile		2.6	2.1	3.9	2.6	14.4
95% Confidence Interval for Mean		(0.79-0.8)	(1.11-1.13)	(1.9-1.92)	(1.12-1.12)	(7.61-7.65)

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	493,083	493,083	493,083	493,083	493,083
	Valid	322,081	322,081	322,081	176,226	176,226
	Invalid	33,981	135,017	5,311	8,316	7,107
	Missing	137,021	35,985	165,691	308,541	309,750
Mean		1.7	8.8	12.4	14.8	13.1
Median		1.2	7.4	10.9	13.7	12.0
Standard Deviation		2.0	5.3	6.5	7.1	7.0
90th Percentile		3.0	15.3	20.1	23.6	21.7
95% Confidence Interval for Mean		(1.74-1.75)	(8.73-8.77)	(12.38-12.43)	(14.81-14.87)	(13.06-13.13)

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	493,083	493,083	493,083	493,083	493,083
	Valid	175,440	175,583	175,583	175,584	175,584
	Invalid	7,173	6,896	7,172	7,171	1,905
	Missing	310,470	310,604	310,328	310,328	315,594
Mean		15.5	28.5	30.3	40.6	42.5
Median		13.5	26.6	28.3	38.5	40.1
Standard Deviation		9.5	12.0	12.2	14.1	14.5
90th Percentile		27.5	43.8	45.7	58.7	61.1
95% Confidence Interval for Mean		(15.41-15.5)	(28.48-28.6)	(30.23-30.34)	(40.55-40.68)	(42.38-42.52)

## 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 NEMIS 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	257,170	257,170	257,170	257,170	257,170	257,170	257,170	257,170
	Valid	136,745	136,745	136,745	136,745	136,745	136,745	136,745	136,745
	Invalid	69,888	118,258	69,922	119,201	101,741	26,259	101,777	2,868
	Missing	50,537	2,167	50,503	1,224	18,684	94,166	18,648	117,557
Mean		1.6	0.5	2.1	1.6	5.1	1.7	6.7	10.6
Median		1.7	0.2	2.1	1.5	4.6	1.3	6.2	10.0
Standard Deviation		1.4	1.2	1.8	1.1	2.9	2.1	3.1	4.3
90th Percentile		3.1	1.3	3.8	2.9	8.4	3.2	10.4	15.5
95% Confidence Interval for Mean		(1.59-1.6)	(0.53-0.54)	(2.12-2.14)	(1.61-1.62)	(5.11-5.14)	(1.73-1.76)	(6.72-6.76)	(10.59-10.63)

**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 NEMIS 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	235,913	235,913	235,913	235,913	235,913	235,913	235,913	235,913
	Valid	185,336	185,336	185,336	185,336	185,336	185,336	185,336	185,336
	Invalid	42,446	48,065	42,478	49,897	33,238	7,722	33,240	2,443
	Missing	8,131	2,512	8,099	680	17,339	42,855	17,337	48,134
Mean		0.2	1.6	1.8	0.8	9.5	1.7	10.2	13.7
Median		0.0	0.5	0.6	0.3	8.1	1.2	8.8	11.9
Standard Deviation		0.8	3.5	3.6	1.2	6.0	2.0	6.0	7.5
90th Percentile		0.0	3.4	4.0	1.9	17.2	3.0	18.0	23.2
95% Confidence Interval for Mean		(0.21-0.21)	(1.53-1.56)	(1.74-1.77)	(0.75-0.76)	(9.45-9.5)	(1.73-1.75)	(10.2-10.26)	(13.69-13.76)



## 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.

Agency 4 Response Time (eTimes.01 to eTimes.07)	Agency 1	Agency 2	Agency 3	Agency 4	Agency 5	
N	Total	34,068	47,197	124,630	35,243	192,541
	Valid	26,417	37,915	100,719	25,295	91,221
	Invalid	492	621	1,032	472	1,641
	Missing	7,159	8,661	22,879	9,476	99,679
Mean	12.1	13.0	14.8	8.1	12.3	
Median	10.0	10.8	13.2	7.5	11.5	
Standard Deviation	7.6	8.0	7.5	3.4	4.2	
90th Percentile	21.8	22.8	24.5	11.4	16.9	
95% Confidence Interval for Mean	(12.05-12.23)	(12.92-13.08)	(14.75-14.84)	(8.08-8.17)	(12.22-12.28)	

Total Response Time (eTimes.01 to eTimes.07)	Agency 6	Agency 7	Agency 8	Agency 9	Agency 10	Agency 11	
N	Total	943	11,586	8,438	12,124	9,089	10,067
	Valid	605	7,311	8,356	6,634	7,340	7,954
	Invalid	6	155	82	326	179	230
	Missing	332	4,120	0	5,164	1,570	1,883
Mean	10.2	9.4	8.3	10.0	9.1	8.0	
Median	9.8	8.4	7.8	9.5	8.7	7.3	
Standard Deviation	3.2	4.7	3.2	3.7	2.9	3.7	
90th Percentile	13.1	13.4	11.2	13.9	12.2	11.4	
95% Confidence Interval for Mean	(9.92-10.43)	(9.29-9.51)	(8.18-8.32)	(9.93-10.11)	(8.99-9.12)	(7.93-8.09)	

Total Response Time (eTimes.01 to eTimes.07)	Agency 12	Agency 13	Agency 14	Agency 15	Agency 16	Agency 17	
N	Total	1,120	588	53	3,517	826	1,053
	Valid	851	236	17	722	124	364
	Invalid	1	14	5	27	4	24
	Missing	268	338	31	2,768	698	665
Mean	12.4	11.5	10.4	12.3	10.6	11.3	
Median	12.1	9.9	5.2	12.4	9.8	10.6	
Standard Deviation	4.2	6.1	16.0	4.0	4.3	3.8	
90th Percentile	17.0	18.7	19.9	16.1	15.0	16.1	
95% Confidence Interval for Mean	(12.13-12.69)	(10.72-12.28)	(2.19-18.61)	(11.97-12.55)	(9.8-11.33)	(10.88-11.67)	

---

*Data in this report is provided by the efforts of the Riverside County EMS System and its EMS Providers in ensuring quality care and documentation of patient encounters.*

Report prepared by Sean Hakam & Catherine Borna Farrokhi, Data & Reporting Unit, Riverside County Emergency Management Department , EMS Agency Division

For more information, please contact Riverside County EMS Administrator, Dan Bates [dbates@rivco.org](mailto:dbates@rivco.org)

---

DRAFT