RIVERSIDE COUNTY EMS AGENCY
# PATIENT CARE CONTINUUM REPORT
2019

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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.***
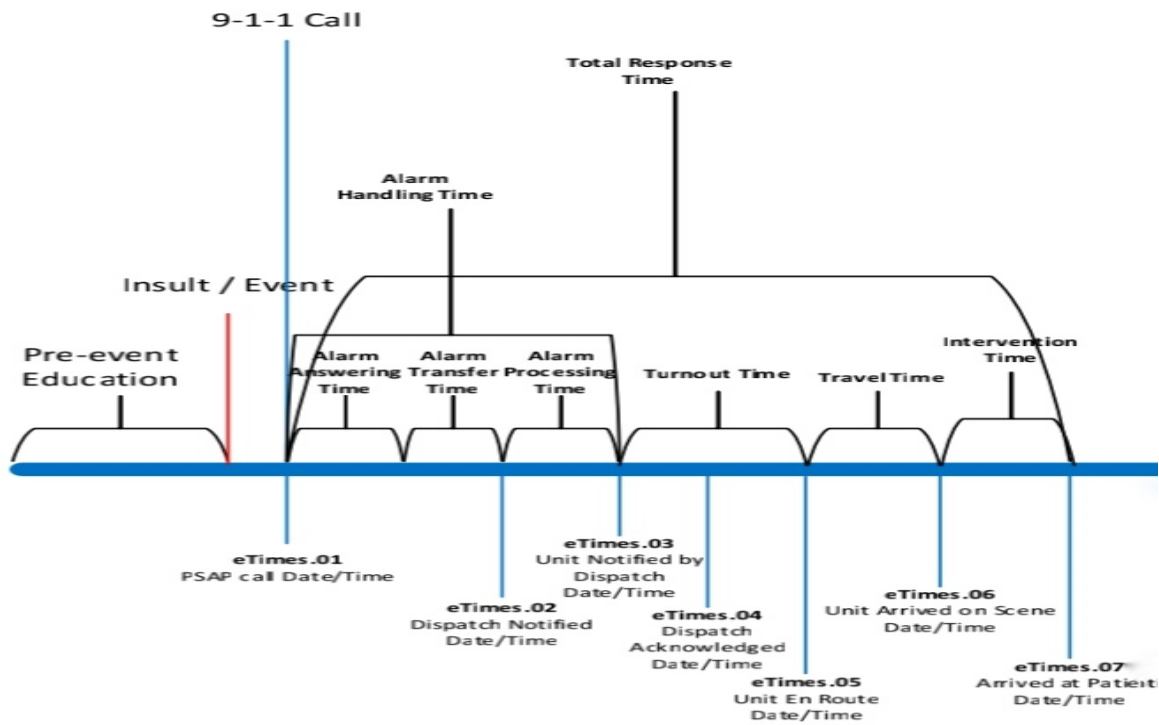
# Methodology

*Data*
**399,650 ePCRs** (electronic patient care reports) were initially identified on ImageTrend® Elite Report Writer between 1/1/2019 and 12/31/2019. *Fifty-three* fields were generated for each ePCR utilized, resulting in a possible **21,181,450 datapoints** for analysis. **272,883 ePCRs** were then identified for use in time interval analysis after downloading, compiling, and cleaning the raw data. The final dataset was created utilizing **14,462,799 datapoints.**

*Exclusions*
**126,767 (31.72% 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

Mean = 38.28
Median = 36.35
Standard Deviation = 12.36
N = 160,158
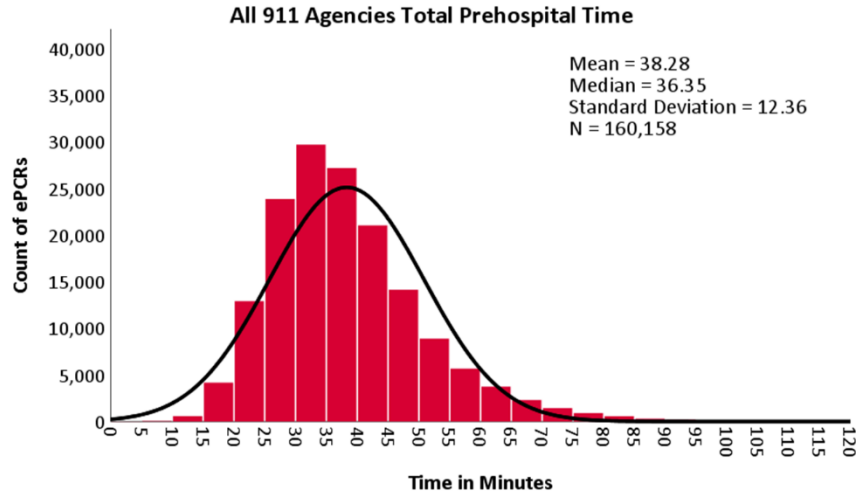
**Histogram II.** *Total Response Time – eTimes.01 to eTimes.07* begins when a 911 call is made to a public safety answering point (PSAP) requesting an EMS unit response and ends when the responding EMS unit arrive at the patient's side.



All 911 Agencies Total Response Time

Mean = 10.70
Median = 9.60
Standard Deviation = 5.42
N = 272,846
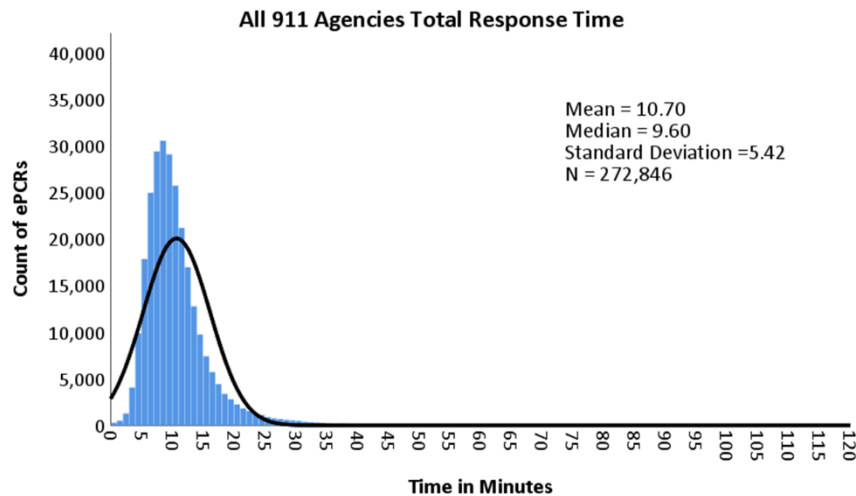
**Histogram III.** *Unit Response Time – eTimes.03 to eTimes.06* begins when the responding EMS unit is notified by dispatch and ends when the responding EMS unit arrives on the scene.



All 911 Agencies Unit Response Time

Mean = 7.61
Median = 6.62
Standard Deviation = 4.41
N = 272,818
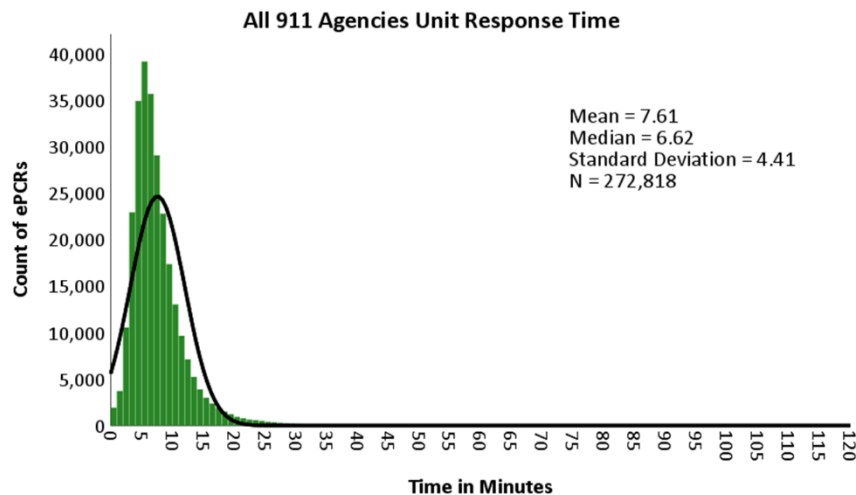
**Graph I.** *Responses by Month* shows ePCR volume by month and allows for a month-to-month comparison of volume.

**Responses by Month**

| Month | Count of ePCRs |
|---|---|
| January | 32,797 |
| February | 30,767 |
| March | 34,417 |
| April | 33,518 |
| May | 33,133 |
| June | 33,215 |
| July | 33,468 |
| August | 34,140 |
| September | 33,013 |
| October | 33,753 |
| November | 33,059 |
| December | 34,370 |
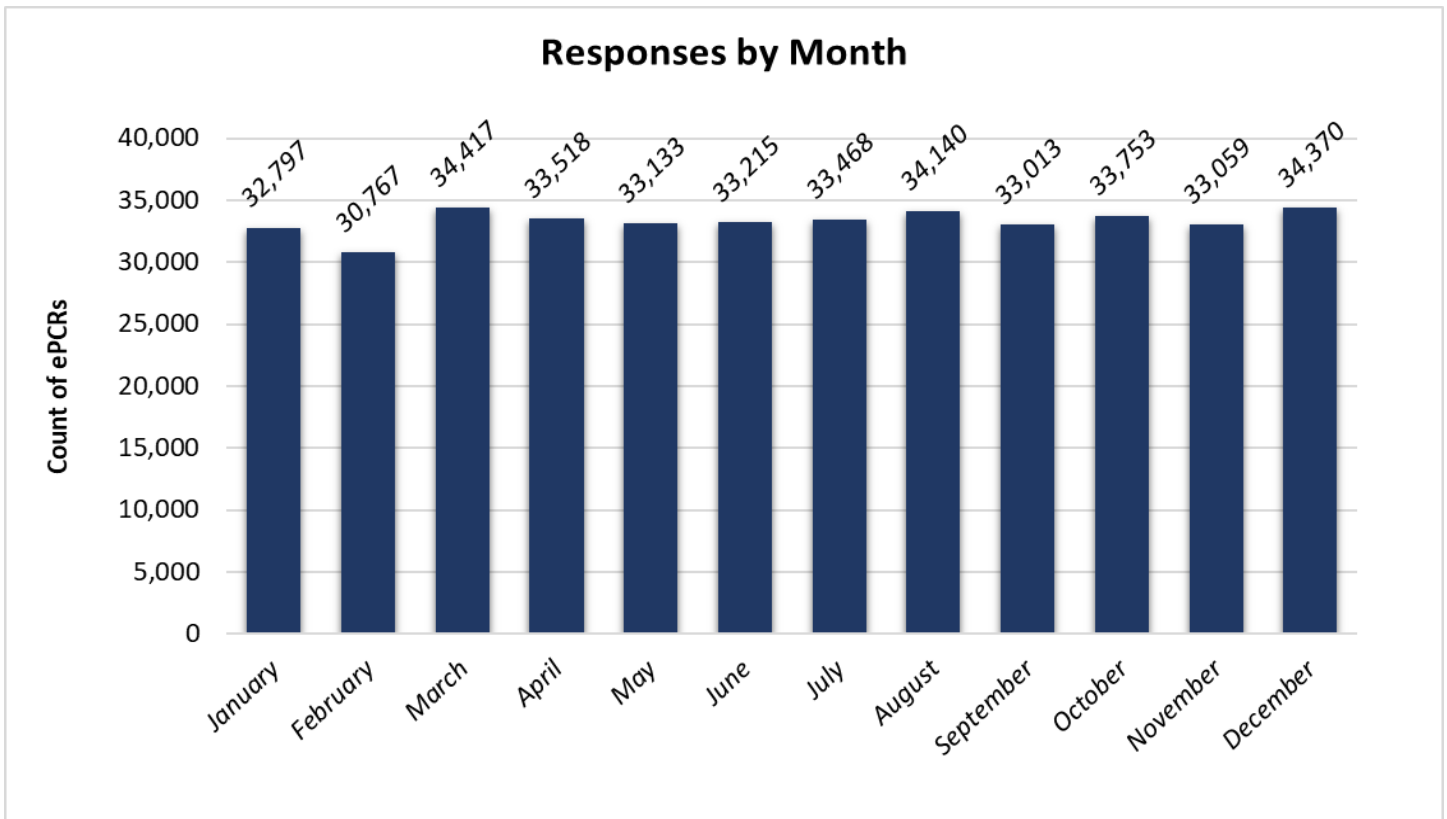
**Graph II.** *Responses by Hour* shows call volumes by time-of-day and indicates which hours are busiest on average.

**Responses by Hour of Day**

| 24 Hour Time | Count of ePCRs |
|---|---|
| 0000 | 10,937 |
| 0100 | 9,947 |
| 0200 | 9,319 |
| 0300 | 8,036 |
| 0400 | 8,219 |
| 0500 | 8,742 |
| 0600 | 10,317 |
| 0700 | 14,214 |
| 0800 | 17,531 |
| 0900 | 20,297 |
| 1000 | 22,277 |
| 1100 | 22,764 |
| 1200 | 22,670 |
| 1300 | 22,413 |
| 1400 | 22,312 |
| 1500 | 22,523 |
| 1600 | 21,933 |
| 1700 | 21,400 |
| 1800 | 20,853 |
| 1900 | 19,933 |
| 2000 | 18,667 |
| 2100 | 16,945 |
| 2200 | 14,730 |
| 2300 | 12,671 |
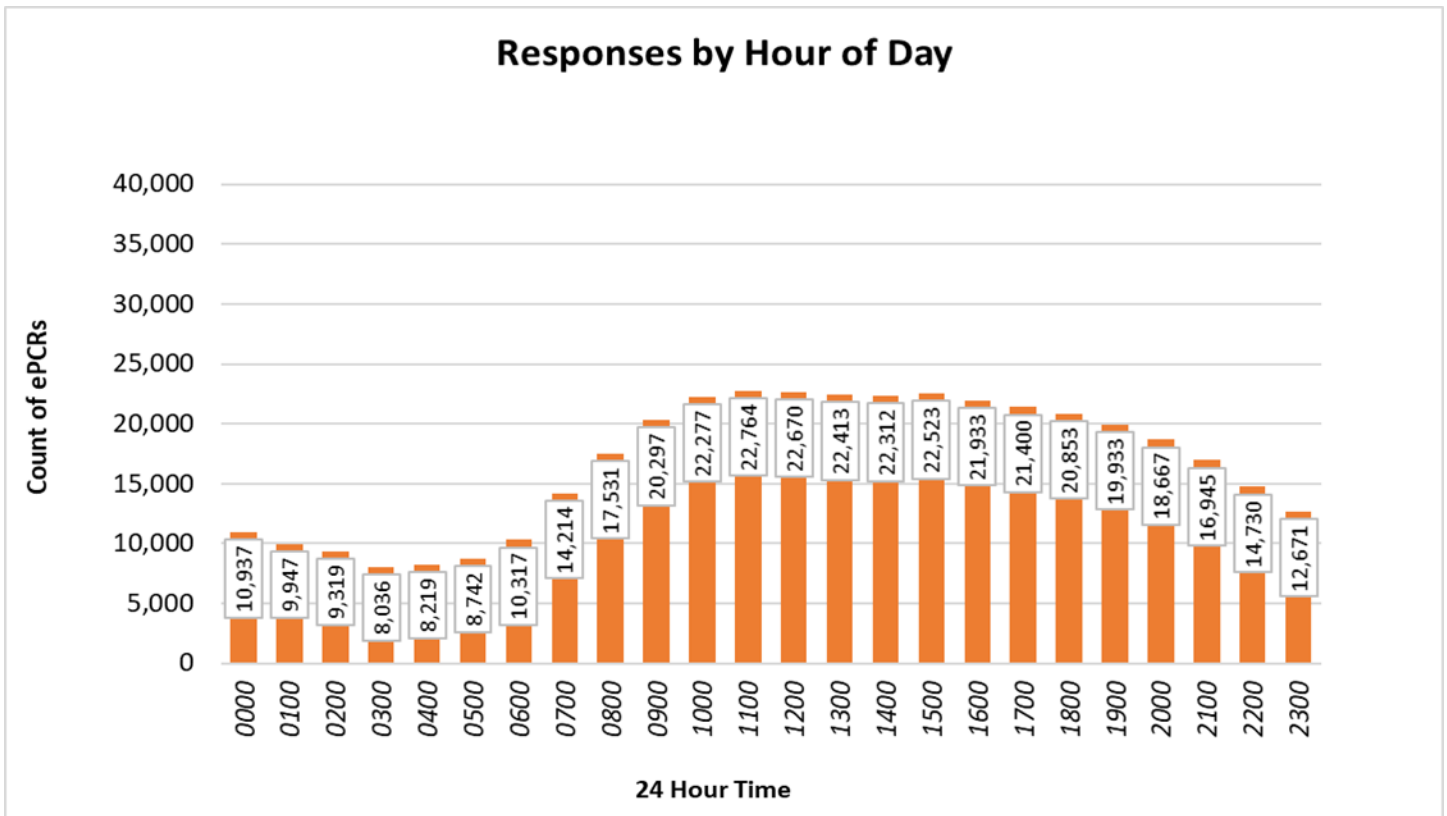
# Time Interval Analysis

**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 | 399,650 | 399,650 | 399,650 | 399,650 | 399,650 |
| | Valid | 250,791 | 272,760 | 272,881 | 272,879 | 272,818 |
| | Invalid | 62,997 | 70,978 | 124,502 | 125,722 | 106,051 |
| | Missing | 85,862 | 55,912 | 2,267 | 1,049 | 20,781 |
| Mean | | 0.7 | 1.4 | 0.8 | 0.9 | 6.7 |
| Median | | 0.0 | 0.5 | 0.3 | 0.7 | 5.6 |
| Standard Deviation | | 1.3 | 2.5 | 2.2 | 0.9 | 4.5 |
| 90th Percentile | | 2.5 | 3.3 | 1.4 | 2.1 | 11.8 |
| 95% Confidence Interval for Mean | | (0.71-0.72) | (1.43-1.44) | (0.8-0.82) | (0.94-0.95) | (6.65-6.68) |

| 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 | 399,650 | 399,650 | 399,650 | 399,650 | 399,650 |
| | Valid | 272,814 | 272,818 | 272,846 | 162,239 | 162,239 |
| | Invalid | 31,972 | 106,062 | 4,196 | 11,155 | 9,551 |
| | Missing | 94,864 | 20,770 | 122,608 | 226,256 | 227,860 |
| Mean | | 1.7 | 7.6 | 10.7 | 14.4 | 12.8 |
| Median | | 1.1 | 6.6 | 9.6 | 13.5 | 11.9 |
| Standard Deviation | | 1.8 | 4.4 | 5.4 | 6.3 | 6.2 |
| 90th Percentile | | 3.0 | 12.6 | 16.6 | 22.8 | 21.0 |
| 95% Confidence Interval for Mean | | (1.65-1.66) | (7.59-7.63) | (10.68-10.72) | (14.37-14.43) | (12.74-12.8) |

| 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 | 399,650 | 399,650 | 399,650 | 399,650 | 399,650 |
| | Valid | 160,150 | 160,157 | 160,158 | 160,158 | 160,158 |
| | Invalid | 8,097 | 8,019 | 8,095 | 8,095 | 3,749 |
| | Missing | 231,403 | 231,474 | 231,397 | 231,397 | 235,743 |
| Mean | | 14.2 | 26.9 | 28.5 | 37.1 | 38.3 |
| Median | | 12.5 | 25.4 | 27.0 | 35.3 | 36.4 |
| Standard Deviation | | 8.3 | 10.4 | 10.5 | 12.1 | 12.4 |
| 90th Percentile | | 25.0 | 40.6 | 42.4 | 53.0 | 54.5 |
| 95% Confidence Interval for Mean | | (14.13-14.21) | (26.85-26.96) | (28.49-28.59) | (37.03-37.15) | (38.22-38.34) |

## 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 | 221,428 | 221,428 | 221,428 | 221,428 | 221,428 | 221,428 | 221,428 | 221,428 |
| | Valid | 97,581 | 119,544 | 119,642 | 119,639 | 119,598 | 119,594 | 119,598 | 119,618 |
| | Invalid | 39,489 | 47,454 | 100,902 | 100,904 | 88,151 | 27,076 | 88,162 | 590 |
| | Missing | 84,358 | 54,430 | 884 | 885 | 13,679 | 74,758 | 13,668 | 101,220 |
| Mean | | 1.8 | 2.0 | 0.6 | 1.5 | 4.8 | 1.7 | 6.3 | 10.0 |
| Median | | 1.9 | 2.0 | 0.3 | 1.4 | 4.4 | 1.3 | 5.8 | 9.4 |
| Standard Deviation | | 1.5 | 2.0 | 1.3 | 0.9 | 2.7 | 1.8 | 2.9 | 4.1 |
| 90th Percentile | | 3.3 | 3.7 | 1.3 | 2.6 | 7.9 | 3.1 | 9.6 | 14.5 |
| 95% Confidence Interval for Mean | | (1.82-1.84) | (2-2.02) | (0.58-0.59) | (1.44-1.45) | (4.79-4.82) | (1.68-1.7) | (6.24-6.27) | (9.94-9.98) |

**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 | 178,223 | 178,223 | 178,223 | 178,223 | 178,223 | 178,223 | 178,223 | 178,223 |
| | Valid | 153,210 | 153,216 | 153,239 | 153,240 | 153,220 | 153,220 | 153,220 | 153,228 |
| | Invalid | 23,509 | 23,525 | 23,601 | 24,819 | 17,901 | 4,897 | 17,901 | 3,607 |
| | Missing | 1,504 | 1,482 | 1,383 | 164 | 7,102 | 20,106 | 7,102 | 21,388 |
| Mean | | 0.0 | 1.0 | 1.0 | 0.6 | 8.1 | 1.6 | 8.7 | 11.3 |
| Median | | 0.0 | 0.3 | 0.3 | 0.3 | 7.0 | 1.0 | 7.6 | 9.8 |
| Standard Deviation | | 0.1 | 2.7 | 2.7 | 0.7 | 5.0 | 1.8 | 5.1 | 6.2 |
| 90th Percentile | | 0.0 | 1.7 | 1.7 | 1.3 | 14.0 | 3.0 | 14.7 | 18.5 |
| 95% Confidence Interval for Mean | | (0-0) | (0.97-1) | (0.97-1) | (0.55-0.56) | (8.09-8.14) | (1.62-1.63) | (8.64-8.69) | (11.25-11.31) |

# 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.

| Total Response Time (eTimes.01 to eTimes.07) | Agency 1 | Agency 2 | Agency 3 | Agency 4 | Agency 5 |
|---|---|---|---|---|---|
| Mean | 11.4 | 10.2 | 11.6 | 7.4 | 11.3 |
| Median | 9.2 | 8.8 | 10.3 | 6.8 | 10.6 |
| Standard Deviation | 7.4 | 5.9 | 6.0 | 3.3 | 3.9 |
| 90th Percentile | 21.0 | 16.2 | 18.7 | 10.7 | 15.5 |
| 95% Confidence Interval for Mean | (11.29-11.48) | (10.11-10.24) | (11.57-11.65) | (7.34-7.43) | (11.25-11.30) |

| Total Response Time (eTimes.01 to eTimes.07) | Agency 6 | Agency 7 | Agency 8 | Agency 9 | Agency 10 |
|---|---|---|---|---|---|
| Mean | 9.1 | 9.0 | 8.3 | 7.7 | 8.3 |
| Median | 8.3 | 8.3 | 7.9 | 7.2 | 7.6 |
| Standard Deviation | 4.0 | 3.7 | 2.8 | 2.9 | 3.6 |
| 90th Percentile | 13.0 | 12.1 | 11.7 | 10.7 | 12.0 |
| 95% Confidence Interval for Mean | (9.00-9.23) | (8.95-9.14) | (8.19-8.41) | (7.61-7.76) | (8.18-8.36) |

| Total Response Time (eTimes.01 to eTimes.07) | Agency 11 | Agency 12 | Agency 13 | Agency 14 | Agency 15 | Agency 16 |
|---|---|---|---|---|---|---|
| Mean | 11.1 | 11.2 | 4.8 | 12.3 | 10.6 | 9.9 |
| Median | 10.7 | 9.8 | 4.7 | 12.4 | 9.9 | 9.2 |
| Standard Deviation | 3.7 | 5.6 | 2.7 | 3.2 | 3.7 | 3.4 |
| 90th Percentile | 15.6 | 23.7 | 8.2 | 15.4 | 14.7 | 14.0 |
| 95% Confidence Interval for Mean | (10.79-11.42) | (8.24-14.22) | (3.71-5.86) | (12.04-12.54) | (10.00-11.19) | (9.37-10.41) |