

A Review of the Working Relationship Between EMSA and the Tulsa Fire Department

Draft Report – June 2016



FIRE/EMS

OPERATIONS

C E N T E R F O R P U B L I C S A F E T Y M A N A G E M E N T

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Section 1. Executive Summary

The Center for Public Safety Management, LLC (CPSM) was retained by the city of Tulsa as part of the city's comprehensive review of fire department operations and organization. As an added element of CPSM's review, CPSM was asked to evaluate the working relationship between the Tulsa Fire Department (TFD) and the Emergency Medical Services Authority (EMSA). EMSA is a public trust set up as a cooperative arrangement between the cities of Tulsa and Oklahoma City for the purpose of coordinating ambulance services and oversight of the EMS delivery system in the two cities and a number of adjacent communities. Specifically, CPSM was tasked with providing recommendations and alternatives regarding this ongoing relationship, which is subject for review and possible renewal in November 2018.

During the study, CPSM analyzed performance data provided by the Tulsa Fire Department (TFD) and EMSA, and examined firsthand the field operations of both entities. To begin the review, project staff asked the city for certain documents, data, and information. The project staff used this information/data to familiarize themselves with the department's structure, assets, and operations. The provided information was also used in conjunction with observations and information collected during on-site visits to determine the existing performance of the agencies and their collaborative efforts in providing emergency medical services in the prehospital setting.

Project staff conducted a site visit on January 10–12, and again on February 1-3, 2016, for the purpose of observing the working relationship between TFD and EMSA, along with agency-connected support operations, interviewing key staff, and reviewing preliminary data and operations. Telephone conference calls as well as e-mail exchanges were conducted between CPSM project management staff, the city, EMSA and the TFD so that CPSM staff could affirm the project scope, as well as elicit further discussion regarding this operational analysis.

Overall, CPSM found the TFD and EMSA working relationship to be a high performance and progressive arrangement that is a recognized nationally in the delivery of EMS services. The TFD and EMSA personnel with whom CPSM interacted are truly interested in serving the community to the best of their abilities. As EMS demands increase and the service network is required to provide increased response activities, the necessity for strong collaborations and seamless service delivery will also continue to expand. This workload and the potential for expanding call volume is not, however, insurmountable and CPSM will provide a series of observations and recommendations that we believe can allow TFD and EMSA to become *more efficient* and *smarter* in the management of emergency and nonemergency responsibilities.

Recommendations

TFD and EMSA provide an excellent service to citizens, visitors to the area, and local businesses. The model developed and utilized in the Tulsa area is well respected and extremely effective in the delivery of emergency medical services. The city of Tulsa has maintained its relationship with EMSA

since 1977. The working relationship observed between the city and EMSA is impressive and provides one of the highest levels of prehospital emergency medical care available in the nation.

On the basis of our observations and the analysis of response activities, training, deployment, and patient outcomes, CPSM recommends that the city of Tulsa maintain its working relationship with EMSA in the delivery of prehospital emergency medical services.

In addition, CPSM has identified seven recommendations that we believe will improve the overall working relationship between EMSA and TFD and have a positive impact on EMS delivery:

- 1. EMSA should work with TFD and area partners in the development of a Community Integrated Health Care program for the Tulsa service area.**
- 2. EMSA should provide a financial contribution toward the capital purchase, operation, and replacement of EMS first response units operated by the Tulsa Fire Department.**
- 3. EMSA and TFD should evaluate the option of a more fluid deployment model that coordinates the distribution of TFD EMS first response units and EMSA ambulances on the basis of real-time call demand.**
- 4. EMSA should evaluate the option of expanding its responsibilities to include the 911 call taker and fire/EMS dispatching duties.**
- 5. EMSA and Medical Control should work with TFD to reduce the number of TFD's "hot" response to EMS calls.**
- 6. EMSA should lead a community effort to develop a more expedient way for emergency responders to off-load patients at area hospitals.**
- 7. EMSA Medical Control should evaluate the difference in patient care and patient outcomes between TFD ALS first responders and TFD BLS first responders.**

Section 2. Scope and Overview

This project is intended to provide an independent review of the working relationship between the Tulsa Fire Department (TFD) and EMSA. EMSA, or the Emergency Medical Services Authority, is a public trust that was set up as a cooperative arrangement between the cities of Tulsa and Oklahoma City. EMSA provides ambulance service and oversight to the EMS delivery system in these two metropolitan areas along with a number of adjacent communities. EMSA is often referred to as a **Public Utility Model**, and has been operational since 1977. The concept of this model is to utilize a quasi-governmental entity to coordinate the delivery of ambulance services throughout the community. As a government supported agency EMSA contracts with a private ambulance provider, currently AMR, which provides the actual prehospital emergency medical care, transport services, EMS dispatching, and related community outreach.



EMSA is divided into two Divisions, Eastern and Western. The Eastern Division includes the cities of Tulsa, Jenks, Bixby, and Sand Springs. The Western Division includes Oklahoma City and several of its neighboring municipalities. The current contractual agreement with AMR has a five-year timeframe from November 1, 2013 and through October 31, 2018. CPSM was asked to review this arrangement and make a recommendation regarding its renewal in 2018.

EMSA provides nearly 170,000 EMS transports annually, with this call volume split almost equally between the two divisions. There is slightly more activity in the Western Division. In the current arrangement with AMR, EMSA provides all ambulance vehicles, medical control, on-board equipment, and dispatching space and associated equipment. AMR provides all personnel to staff the ambulance fleet, supervisors, trainers, and the EMS dispatchers who operate within the Tulsa 911 Communications Center. AMR also provides medical supplies, disposable equipment, vehicle maintenance, training, and follows established reporting requirements. EMSA provides the billing for ambulance transports and receives all revenues for the associated emergency and nonemergency transports. AMR receives a flat rate payment for each transport completed. It is estimated that AMR will receive \$22.2 million for its Eastern Division services in FY2016. The EMSA budget for this division in FY2016 is \$29.4 million.

EMSA Call Activity

EMSA groups calls into four priority levels:

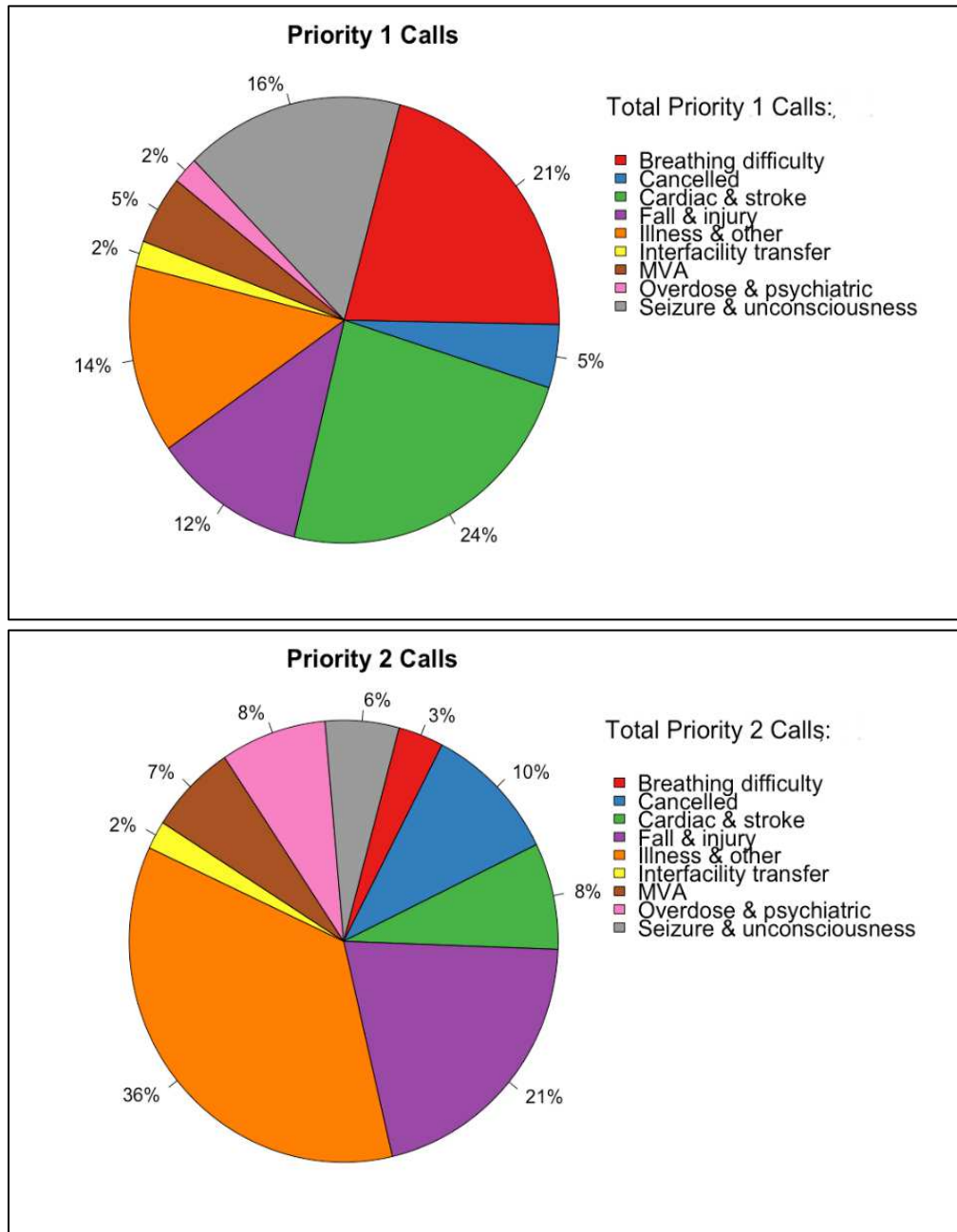
- Priority 1: Life Threatening Emergency.
- Priority 2: Non-Life Threatening Emergency.
- Priority 3: Unscheduled Inter-facility Transfer.
- Priority 4: Scheduled Inter-facility Transfer.

During the year studied, EMSA responded to 88,812 calls within the Tulsa service area. Of these, 23,179 were Priority 1 calls and 56,146 were Priority 2 calls. Table 2-1 and Figure 2-1 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each priority level.

TABLE 2-1: Call Types

| Priority | Call Type | Number of Calls | Calls per Day | Call Percentage |
|-----------------------------------|-------------------------------|-----------------|---------------|-----------------|
| Life Threatening Emergency | Breathing difficulty | 5,017 | 13.7 | 5.6 |
| | Cancelled | 1,090 | 3.0 | 1.2 |
| | Cardiac and stroke | 5,654 | 15.5 | 6.4 |
| | Fall and injury | 2,730 | 7.5 | 3.1 |
| | Illness and other | 3,240 | 8.9 | 3.6 |
| | Inter-facility transfer | 434 | 1.2 | 0.5 |
| | MVA | 1,187 | 3.3 | 1.3 |
| | Overdose and psychiatric | 458 | 1.3 | 0.5 |
| | Seizure and unconsciousness | 3,909 | 10.7 | 4.4 |
| | Priority 1 Total | 23,719 | 65.0 | 26.7 |
| Non-Life Threatening Emergency | Breathing difficulty | 1,922 | 5.3 | 2.2 |
| | Cancelled | 5,731 | 15.7 | 6.5 |
| | Cardiac and stroke | 4,378 | 12.0 | 4.9 |
| | Fall and injury | 11,656 | 31.9 | 13.1 |
| | Illness and other | 19,987 | 54.8 | 22.5 |
| | Inter-facility transfer | 1,157 | 3.2 | 1.3 |
| | MVA | 3,712 | 10.2 | 4.2 |
| | Overdose and psychiatric | 4,480 | 12.3 | 5.0 |
| | Seizure and unconsciousness | 3,123 | 8.6 | 3.5 |
| | Priority 2 Total | 56,146 | 153.8 | 63.2 |
| Unscheduled & Scheduled Transfers | Cancelled | 232 | 0.6 | 0.3 |
| | Non-emergency transfer | 8,715 | 23.9 | 9.8 |
| | Priority 3 and 4 Total | 8,947 | 24.5 | 10.1 |
| Total | Total | 88,812 | 243.3 | 100.0 |

FIGURE 2-1: Priority 1 and Priority 2 Calls by Type



Observations:

Overall

- The authority received an average of 243.3 calls per day.
- Priority 1 calls for the year totaled 23,719 (27 percent of all calls), an average of 65 per day.
- Priority 2 calls for the year totaled 56,146 (63 percent of all calls), an average of 154 per day.

- Priority 3 calls for the year totaled 8,947 (10 percent of all calls), an average 25 per day.
- Overall, 8 percent of calls were cancelled.

Priority 1 – Life Threatening Emergency

- Cardiac and stroke calls were the largest category of Priority 1 calls at 24 percent.
- Breathing difficulty calls made up 21 percent of the Priority 1 calls.
- Motor vehicle accidents made up 5 percent of the Priority 1 calls.

Priority 2 – Non-Life Threatening Emergency

- Illness and other calls were the largest category of Priority 2 calls at 36 percent.
- Fall and injury calls made up 21 percent of Priority 2 calls.
- Cardiac and stroke calls made up 8 percent of Priority 2 calls.
- Motor vehicle accidents made up 7 percent of Priority 2 calls.

In looking at the EMSA call activity in the Tulsa service area, it is important to note that during this same time period, TFD units responded to a total 35,624 EMS calls, broken out as follows;

- 55 percent (approximately 19,500) Priority 1 calls.
- 45 percent (approximately 16,000) as Priority 2 calls.

It should be noted that EMSA responded to approximately 44,000 more calls than TFD. The primary reason for this difference is that for many of the Priority 2 calls, only an EMSA unit was dispatched. This determination is made through the dispatch call screening process and is based on medical evaluation that is based on clinical findings. It is also important to point out that in addition to the nearly 80,000 Priority 1 and Priority 2 responses, EMSA also handles an estimated 8,900 inter-facility transfers.

Response Times

TFD and EMSA operate in what is often termed as a two-tiered response system. In this arrangement, the fire department is the immediate responding agency, and typically arrives at the scene first and begins patient assessment and stabilization. The ambulance unit responds concurrently, but because of the distribution of ambulance resources and their workload, they typically arrive after the TFD unit. In addition, TFD units typically respond hot on all EMS calls (lights and sirens), while EMSA units will respond cold (no lights and sirens, making stops at traffic signals) on most of the Priority 2 calls. The current contractual arrangement between EMSA and AMR requires that ambulance units respond to Priority 1 calls within 10:59 minutes and Priority 2 calls within 24:59 minutes. These response time requirements are based on a 90th percentile criteria, meaning that on 90 percent of all Priority 1 responses an AMR unit must arrive on scene within the 10:59 minute timeframe. In the event that these timeframes are not met, AMR may be subject to a monetary fine. In 2015, AMR was fined in excess of \$300,000 for just over 4,600 late

arrival occurrences. Included in this amount was approximately \$18,000 in reporting fines for either delayed reporting or improper documentation. When looking at total revenues, though substantial, the amount of fines levied in 2015 represents less than one percent of AMR's total revenue.

Table 2-2 is a one year analysis of EMSA response times. In this analysis, we focused on Priority 1 and Priority 2 calls. We only included the times for those units that had complete time stamps, that is, units with all components recorded so as to be able to calculate each segment of response time. Cancelled calls were also excluded from this analysis. Important to note is that all calls that do not result in a transport are considered cancelled calls and subsequently are excluded from EMSA response time criteria. Our analysis, however, included nontransport calls in the response time calculations. The main focus is the response time of the first arriving EMSA unit. As a result, in this section, a total of 62,660 calls were used in the analysis.

TABLE 2-2: Average Response Times of First Arriving Unit, by Priority and Call Type (Minutes)

| Priority | Call Type | Dispatch Time | Turnout Time | Travel Time | Response Time | Sample Size |
|--------------------------------------|-----------------------------|---------------|--------------|-------------|---------------|---------------|
| Life Threatening Emergency | Breathing difficulty | 1.0 | 0.4 | 6.6 | 8.0 | 4,255 |
| | Cardiac and stroke | 1.1 | 0.3 | 6.5 | 8.0 | 4,838 |
| | Fall and injury | 1.1 | 0.4 | 6.5 | 8.0 | 2,355 |
| | Illness and other | 1.2 | 0.4 | 6.5 | 8.1 | 2,778 |
| | Interfacility transfer | 2.8 | 0.3 | 4.0 | 7.1 | 374 |
| | MVA | 1.4 | 0.4 | 5.9 | 7.7 | 1,014 |
| | Overdose and psychiatric | 1.4 | 0.4 | 6.8 | 8.5 | 387 |
| | Seizure and unconsciousness | 1.1 | 0.4 | 6.3 | 7.8 | 3,327 |
| | Priority 1 Total | 1.2 | 0.4 | 6.4 | 8.0 | 19,328 |
| Non-Life Threatening Emergency | Breathing difficulty | 1.5 | 0.4 | 9.1 | 11.0 | 1,654 |
| | Cardiac and stroke | 1.3 | 0.4 | 8.9 | 10.6 | 3,719 |
| | Fall and injury | 1.4 | 0.4 | 9.2 | 11.1 | 10,054 |
| | Illness and other | 1.4 | 0.4 | 9.2 | 11.0 | 17,124 |
| | Interfacility transfer | 3.4 | 0.5 | 6.8 | 10.6 | 1,014 |
| | MVA | 1.5 | 0.4 | 8.3 | 10.1 | 3,199 |
| | Overdose and psychiatric | 1.5 | 0.5 | 8.6 | 10.5 | 3,874 |
| | Seizure and unconsciousness | 1.4 | 0.4 | 9.1 | 10.8 | 2,694 |
| | Priority 2 Total | 1.5 | 0.4 | 9.0 | 10.9 | 43,332 |
| Total | 1.4 | 0.4 | 8.2 | 10.0 | 62,660 | |

Note: Dispatch time is for the first arriving unit. Another unit may have been dispatched first but reassigned to a higher priority call or cancelled when another, closer, unit became available and was dispatched. Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

The CPSM analysis is not intended to be an assessment of EMSA contractual response time requirements. While the measurement of response times involve many of the same calls, there are significant differences in the calls that are included in our analyses. Table 2-3 is the breakout of calls and call types and their transport rates. Overall, approximately 68 percent of the Priority 1 and Priority 2 calls result in transports, or approximately 54,000 calls.

TABLE 2-3: Number of Transports by Call Type and Priority

| Priority | Call Type | Number of Calls | | | |
|--------------------------------|---------------------------------|-----------------|---------------|---------------|----------------|
| | | Non-Transport | Transport | Total | Transport Rate |
| Life Threatening Emergency | Breathing difficulty | 621 | 4,396 | 5,017 | 87.6 |
| | Cancelled | 1,090 | 0 | 1,090 | 0.0 |
| | Cardiac and stroke | 737 | 4,917 | 5,654 | 87.0 |
| | Fall and injury | 529 | 2,201 | 2,730 | 80.6 |
| | Illness and other | 914 | 2,326 | 3,240 | 71.8 |
| | Inter-facility transfer | 0 | 434 | 434 | 100.0 |
| | MVA | 411 | 776 | 1,187 | 65.4 |
| | Overdose and psychiatric | 108 | 350 | 458 | 76.4 |
| | Seizure and unconsciousness | 807 | 3,102 | 3,909 | 79.4 |
| | Priority 1 Total | 5,217 | 18,502 | 23,719 | 78.0 |
| | Priority 1 Daily Average | 14.3 | 50.7 | 65.0 | — |
| Non-Life Threatening Emergency | Breathing difficulty | 383 | 1,539 | 1,922 | 80.1 |
| | Cancelled | 5,731 | 0 | 5,731 | 0.0 |
| | Cardiac and stroke | 623 | 3,755 | 4,378 | 85.8 |
| | Fall and injury | 4,464 | 7,192 | 11,656 | 61.7 |
| | Illness and other | 4,508 | 15,479 | 19,987 | 77.5 |
| | Inter-facility transfer | 0 | 1,157 | 1,157 | 100.0 |
| | MVA | 2,192 | 1,520 | 3,712 | 41.0 |
| | Overdose and psychiatric | 2,136 | 2,344 | 4,480 | 52.3 |
| | Seizure and unconsciousness | 742 | 2,381 | 3,123 | 76.2 |
| | Priority 2 Total | 20,779 | 35,367 | 56,146 | 63.0 |
| | Priority 2 Daily Average | 56.9 | 96.9 | 153.8 | — |
| Total | 25,996 | 53,869 | 79,865 | 67.5 | |
| Daily Average | 71.2 | 147.6 | 218.8 | — | |

In addition, EMSA contractual response time requirements include exceptions for weather and periods of unusually high call volume. There is special handling of calls in which there is a change in call priority. Table 2-4 details the 90th percentile response times for the one-year study period.

TABLE 2-4: 90th Percentile Response Times of First Arriving Unit, by Priority and Call Type (Minutes)

| Priority | Call Type | Dispatch Time | Turnout Time | Travel Time | Response Time | Sample Size |
|--------------------------------|-----------------------------|---------------|--------------|-------------|---------------|---------------|
| Life Threatening Emergency | Breathing difficulty | 2.3 | 0.8 | 10.5 | 12.0 | 4,255 |
| | Cardiac and stroke | 2.5 | 0.7 | 10.4 | 12.1 | 4,838 |
| | Fall and injury | 2.7 | 0.8 | 10.4 | 12.1 | 2,355 |
| | Illness and other | 2.7 | 0.9 | 10.6 | 12.6 | 2,778 |
| | Inter-facility transfer | 4.2 | 0.6 | 8.6 | 11.0 | 374 |
| | MVA | 2.9 | 0.9 | 10.4 | 12.4 | 1,014 |
| | Overdose and psychiatric | 3.5 | 1.0 | 10.8 | 13.3 | 387 |
| | Seizure and unconsciousness | 2.7 | 0.8 | 10.1 | 11.8 | 3,327 |
| | Priority 1 Total | 2.7 | 0.8 | 10.4 | 12.2 | 19,328 |
| Non-Life Threatening Emergency | Breathing difficulty | 4.3 | 0.9 | 14.8 | 18.5 | 1,654 |
| | Cardiac and stroke | 3.1 | 0.8 | 14.6 | 17.5 | 3,719 |
| | Fall and injury | 3.7 | 0.9 | 15.1 | 18.0 | 10,054 |
| | Illness and other | 3.5 | 0.9 | 15.0 | 17.8 | 17,124 |
| | Inter-facility transfer | 5.3 | 1.2 | 14.6 | 19.6 | 1,014 |
| | MVA | 3.8 | 0.9 | 14.2 | 16.9 | 3,199 |
| | Overdose and psychiatric | 3.8 | 1.0 | 14.5 | 17.3 | 3,874 |
| | Seizure and unconsciousness | 3.6 | 0.8 | 14.7 | 17.6 | 2,694 |
| | Priority 2 Total | 3.7 | 0.9 | 14.8 | 17.8 | 43,332 |
| Total | 3.2 | 0.9 | 13.9 | 16.4 | 62,660 | |

Note: Dispatch time is for the first arriving EMSA unit. Another unit may have been dispatched first but reassigned to a higher priority call or cancelled when another closer unit became available and was dispatched.

Observations:

Overall

- The 90th percentile dispatch time was 3.2 minutes.
- The 90th percentile turnout time was 0.9 minutes.
- The 90th percentile travel time was 13.9 minutes.
- The 90th percentile response time was 12.2 minutes for Priority 1 calls and 17.8 minutes for Priority 2 calls.

It is important to note that when looking at these response times a key component of the dispatch handling time is **not included** in this analysis. Typically, dispatch handling time includes that time from which the 911 call is received at the Public Safety Answering Point (PSAP) to the time that the responding units are notified. In the Tulsa system the calculation of dispatch time for EMSA begins at the time that an EMSA dispatcher receives the call from the 911 call taker to the time an EMSA unit is dispatched. The call taker is the individual who first talks with the 911 caller to determine the nature of the call (fire, police, EMS, etc.). Once the call taker receives this information, they

transfer the caller to the appropriate dispatcher (fire, police, EMS). Typically, this transfer process takes less than 10 seconds; however, the Tulsa 911Center has been experiencing delays in the AT&T line transfer and estimates that in some cases these delays can be upwards of 30 to 40 seconds. Unfortunately, the Tulsa 911 Center does not monitor this aspect of the call processing time and is unable to accurately compute the full call handling time. Tulsa 911 Center officials are working with AT&T to rectify this occurrence, but at the time of the CPSM site visit there was not a resolution for this situation.

In our analysis of arrival times comparing TFD and EMSA it was found that TFD arrives on life threatening calls (Priority 1) ahead of an EMSA unit on average 3.6 minutes faster. On non-life threatening calls (Priority 2), TFD arrives, on average, 7 minutes faster than an EMSA unit. It should also be noted that on a number of instances (25.6 percent of the Priority 1 calls and 15.6 percent of Priority 2 calls), an EMSA unit arrives on scene prior to a TFD unit. This was a very interesting observation, indicating that there is not a significant difference in the arrival times of TFD and EMSA units. Even more surprising was the comparison of Priority 2 calls. In these situation EMSA units are typically responding in a cold response (non-lights and sirens) and TFD units are responding hot (lights and sirens).Table 2-5 compares the on-scene arrival times between TFD and EMSA units.

TABLE 2-5: Comparison of On-Scene Arrival Times–TFD vs. EMSA

| Priority | First Arriving Agency | Time Between First and Second Arriving Agency | | Number of Calls |
|--------------------------------|-----------------------|---|-----------------|-----------------|
| | | Average | 90th Percentile | |
| Life Threatening Emergency | EMSA | 1.7 | 3.6 | 4,477 |
| | TFD | 3.6 | 6.9 | 13,010 |
| | Total | 3.1 | 6.3 | 17,487 |
| Non-Life Threatening Emergency | EMSA | 3.8 | 10.4 | 2,326 |
| | TFD | 7.0 | 14.6 | 12,381 |
| | Total | 6.5 | 14.1 | 14,707 |
| Overall | EMSA | 2.4 | 5.0 | 6,803 |
| | TFD | 5.3 | 11.2 | 25,391 |
| | Total | 4.7 | 10.4 | 32,194 |

Call Duration

Typically an EMSA unit spends, on average, just over one hour (60.6 minutes) for each call to which it responds. There was only a 7.3 minute difference in the call duration time between Priority 1 and Priority 2 calls. Not surprisingly, the interfacility transfers had the longest average duration.

TABLE 2-6: Annual Runs and Deployed Time by Call Type

| Priority | Call Type | Avg. Deployed Min. per Run | Total Annual Hours | Percent of Total Hours | Avg. Deployed Hours per Day | Total Annual Runs | Avg. Runs per Day |
|-----------------------------------|-------------------------------|----------------------------|--------------------|------------------------|-----------------------------|-------------------|-------------------|
| Life Threatening Emergency | Breathing difficulty | 69.5 | 6,922.2 | 6.5 | 19.0 | 5,973 | 16.4 |
| | Cancelled | 10.7 | 235.0 | 0.2 | 0.6 | 1,315 | 3.6 |
| | Cardiac and stroke | 70.2 | 7,887.0 | 7.4 | 21.6 | 6,739 | 18.5 |
| | Fall and injury | 65.8 | 3,624.4 | 3.4 | 9.9 | 3,307 | 9.1 |
| | Illness and other | 60.7 | 3,944.5 | 3.7 | 10.8 | 3,900 | 10.7 |
| | Inter-facility transfer | 85.5 | 669.5 | 0.6 | 1.8 | 470 | 1.3 |
| | MVA | 61.9 | 1,663.4 | 1.6 | 4.6 | 1,613 | 4.4 |
| | Overdose and psychiatric | 65.7 | 618.5 | 0.6 | 1.7 | 565 | 1.5 |
| | Seizure and unconsciousness | 68.0 | 5,323.3 | 5.0 | 14.6 | 4,696 | 12.9 |
| | Priority 1 Total | | 64.8 | 30,887.7 | 29.0 | 84.6 | 28,578 |
| Non-Life Threatening Emergency | Breathing difficulty | 66.9 | 2,558.4 | 2.4 | 7.0 | 2,293 | 6.3 |
| | Cancelled | 12.0 | 1,385.3 | 1.3 | 3.8 | 6,900 | 18.9 |
| | Cardiac and stroke | 70.5 | 6,052.9 | 5.7 | 16.6 | 5,148 | 14.1 |
| | Fall and injury | 61.8 | 14,163.6 | 13.3 | 38.8 | 13,751 | 37.7 |
| | Illness and other | 64.3 | 25,247.6 | 23.7 | 69.2 | 23,563 | 64.6 |
| | Inter-facility transfer | 76.7 | 1,682.2 | 1.6 | 4.6 | 1,316 | 3.6 |
| | MVA | 51.4 | 3,913.5 | 3.7 | 10.7 | 4,564 | 12.5 |
| | Overdose and psychiatric | 52.5 | 4,681.5 | 4.4 | 12.8 | 5,352 | 14.7 |
| | Seizure and unconsciousness | 67.7 | 4,180.6 | 3.9 | 11.5 | 3,703 | 10.1 |
| | Priority 2 Total | | 57.5 | 63,865.7 | 60.0 | 175.0 | 66,590 |
| Unscheduled & Scheduled Transfers | Cancelled | 30.4 | 125.5 | 0.1 | 0.3 | 248 | 0.7 |
| | Non-emergency transfer | 69.6 | 11,575.4 | 10.9 | 31.7 | 9,984 | 27.4 |
| | Priority 3 and 4 Total | | 68.6 | 11,700.9 | 11.0 | 32.1 | 10,232 |
| Total | | 60.6 | 106,454.4 | 100.0 | 291.7 | 105,400 | 288.8 |

It was also very interesting to note the difference in call duration between calls resulting in transports and those not involving transports. When an EMSA unit conducts a transport, the average call duration time increases by **more than 250 percent** (from 34.7 minutes to 88.2 minutes). Table 2-7 demonstrates the difference in average call duration between the various call types and transports vs. nontransports.

TABLE 2-7: Transport Call Duration, by Call Type and Priority

| Priority | Call Type | Average Duration | | |
|--------------------------------|-----------------------------|------------------|-------------|-------------|
| | | Non-Transport | Transport | Total |
| Life Threatening Emergency | Breathing difficulty | 49.8 | 87.4 | 82.7 |
| | Cancelled | 12.9 | NA | 12.9 |
| | Cardiac and stroke | 54.0 | 88.1 | 83.7 |
| | Fall and injury | 37.7 | 88.1 | 78.3 |
| | Illness and other | 36.3 | 87.1 | 72.7 |
| | Interfacility transfer | NA | 92.3 | 92.3 |
| | MVA | 39.3 | 95.2 | 75.8 |
| | Overdose and psychiatric | 40.5 | 91.4 | 79.4 |
| | Seizure and unconsciousness | 48.2 | 90.2 | 81.5 |
| | Priority 1 Total | 37.8 | 88.6 | 77.4 |
| Non-Life Threatening Emergency | Breathing difficulty | 48.4 | 87.6 | 79.8 |
| | Cancelled | 14.6 | NA | 14.6 |
| | Cardiac and stroke | 48.7 | 88.5 | 82.8 |
| | Fall and injury | 44.4 | 90.3 | 72.7 |
| | Illness and other | 39.9 | 86.1 | 75.7 |
| | Interfacility transfer | NA | 87.1 | 87.1 |
| | MVA | 37.5 | 93.3 | 60.3 |
| | Overdose and psychiatric | 35.1 | 87.8 | 62.7 |
| | Seizure and unconsciousness | 51.0 | 89.4 | 80.3 |
| | Priority 2 Total | 33.9 | 88.0 | 68.0 |
| Total | 34.7 | 88.2 | 71.0 | |

Note: Duration of a call is defined as the longest deployed time of any of the EMSA units responding to the same call.

Observations:

Overall

- Overall, the average duration for Priority 1 and Priority 2 calls was 71 minutes.
- The overall average duration for Priority 1 and Priority 2 calls not resulting in a transport was 34.7 minutes.
- The overall average duration for Priority 1 and Priority 2 calls resulting in a transport was 88.2 minutes, which is 2.5 times longer than a nontransport call.

Priority 1 – Life Threatening Emergency

- Priority 1 calls had an average duration of 77.4 minutes.
- Priority 1 calls not resulting in a transport had an average duration of 37.8 minutes while calls with a transport lasted 2.3 times longer, with an average duration of 88.6 minutes.
- Inter-facility transfers lasted the longest overall, with an average duration of 92.3 minutes.

- Motor vehicle accidents had the longest average duration for Priority 1 transports, with an average duration of 95.2 minutes.

Priority 2 – Non-Life Threatening Emergency

- Priority 2 calls had an average duration of 68 minutes.
- Priority 2 calls not resulting in a transport had an average duration of 33.9 minutes while calls with a transport lasted 2.6 times longer, with an average duration of 88 minutes.
- Inter-facility transfers lasted the longest overall with an average duration of 87.1 minutes.
- Motor vehicle accidents had the longest average duration for Priority 2 transports, with an average duration of 93.3 minutes.

A key reason contributing to the extended call durations for EMSA transport calls is the extended patient off-loading times at area hospitals. On average, units are waiting approximately 40 minutes to off-load patients at area hospitals. In many instances it is not uncommon to observe EMSA ambulances waiting for upwards of two hours before their patient is received in the emergency department. In one case during our study period (2015), we observed a unit waiting nearly **5 hours to off-load its patient**. This delay in off-loading patients limits the availability of EMSA ambulances and has an impact on overall response times. CPSM estimates that on an annual basis EMSA units combined spend over 35,000 hours at area hospitals just waiting to off-load their patients. One hospital in particular (St. Francis) has been the most problematic in its ability to rapidly receive a patient and release EMSA ambulances. Table 2-8 is an analysis of patient off-loading times at the most frequently used hospital receiving facilities in the Tulsa area.

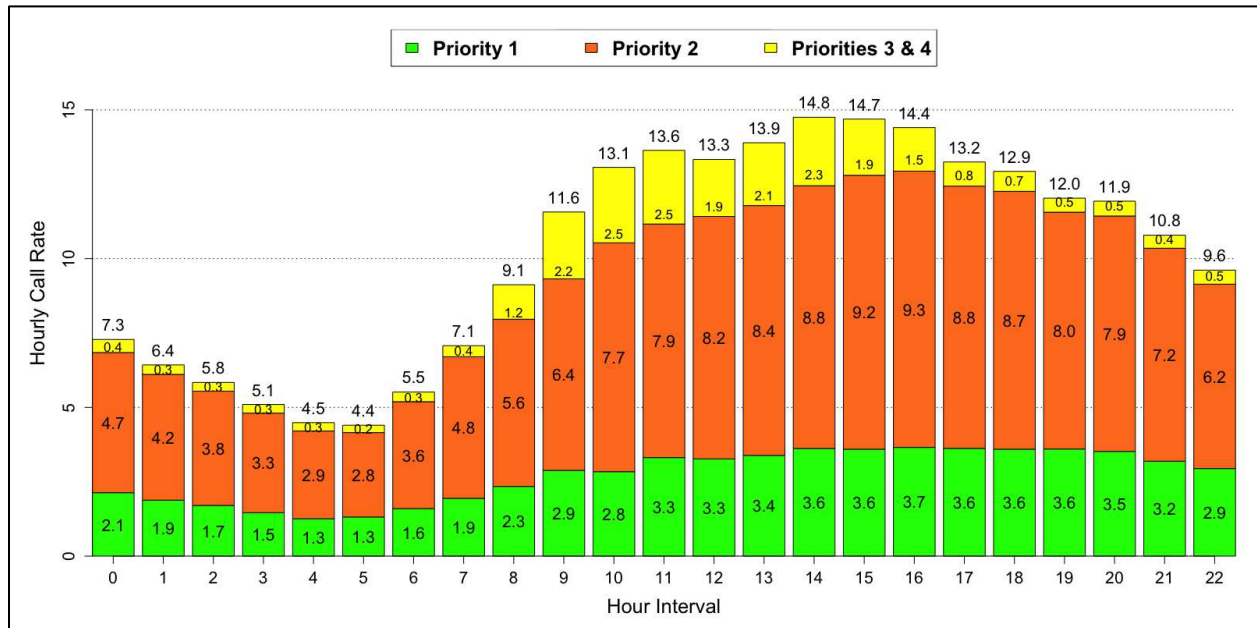
TABLE 2-8: Patient Off-Loading Times at Tulsa Area Hospitals

| Priority | Transport Destination | Average Offload Time | 90th Percentile Offload Time | Average Call Duration | 90th Percentile Call Duration | Number of Transports |
|--------------------------------|----------------------------|----------------------|------------------------------|-----------------------|-------------------------------|----------------------|
| Life Threatening Emergency | Hillcrest Medical Center | 40.5 | 61.6 | 86.2 | 113.8 | 4,043 |
| | Hillcrest South Hospital | 36.7 | 56.1 | 84.6 | 110.4 | 437 |
| | OSU Medical Center | 34.5 | 52.0 | 78.7 | 103.7 | 1,812 |
| | St. Francis Hospital | 46.2 | 70.7 | 93.3 | 121.9 | 6,439 |
| | St. Francis Hospital South | 33.9 | 52.4 | 84.3 | 106.8 | 279 |
| | St. John Medical Center | 41.7 | 64.3 | 88.5 | 115.9 | 5,487 |
| | Priority 1 Total | | 42.0 | 65.5 | 88.6 | 116.7 |
| Non-Life Threatening Emergency | Hillcrest Medical Center | 36.9 | 56.1 | 85.3 | 113.6 | 7,920 |
| | Hillcrest South Hospital | 32.9 | 49.6 | 84.3 | 110.8 | 958 |
| | OSU Medical Center | 31.5 | 47.8 | 77.0 | 102.5 | 4,274 |
| | St. Francis Hospital | 42.5 | 65.3 | 94.5 | 124.0 | 11,399 |
| | St. Francis Hospital South | 32.7 | 52.1 | 85.6 | 114.1 | 737 |
| | St. John Medical Center | 37.2 | 56.2 | 88.4 | 116.0 | 9,784 |
| | Priority 2 Total | | 37.9 | 58.4 | 88.1 | 117.2 |
| | Total | 39.4 | 60.9 | 88.3 | 117.1 | 53,569 |

Deployment and Workload

EMSA units utilize a *system status management* process in the deployment of resources. Ambulance units are assigned to geographic regions of the city and are re-assigned on the basis of the ongoing call activity and historical demand patterns. The number of EMSA units operated throughout the day varies on the basis of historical call volume and periodic surges in emergency and interfacility transfers. The number of units range from a low of 10 to 12 units citywide during the nonpeak periods of operation (usually between 11:00 p.m. and 7:00 a.m.), to the maximum number of units operational, typically 32 to 35, during the peak periods of operation (10:00 a.m. to 8:00 p.m.). During special events, festivals, sporting events, etc., additional units may be placed into service. Figure 2-2 is an hourly representation of the EMSA call activity.

FIGURE 2-2: Average Calls by Hour of Day



It is important to note that daily and hourly call volumes may experience spikes whenever there is a catastrophic event or multiple or significant incidents (transportation accidents, civil unrest, large fire involving mass evacuations, a weather event, flooding, etc.) occur. In the evaluation period observed it was not uncommon to see hourly peaks in which the call volume exceeded 25 calls and required the response of more than 40 units for a given period.

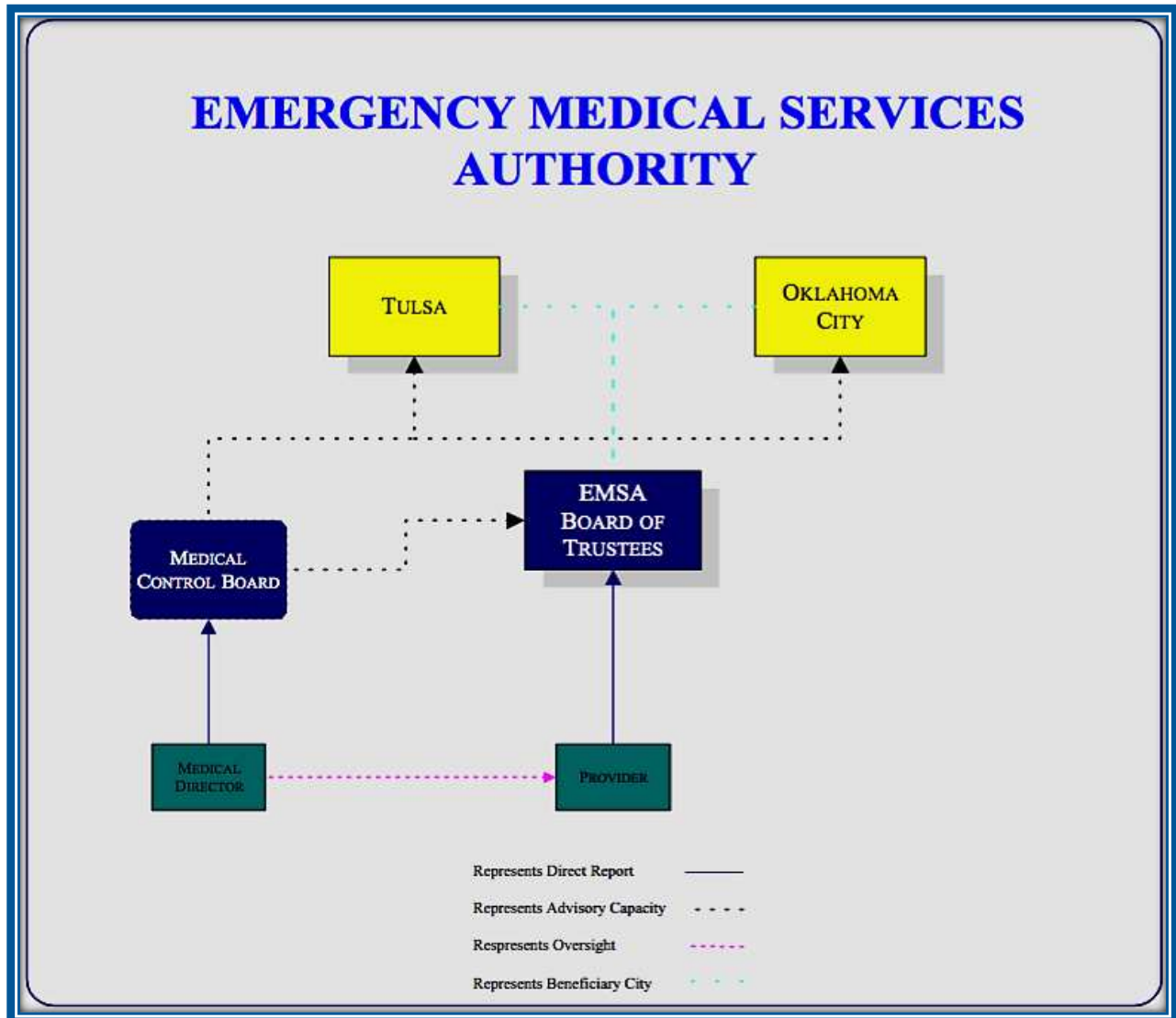
Section 3. Management and System Oversight

The service delivery model that is being utilized by EMSA in its joint service responsibility with the Tulsa Fire Department, Oklahoma City Fire Department, neighboring communities, and the associated public safety answering points, has gained national recognition as a high-performance, quality-driven service network. The key to EMSA's success is a comprehensive organizational structure that is orchestrated by a professional management team, dedicated Medical Control, progressive public safety responders, highly trained emergency 911 communicators, and a sophisticated financial and political review process.

Utilizing a single set of medical protocols, the EMSA system utilizes evidence-based medical analysis to monitor the delivery of prehospital emergency medical services. A main focus in the management of this system is the prioritization of calls at the dispatch level and a corresponding measured response by both fire and ambulance units. Medical Control has devised a series of assessments regarding the reported patient condition and provides guidance to responding units regarding the number of responding units and the mode of response (hot or cold). The key element in this delivery system is the comprehensive oversight of all the key players beginning at the 911 call taker and continuing to the delivery of the patient to a definitive treatment center. Throughout the process there is effective coordination and collaboration of the multiple service providers with ongoing oversight that ensures quality patient care and the comprehensive monitoring of patient outcomes. The system is built upon the constant review of outcomes that are matched against a quality assurance process that touches every aspect of the delivery system.

Aligned with this intricate field delivery network, there is a robust training and remediation effort that feeds off of the field observations and then incorporates ongoing research and advances in prehospital emergency medical care to ensure the highest level of proficiency. Figure 3-3 shows the organizational structure under which EMSA operate.

FIGURE 3-3: EMSA Organizational Structure



On the basis of our observations and the analysis of response activities, training, deployment, and patient outcomes, CPSM recommends that the city of Tulsa maintain its working relationship with EMSA in the delivery of prehospital emergency medical services.

Section 4. Recommendations

Though the EMSA model has proven extremely effective in terms of service efficiency and the quality of patient care, there are a number of areas that CPSM believes will assist the EMSA system to improve.

- **Community Integrated Health Care:** A number of communities have implemented programs aimed at assisting their citizens in obtaining needed health care and social services from resources apart from the emergency 911 system and hospital emergency departments. These programs have utilized a number of titles, including *Community Assistance Referral and Education Services, Community Paramedicine, Mobile Integrated Health Care, etc.* In each of these efforts, the overall objective is to move nonemergency users to the appropriate service provider through facilitated referrals, assisted processing and transportation when needed. The volume of nonemergency call activities that inundate the emergency response network is staggering. In some systems the nonemergency workload accounts for nearly 85 percent of the call activity. This does not mean that in the majority of cases some type of assistance is not truly needed, the type of assistance required does not necessitate emergency response and care in an emergency room setting. In the Tulsa/EMSA system, CPSM believes that an estimated 25,000 to 30,000 of the yearly Priority 1 and Priority 2 calls can be better managed through a Community Integrated Health Care program. This excessive nonemergency call activity is fueled in part by a large number of mental health issues, significant cases involving substance abuse, uninsured or underinsured patients, and generally an improper usage of the emergency network fueled by expedience. In some systems, the Community Integrated Health Care provider has developed a revenue stream by redirecting nonemergency cases away from emergency care centers and subsequently reducing readmissions.

Recommendation: EMSA should work with TFD and area partners in the development of a Community Integrated Health Care program for the Tulsa service area.

- **TFD Peak Period EMS First Response Units:** EMSA and TFD utilize a *two-tiered response system* that provides a joint response by both agencies on all Priority 1 calls and the majority of Priority 2 responses. This joint response process provides added back-up capacity during peak demand periods, additional staffing on those more labor intensive incidents, and the ability to enhance response times by having the closest available unit respond. On most incidents (nearly 79 percent of Priority 1 and Priority 2 calls) a TFD unit is first to arrive on scene to render assistance. The level of patient care provided by both agencies is seamless and the overall effectiveness of the delivery systems is a by-product of the excellent working relationship and strong collaboration. Most EMS responses carried out by TFD units are done by larger fire apparatus (engines and aerial ladders). The wear and tear on these larger apparatus is very costly and the high volume of EMS responses can serve to accelerate the replacement schedules of these costly apparatus. In addition, the high frequency of EMS responses increases the overall probability of these units being

unavailable when a fire emergency occurs. CPSM has recommended the addition of ten new EMS first response units to TFD's resources. The primary function of these units is to provide first responder duties for EMS calls in the Tulsa service area. It is the belief of CPSM that EMSA should off-set a portion of the cost associated with the purchase and operation of these units.

Recommendation: EMSA should provide a financial contribution toward the capital purchase, operation, and replacement of EMS first response units operated by the Tulsa Fire Department.

- **Implement a Dynamic Deployment Process for TFD's EMS First Response Units:** TFD typically deploys its apparatus from assigned fire stations and on very infrequent occasions are these apparatus redeployed to reflect peaks in call activities. EMSA, on the other hand, utilizes a system status management process in which units are deployed in a more fluid method utilizing a posting process that includes redeploying these units throughout the day to reflect call volume and the distribution of available units. Assuming the addition of TFD EMS first response units, it is recommended that the deployment of these units be more fluid and reflect both the ongoing call activities and the distribution of both EMSA ambulances and TFD call activities. EMSA dispatchers have the ability to recommend redeployments or move-ups of TFD EMS first response units that reflect real-time call activities. CPSM believes that this will improve system coverage and improve overall response times.

Recommendation: EMSA and TFD should evaluate the option of a more fluid deployment model that coordinates the distribution of TFD EMS first response units and EMSA ambulances on the basis of real-time call demand.

- **Expand the EMSA Dispatching Duties in the Tulsa 911 Communication Center** Currently, EMSA is responsible for the EMS dispatching duties for EMSA units. This function is carried out by AMR personnel and is a function of their contractual agreement with the City. 911 call taker duties along with TFD dispatching duties, are the responsibility of TPD and TFD personnel. The call taker responsibilities involve the answering of calls from the public to determine the nature of these calls. Once that determination is made the call taker will transfer the call to the appropriate dispatcher (police, fire, EMS). The call taker activities are not monitored and the Tulsa 911 Center is not recording the time it takes to complete these transfers. If an EMS call is received by the call taker, it is first transferred to the EMSA dispatch position who will then interrogate the caller as to severity of the call and will then assign EMSA units on the basis of the nature of the call. If the call requires a TFD response, the call is then transferred to the TFD dispatcher position and they assign a TFD unit for response. The multiple transfers involved in a routine EMS call leads to redundancy and added steps, resulting in processing delays. CPSM believes that there are opportunities to consolidate a number of the dispatching functions for EMS calls that could improve the overall call processing procedure.

Recommendation: EMSA should evaluate the option of expanding its responsibilities to include the 911 call taker and fire/EMS dispatching duties.

- **Reduce the Frequency of “hot” responses (using lights and sirens) by TFD Units to EMS Calls.** TFD is responding “hot” on nearly all EMS responses. Of the 35,600 EMS calls in the period evaluated, approximately 55 percent (approximately 19,600) were Priority 1 calls and 45 percent (approximately 16,000) were Priority 2 calls. CPSM believes that up to 40 percent of the total EMS calls (approximately 14,000 calls annually) can be downgraded to a “cold” response (no lights and sirens and following traffic patterns). Medical Control has identified the call types that would warrant a TFD cold response; however, TFD has chosen to respond hot on nearly all EMS responses. Emergency response units that are responding with lights and sirens are more susceptible to traffic accidents. Accidents involving fire vehicles responding to emergencies are the second highest cause for line-of-duty deaths for firefighters.¹ It is estimated that more than 30,000 fire apparatus are involved in accidents nationally when responding to emergencies each year.²

Recommendation: EMSA and Medical Control should work with TFD to reduce the number of TFD’s “hot” responses to EMS calls.

- **Reduce Patient Off-Loading Times at Area Hospitals:** In 2015, EMSA transported nearly 54,600 patients to area hospitals. On average, it took approximately 40 minutes to off-load each patient. This equates to more than 35,000 hours of off-loading time for all patients combined, or the equivalent of nearly 17 full-time personnel waiting for a year at Tulsa area hospitals for the sole purpose of off-loading patients. It is not uncommon to see off-loading time of two hours or more. In fact, there were more than 5,000 times in 2015 in which an EMSA unit was required to wait nearly two hours to off-load its patient. In our analysis we observed an individual case in which it took nearly five hours for an EMSA unit to off-load its patient. Ironically, there was little difference in the off-loading times of Priority 1 and Priority 2 patients (approximately seven minutes). Excessive delays in off-loading patients ripples through the entire emergency response network, causing delays in patient care. The ability to better manage this process is critically needed in the Tulsa system. This is a community problem that requires a directed effort and resolve.

Recommendation: EMSA should lead a community effort to develop a more expedient way for emergency responders to off-load patients at area hospitals.

- **Assessment of ALS vs. BLS First Response:** TFD provides its first response service at both the ALS (Advanced Life Support-Paramedic) and BLS (Basic Life Support-EMT) levels. The TFD supports 100 paramedics and these individuals are distributed through an internal fire department determination that considers call volume and those areas where EMSA

¹ “Analysis of Firetruck Crashes and Associated Firefighter Injuries in the U.S.” Association for the Advancement of Automotive Medicine. October 2012.

² Ibid.

response times are extended. A total of 16 of the city's 42 first response fire units are continually staffed and equipped to provide ALS. Many agencies struggle with the decision regarding the impacts of delivering EMS first response at the ALS or BLS levels. There have been a number studies that have attempted to evaluate these differences.³ TFD and EMSA Medical Control are in an ideal situation to evaluate these differences, given the ability to compare outcomes in a similar environment in which ALS and BLS first responders operate. The cost to maintain ALS delivery is significantly higher than the cost associated with BLS delivery.

Recommendation: EMSA Medical Control should evaluate the difference in patient care and patient outcomes between TFD ALS first responders compared to TFD BLS first responders.

³ See "EFFECTIVENESS OF FIRST RESPONSE PARAMEDICS" By Thomas M. Dunn, Ph.D., NREMT-B, I William W. Dunn, BA, NREMT-P,23 Michael Krowka, BS, NREMT-P I Benjamin Dengerink, BS, NREMT-P I and Micah Ownbey, BS, NREMT-P I University of Northern Colorado, Greeley; 2Denver Health Paramedic Division; 3Eagle County (CO) Ambulance District Corresponding Author: thomas.dunn@unco.edu. ALSO; "Fewer Paramedics Means More Lives Saved" by Robert Davis, USA Today, May 21, 2006.

Section 5. Data Analysis

Introduction

This data analysis is a key component of the study of the Tulsa Fire Department (TFD), which was conducted by the Center for Public Safety Management, LLC (CPSM). This analysis complements the data analysis of the TFD by examining all the calls for emergency medical services within Tulsa city limits to the Emergency Medical Services Authority (EMSA) between January 1, 2015, and December 31, 2015, as recorded in the EMSA computer-aided dispatch system.

This analysis contains six parts. The first part focuses on call types. The second part explores time spent on calls and workload. The third part presents analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of EMSA units. The fifth part analyzes transport activities. The sixth and final part compares response times of TFD and EMSA to calls to which both responded.

During the study period, EMSA responded to 88,812 calls. The total combined yearly workload (deployed time) for all EMSA units was 106,454 hours. The average dispatch time for the first arriving EMSA unit was 1.4 minutes, and the average response time of the first arriving EMSA unit was 10 minutes. The 90th percentile dispatch time was 3.2 minutes, and the 90th percentile response time was 16.4 minutes.

Methodology

Calls, runs, and transports are analyzed. A call is an emergency service request or incident. A run is a dispatch of a unit. A transport is a run in which one or more people were also transported to a hospital. Thus, a call might include multiple runs and transports.

We received CAD data for the Emergency Medical Services Authority (EMSA) as well as CAD data for the Tulsa Fire Department. We assigned calls to standard call types based on their problem descriptions. We also matched the EMSA and TFD CAD data to identify calls where both responded.

Our definition of a cancelled call differs from EMSA's internal definition. EMSA classifies all nontransport calls as cancelled calls. We identified cancelled calls based on the National Fire Incident Reporting System's (NFIRS) call type definitions. A call was considered cancelled if: no EMSA unit arrived on scene; a unit arrived but no patient was found or the patient left prior to an EMSA unit arriving; or patient care or transport was handled by another agency.

EMSA groups calls into four priority levels:

- Priority 1: Life Threatening Emergency
- Priority 2: Non-Life Threatening Emergency
- Priority 3: Unscheduled Interfacility Transfer
- Priority 4: Scheduled Interfacility Transfer

We include priority 3 and 4 calls in all analyses except the response time and transport analyses.

Aggregate Call Totals

In this report, each citizen-initiated emergency service request is considered a call, as are requests initiated by other public safety agencies (e.g., police or fire) or health-care providers (e.g., hospitals and nursing homes). During the year studied, EMSA responded to 88,812 calls. Of these, 23,179 were Priority 1 calls and 56,146 were Priority 2 calls within Tulsa. Each dispatched unit is a separate "run." As multiple units may be dispatched to a call, there are more runs than calls. EMSA's total runs and workload are reported in the second part of this analysis.

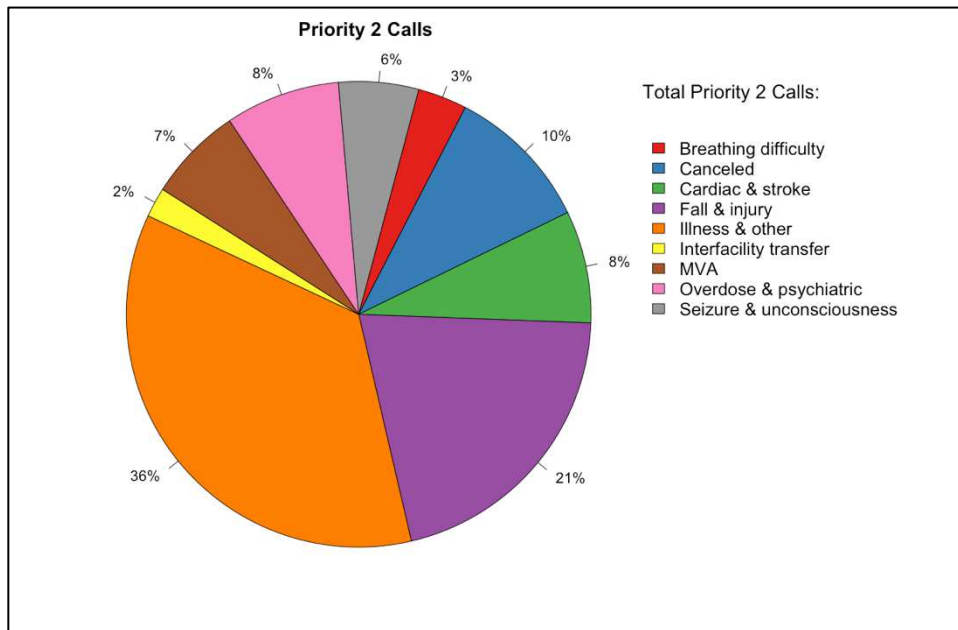
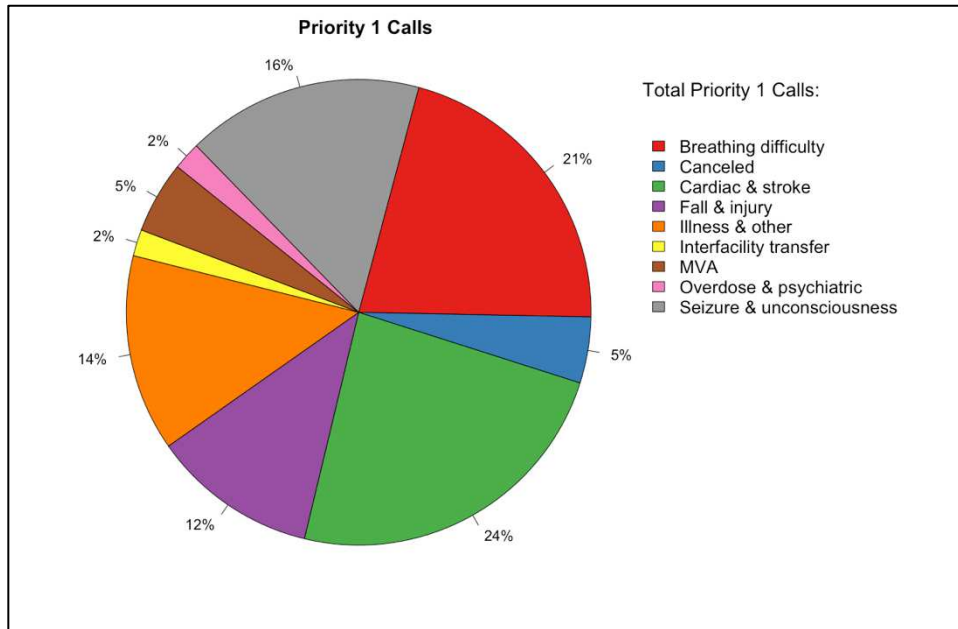
Calls by Type

Table 5-1 and Figure 5-1 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each priority level.

TABLE 5-1: Call Types

| Priority | Call Type | Number of Calls | Calls per Day | Call Percentage |
|--------------------------------------|-------------------------------|-----------------|---------------|-----------------|
| Life Threatening Emergency | Breathing difficulty | 5,017 | 13.7 | 5.6 |
| | Cancelled | 1,090 | 3.0 | 1.2 |
| | Cardiac and stroke | 5,654 | 15.5 | 6.4 |
| | Fall and injury | 2,730 | 7.5 | 3.1 |
| | Illness and other | 3,240 | 8.9 | 3.6 |
| | Interfacility transfer | 434 | 1.2 | 0.5 |
| | MVA | 1,187 | 3.3 | 1.3 |
| | Overdose and psychiatric | 458 | 1.3 | 0.5 |
| | Seizure and unconsciousness | 3,909 | 10.7 | 4.4 |
| | Priority 1 Total | 23,719 | 65.0 | 26.7 |
| Non-Life Threatening Emergency | Breathing difficulty | 1,922 | 5.3 | 2.2 |
| | Cancelled | 5,731 | 15.7 | 6.5 |
| | Cardiac and stroke | 4,378 | 12.0 | 4.9 |
| | Fall and injury | 11,656 | 31.9 | 13.1 |
| | Illness and other | 19,987 | 54.8 | 22.5 |
| | Interfacility transfer | 1,157 | 3.2 | 1.3 |
| | MVA | 3,712 | 10.2 | 4.2 |
| | Overdose and psychiatric | 4,480 | 12.3 | 5.0 |
| | Seizure and unconsciousness | 3,123 | 8.6 | 3.5 |
| | Priority 2 Total | 56,146 | 153.8 | 63.2 |
| Unscheduled & Scheduled Transfers | Cancelled | 232 | 0.6 | 0.3 |
| | Nonemergency transfer | 8,715 | 23.9 | 9.8 |
| | Priority 3 and 4 Total | 8,947 | 24.5 | 10.1 |
| Total | | 88,812 | 243.3 | 100.0 |

FIGURE 5-2: Priority 1 and Priority 2 Calls by Type



Observations:

Overall

- The authority received an average of 243.3 calls per day.
- Priority 1 calls for the year totaled 23,719 (27 percent of all calls), an average of 65 per day.
- Priority 2 calls for the year totaled 56,146 (63 percent of all calls), an average of 154 per day.
- Priority 3 and 4 calls for the year totaled 8,947 (10 percent of all calls), an average of 25 per day.
- Overall, 8 percent of calls were cancelled.

Priority 1 – Life Threatening Emergency

- Cardiac and stroke calls were the largest category of Priority 1 calls at 24 percent.
- Breathing difficulty calls made up 21 percent of the Priority 1 calls.
- Motor vehicle accident calls made up 5 percent of the Priority 1 calls.

Priority 2 – Non-Life Threatening Emergency

- Illness and other calls were the largest category of Priority 2 calls at 36 percent.
- Fall and injury calls made up 21 percent of Priority 2 calls.
- Cardiac and stroke calls made up 8 percent of Priority 2 calls.
- Motor vehicle accidents made up 7 percent of Priority 2 calls.

Calls by Type and Duration

Table 5-2 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than two hours.

TABLE 5-2: Calls by Type and Duration

| Priority | Call Type | Less than One-half Hour | One-half Hour to One Hour | One to Two Hours | More than Two Hours | Total |
|-----------------------------------|-----------------------------|-------------------------------|---------------------------|------------------|---------------------|---------------|
| Life Threatening Emergency | Breathing difficulty | 96 | 695 | 3,905 | 321 | 5,017 |
| | Cancelled | 1,018 | 68 | 4 | 0 | 1,090 |
| | Cardiac and stroke | 100 | 750 | 4,414 | 390 | 5,654 |
| | Fall and injury | 218 | 408 | 1,928 | 176 | 2,730 |
| | Illness and other | 455 | 495 | 2,099 | 191 | 3,240 |
| | Interfacility transfer | 0 | 28 | 363 | 43 | 434 |
| | MVA | 169 | 216 | 681 | 121 | 1,187 |
| | Overdose and psychiatric | 37 | 73 | 313 | 35 | 458 |
| | Seizure and unconsciousness | 183 | 584 | 2,857 | 285 | 3,909 |
| | | Priority 1 Total | 2,276 | 3,317 | 16,564 | 1,562 |
| Non-Life Threatening Emergency | Breathing difficulty | 90 | 303 | 1,426 | 103 | 1,922 |
| | Cancelled | 5,197 | 497 | 36 | 1 | 5,731 |
| | Cardiac and stroke | 117 | 576 | 3,418 | 267 | 4,378 |
| | Fall and injury | 1,255 | 2,831 | 6,814 | 756 | 11,656 |
| | Illness and other | 1,809 | 3,563 | 13,459 | 1,156 | 19,987 |
| | Interfacility transfer | 4 | 99 | 975 | 79 | 1,157 |
| | MVA | 899 | 1,121 | 1,495 | 197 | 3,712 |
| | Overdose and psychiatric | 1,042 | 1,133 | 2,054 | 251 | 4,480 |
| | Seizure and unconsciousness | 100 | 581 | 2,237 | 205 | 3,123 |
| | | Priority 2 Total | 10,513 | 10,704 | 31,914 | 3,015 |
| Unscheduled & Scheduled Transfers | Cancelled | 121 | 76 | 29 | 6 | 232 |
| | Nonemergency transfer | 146 | 2,267 | 5,247 | 1,055 | 8,715 |
| | | Priority 3 and 4 Total | 267 | 2,343 | 5,276 | 1,061 |
| Total | | 13,056 | 16,364 | 53,754 | 5,638 | 88,812 |

Observations:

Priority 1 – Life Threatening Emergency

- A total of 5,593 Priority 1 calls (24 percent) lasted less than one hour, 16,564 Priority 1 calls (70 percent) lasted between one and two hours, and 1,562 Priority 1 calls (7 percent) lasted more than two hours.
- On average, there were 49.7 Priority 1 calls per day which lasted more than one hour.
- A total of 850 Priority 1 cardiac and stroke calls (15 percent of this type of call) lasted less than one hour, and 4,804 Priority 1 cardiac and stroke calls (85 percent of this type of call) lasted more than an hour.
- A total of 385 Priority 1 motor vehicle accidents (32 percent of this type of call) lasted less than one hour, and 802 Priority 1 motor vehicle accidents (68 percent of this type of call) lasted more than an hour.

Priority 2 – Non-Life Threatening Emergency

- A total of 21,217 Priority 2 calls (38 percent) lasted less than one hour, 31,914 Priority 2 calls (57 percent) lasted between one and two hours, and 3,015 Priority 2 calls (5 percent) lasted more than two hours.
- On average, there were 95.7 Priority 2 calls per day which lasted more than one hour.
- A total of 693 Priority 2 cardiac and stroke calls (16 percent of this type of call) lasted less than one hour, and 3,685 Priority 2 cardiac and stroke calls (84 percent of this type of call) lasted more than an hour.
- A total of 2,020 Priority 2 motor vehicle accidents (54 percent of this type of call) lasted less than one hour, and 1,692 Priority 2 motor vehicle accidents (46 percent of this type of call) lasted more than an hour.

Priority 3 and 4 – Scheduled and Unscheduled Transfers

- A total of 2,413 Priority 3 and 4 nonemergency transfers (28 percent) lasted less than one hour, and 6,302 Priority 2 and 3 nonemergency transfers (72 percent) lasted more than an hour.

Average Calls per Day and per Hour

Figure 5-2 shows the monthly variation in the average daily number of calls handled by EMSA during the year studied. Similarly, Figure 3 illustrates the average number of calls received during each hour of the day.

FIGURE 5-3: Average Calls per Day, by Month

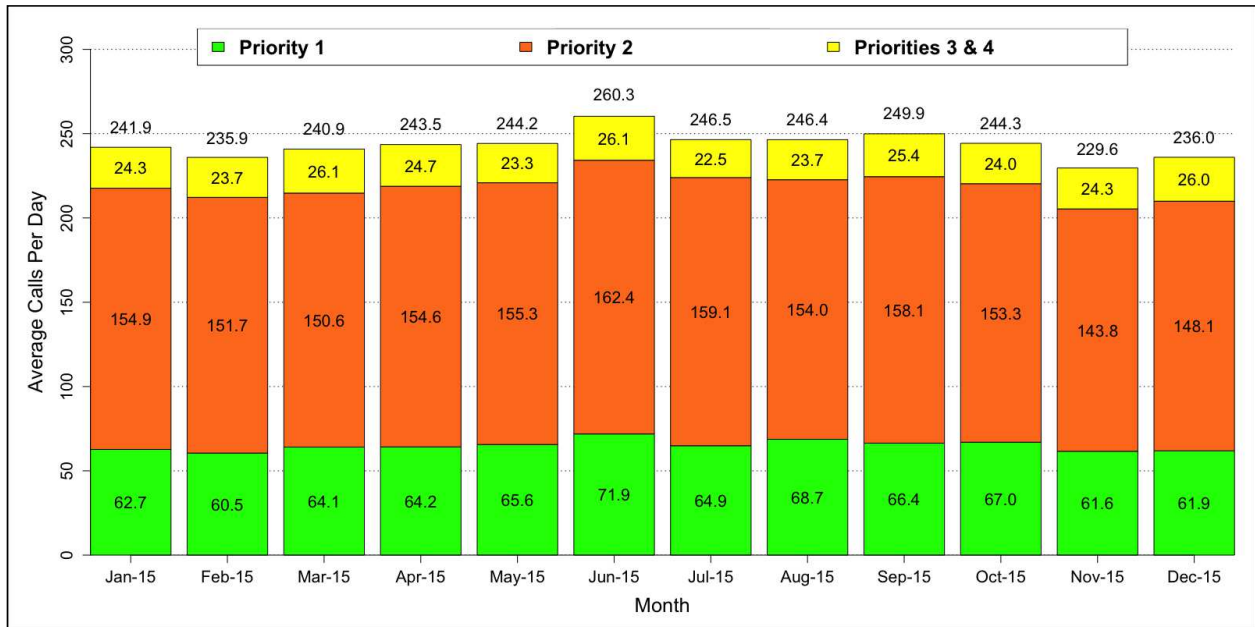
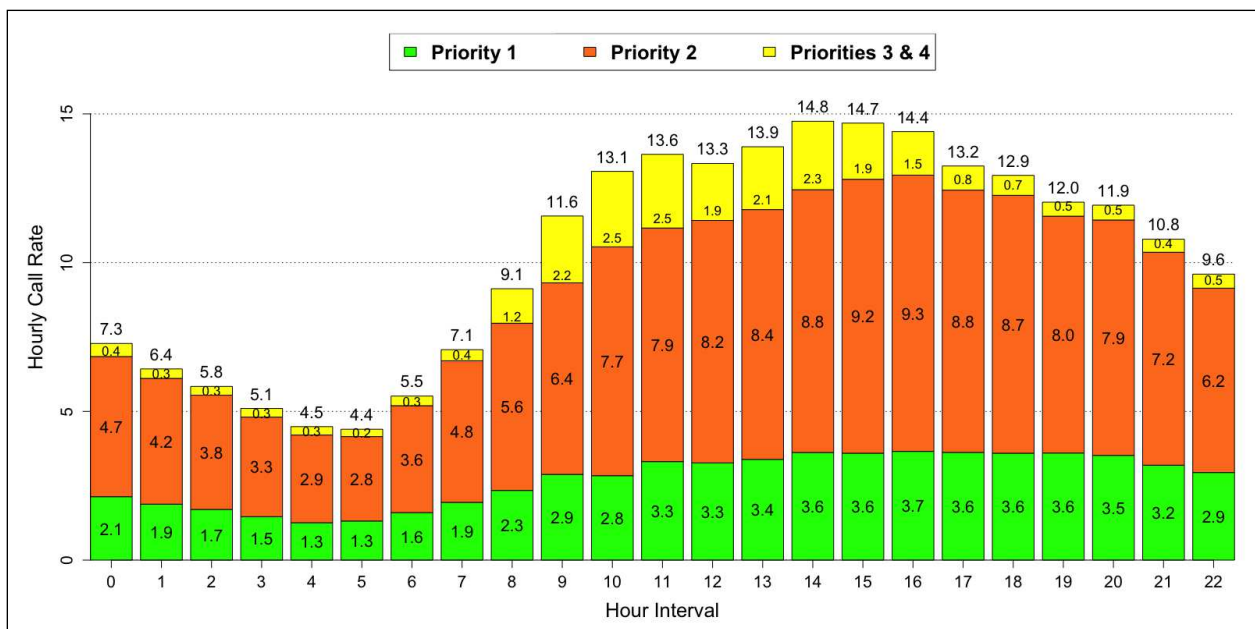


FIGURE 5-4: Average Calls by Hour of Day



Observations:

Average Calls per Day

- Average calls per day ranged from a low of 229.6 calls per day in November 2015 to a high of 260.3 calls per day in June 2015. The highest monthly average was 13 percent greater than the lowest monthly average.
- Average Priority 1 calls per day ranged from a low of 60.5 calls per day in February 2015 to a high of 71.9 calls per day in June 2015.
- Average Priority 2 calls per day ranged from a low of 143.8 calls per day in November 2015 to a high of 162.4 calls per day in June 2015.
- Average Priority 3 and 4 calls per day ranged from a low of 22.5 calls per day in July 2015 to a high of 26.1 calls per day in March 2015 and June 2015.
- The highest number of calls received in a single day was 320, which occurred on June 5, 2015, and the second highest total calls in a day was 304, which occurred on September 4, 2015.
- June 5, 2015, was also the day the Tulsa Fire Department received the highest number of calls in a day in the year. On October 20, 2015, TFD received the second-highest total calls in a day (which was also the day with the sixth-highest total calls in a day for EMSA with 289 calls received).

Average Calls per Hour

- Average hourly calls rates ranged from 4.4 to 14.8 calls per hour.
- Call rates were highest between 2:00 p.m. and 4:00 p.m., averaging 14.7 calls per hour.
 - Priority 1 call rates were highest between 2:00 p.m. and 8:00 p.m., with an average of 3.6 calls per hour.
 - Priority 2 call rates were highest between 3:00 p.m. and 5:00 p.m., with an average of 9.2 calls per hour.
 - Priority 3 and 4 call rates were highest between 10:00 a.m. and noon, with an average of 2.5 calls per hour.
- Overall call rates were lowest between 4:00 a.m. and 6:00 a.m., with an average of 4.4 calls per hour.

Workload—Calls and Total Time Spent

Workload is reported in two ways: deployed time and runs. A dispatch of a unit is defined as a run; thus, if a unit is dispatched and then cancelled when a unit that is closer to the incident becomes available and is dispatched, this would be counted as two runs. The deployed time of a run is from the time a unit is dispatched through the time a unit is cleared.

Runs and Deployed Time – All Units

Deployed time, also referred to as deployed hours, is the total deployment time of all the units deployed on all calls. Table 5-3 shows the total deployed time, both overall and broken down by type of call, for EMSA units during the year studied.

TABLE 5-3: Annual Runs and Deployed Time by Call Type

| Priority | Call Type | Avg. Deployed Min. per Run | Total Annual Hours | Percent of Total Hours | Avg. Deployed Hours per Day | Total Annual Runs | Avg. Runs per Day |
|-----------------------------------|-----------------------------|-------------------------------|--------------------|------------------------|-----------------------------|-------------------|-------------------|
| Life Threatening Emergency | Breathing difficulty | 69.5 | 6,922.2 | 6.5 | 19.0 | 5,973 | 16.4 |
| | Cancelled | 10.7 | 235.0 | 0.2 | 0.6 | 1,315 | 3.6 |
| | Cardiac and stroke | 70.2 | 7,887.0 | 7.4 | 21.6 | 6,739 | 18.5 |
| | Fall and injury | 65.8 | 3,624.4 | 3.4 | 9.9 | 3,307 | 9.1 |
| | Illness and other | 60.7 | 3,944.5 | 3.7 | 10.8 | 3,900 | 10.7 |
| | Interfacility transfer | 85.5 | 669.5 | 0.6 | 1.8 | 470 | 1.3 |
| | MVA | 61.9 | 1,663.4 | 1.6 | 4.6 | 1,613 | 4.4 |
| | Overdose and psychiatric | 65.7 | 618.5 | 0.6 | 1.7 | 565 | 1.5 |
| | Seizure and unconsciousness | 68.0 | 5,323.3 | 5.0 | 14.6 | 4,696 | 12.9 |
| | Priority 1 Total | 64.8 | 30,887.7 | 29.0 | 84.6 | 28,578 | 78.3 |
| Non-Life Threatening Emergency | Breathing difficulty | 66.9 | 2,558.4 | 2.4 | 7.0 | 2,293 | 6.3 |
| | Cancelled | 12.0 | 1,385.3 | 1.3 | 3.8 | 6,900 | 18.9 |
| | Cardiac and stroke | 70.5 | 6,052.9 | 5.7 | 16.6 | 5,148 | 14.1 |
| | Fall and injury | 61.8 | 14,163.6 | 13.3 | 38.8 | 13,751 | 37.7 |
| | Illness and other | 64.3 | 25,247.6 | 23.7 | 69.2 | 23,563 | 64.6 |
| | Interfacility transfer | 76.7 | 1,682.2 | 1.6 | 4.6 | 1,316 | 3.6 |
| | MVA | 51.4 | 3,913.5 | 3.7 | 10.7 | 4,564 | 12.5 |
| | Overdose and psychiatric | 52.5 | 4,681.5 | 4.4 | 12.8 | 5,352 | 14.7 |
| | Seizure and unconsciousness | 67.7 | 4,180.6 | 3.9 | 11.5 | 3,703 | 10.1 |
| | Priority 2 Total | 57.5 | 63,865.7 | 60.0 | 175.0 | 66,590 | 182.4 |
| Unscheduled & Scheduled Transfers | Cancelled | 30.4 | 125.5 | 0.1 | 0.3 | 248 | 0.7 |
| | Nonemergency transfer | 69.6 | 11,575.4 | 10.9 | 31.7 | 9,984 | 27.4 |
| | | Priority 3 and 4 Total | 68.6 | 11,700.9 | 11.0 | 32.1 | 10,232 |
| | Total | 60.6 | 106,454.4 | 100.0 | 291.7 | 105,400 | 288.8 |

Observations:

- Total deployed time for the year was 106,454 hours. The daily average was 291.7 hours for all units combined.
- There were 105,400 runs, including 10,232 runs dispatched for scheduled and unscheduled transfers. The daily average was 289 runs.
- Priority 1 calls accounted for 29 percent of the total workload. The average deployed time for Priority 1 calls was 65 minutes. The deployed hours for all units dispatched to Priority 1 calls averaged 85 hours per day.
- Priority 2 calls accounted for 60.0 percent of the total workload. The average deployed time for Priority 2 calls was 58 minutes. The deployed hours for all units dispatched to Priority 2 calls averaged 175 hours per day.
- Priority 3 and 4 calls accounted for 11 percent of the total workload with an average 69 minutes per call and an average of 32 hours of deployed time per day.

FIGURE 5-5: Average Deployed Time by Hour of Day

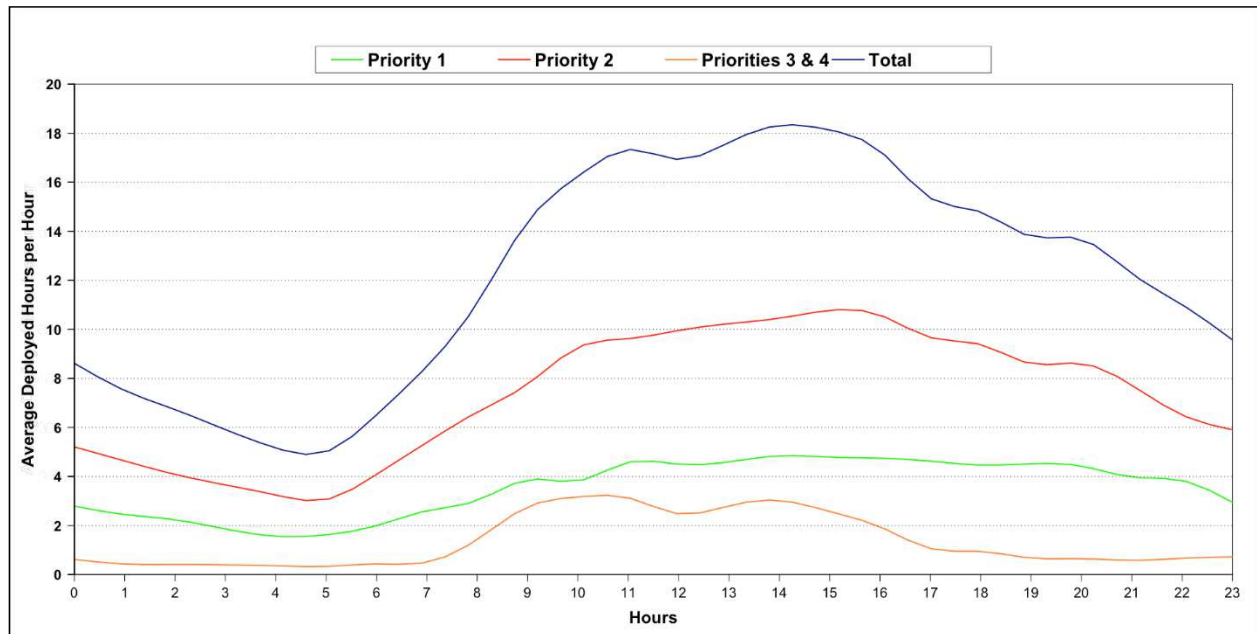


TABLE 5-4: Average Deployed Time by Hour of Day

| Hour | Life Threatening Emergency | Non-Life Threatening Emergency | Unscheduled & Scheduled Transfers | Total |
|------|-------------------------------|-----------------------------------|--------------------------------------|-------|
| 0 | 2.8 | 5.2 | 0.6 | 8.6 |
| 1 | 2.4 | 4.6 | 0.4 | 7.5 |
| 2 | 2.2 | 4.1 | 0.4 | 6.7 |
| 3 | 1.9 | 3.7 | 0.4 | 5.9 |
| 4 | 1.6 | 3.2 | 0.4 | 5.2 |
| 5 | 1.6 | 3.1 | 0.3 | 5.0 |
| 6 | 2.0 | 4.1 | 0.4 | 6.5 |
| 7 | 2.6 | 5.4 | 0.5 | 8.5 |
| 8 | 3.0 | 6.6 | 1.4 | 11.1 |
| 9 | 3.9 | 7.8 | 2.8 | 14.4 |
| 10 | 3.8 | 9.3 | 3.2 | 16.2 |
| 11 | 4.6 | 9.6 | 3.1 | 17.3 |
| 12 | 4.5 | 10.0 | 2.5 | 16.9 |
| 13 | 4.6 | 10.2 | 2.8 | 17.6 |
| 14 | 4.8 | 10.5 | 3.0 | 18.3 |
| 15 | 4.8 | 10.8 | 2.6 | 18.1 |
| 16 | 4.7 | 10.6 | 1.9 | 17.3 |
| 17 | 4.6 | 9.7 | 1.1 | 15.3 |
| 18 | 4.5 | 9.4 | 0.9 | 14.8 |
| 19 | 4.5 | 8.6 | 0.7 | 13.8 |
| 20 | 4.4 | 8.6 | 0.6 | 13.7 |
| 21 | 4.0 | 7.7 | 0.6 | 12.3 |
| 22 | 3.8 | 6.5 | 0.7 | 11.0 |
| 23 | 2.9 | 5.9 | 0.7 | 9.6 |

Observations:

- Hourly deployed time was highest during the day between 11:00 a.m. and 5:00 p.m., averaging between 16.9 hours and 18.3 hours.
- Average deployed time peaked between 2:00 p.m. and 4:00 p.m., with an average of about 18.2 hours.
- Hourly deployed time was the lowest between 4:00 a.m. and 6:00 a.m., with an average of about 5.1 hours.

Workload by Response Area and Priority

Table 5-5 provides a summary of workload by response area and call priority level. Tables 5-6 and 5-7 provide a breakdown of runs and average deployed time per day by call type and priority level within each response area.

TABLE 5-5: Call Workload by Response Area and Priority

| Response Area | Priority | Avg. Deployed Min. per Run | Total Annual Hours | Avg. Deployed Hours per Day | Total Annual Runs | Avg. Runs per Day |
|---------------|------------------|----------------------------|--------------------|-----------------------------|-------------------|-------------------|
| Tulsa 1 | Priority 1 | 61.6 | 9,972.2 | 27.3 | 9,717 | 26.6 |
| | Priority 2 | 54.3 | 20,556.7 | 56.3 | 22,702 | 62.2 |
| | Priority 3 and 4 | 69.9 | 6,156.6 | 16.9 | 5,285 | 14.5 |
| | Total | 58.4 | 36,685.5 | 100.5 | 37,704 | 103.3 |
| Tulsa 2 | Priority 1 | 65.6 | 9,098.1 | 24.9 | 8,318 | 22.8 |
| | Priority 2 | 57.8 | 17,427.5 | 47.7 | 18,100 | 49.6 |
| | Priority 3 and 4 | 82.6 | 180.3 | 0.5 | 131 | 0.4 |
| | Total | 60.4 | 26,705.8 | 73.2 | 26,549 | 72.7 |
| Tulsa 3 | Priority 1 | 67.3 | 11,817.4 | 32.4 | 10,543 | 28.9 |
| | Priority 2 | 60.2 | 25,881.6 | 70.9 | 25,788 | 70.7 |
| | Priority 3 and 4 | 66.8 | 5,364.0 | 14.7 | 4,816 | 13.2 |
| | Total | 62.8 | 43,063.0 | 118.0 | 41,147 | 112.7 |
| Total | | 60.6 | 106,454.4 | 291.7 | 105,400 | 288.8 |

TABLE 5-6: Total Annual Runs by Call Type by Response Area and Priority

| Response Area | Priority | Breathing Difficulty | Cardiac/Stroke | Fall/Injury | Illness/Other | Inter-facility Transfer | MVA | Overdose/Psychiatric | Seizure/Unconsciousness | Cancelled | Total | Avg. Runs per Day |
|---------------|----------------|----------------------|----------------|---------------|---------------|-------------------------|--------------|----------------------|-------------------------|--------------|----------------|-------------------|
| Tulsa 1 | Priority 1 | 2,021 | 2,218 | 1,094 | 1,413 | 121 | 547 | 195 | 1,600 | 508 | 9,717 | 26.6 |
| | Priority 2 | 762 | 1,793 | 4,223 | 8,680 | 355 | 1,235 | 1,972 | 1,267 | 2,415 | 22,702 | 62.2 |
| | Priority 3 & 4 | 0 | 0 | 0 | 0 | 5,151 | 0 | 0 | 0 | 134 | 5,285 | 14.5 |
| | Total | 2,783 | 4,011 | 5,317 | 10,093 | 5,627 | 1,782 | 2,167 | 2,867 | 3,057 | 37,704 | 103.3 |
| Tulsa 2 | Priority 1 | 1,726 | 2,061 | 1,033 | 1,114 | 0 | 454 | 172 | 1,382 | 376 | 8,318 | 22.8 |
| | Priority 2 | 656 | 1,333 | 3,904 | 6,507 | 3 | 1,172 | 1,624 | 1,018 | 1,883 | 18,100 | 49.6 |
| | Priority 3 & 4 | 0 | 0 | 0 | 0 | 127 | 0 | 0 | 0 | 4 | 131 | 0.4 |
| | Total | 2,382 | 3,394 | 4,937 | 7,621 | 130 | 1,626 | 1,796 | 2,400 | 2,263 | 26,549 | 72.7 |
| Tulsa 3 | Priority 1 | 2,226 | 2,460 | 1,180 | 1,373 | 349 | 612 | 198 | 1,714 | 431 | 10,543 | 28.9 |
| | Priority 2 | 875 | 2,022 | 5,624 | 8,376 | 958 | 2,157 | 1,756 | 1,418 | 2,602 | 25,788 | 70.7 |
| | Priority 3 & 4 | 0 | 0 | 0 | 0 | 4,706 | 0 | 0 | 0 | 110 | 4,816 | 13.2 |
| | Total | 3,101 | 4,482 | 6,804 | 9,749 | 6,013 | 2,769 | 1,954 | 3,132 | 3,143 | 41,147 | 112.7 |
| | Total | 8,266 | 11,887 | 17,058 | 27,463 | 11,770 | 6,177 | 5,917 | 8,399 | 8,463 | 105,400 | 288.8 |

Note: Priority 3 and Priority 4 nonemergency transfers are shown in this table under interfacility transfers.

TABLE 5-7: Daily Average Deployed Time by Call Type by Response Area and Priority

| Response Area | Priority | Breathing Difficulty | Cardiac/Stroke | Fall/Injury | Illness/Other | Inter-facility Transfer | MVA | Overdose/Psychiatric | Seizure/Unconsciousness | Cancelled | Total |
|---------------|----------------|----------------------|----------------|-------------|---------------|-------------------------|-------------|----------------------|-------------------------|------------|--------------|
| Tulsa 1 | Priority 1 | 6.2 | 6.9 | 3.1 | 3.6 | 0.5 | 1.5 | 0.6 | 4.8 | 0.2 | 27.3 |
| | Priority 2 | 2.3 | 5.5 | 11.0 | 23.8 | 1.3 | 2.9 | 4.5 | 3.7 | 1.3 | 56.3 |
| | Priority 3 & 4 | 0.0 | 0.0 | 0.0 | 0.0 | 16.7 | 0.0 | 0.0 | 0.0 | 0.2 | 16.9 |
| | Total | 8.5 | 12.4 | 14.2 | 27.4 | 18.4 | 4.4 | 5.1 | 8.5 | 1.8 | 100.5 |
| Tulsa 2 | Priority 1 | 5.6 | 6.7 | 3.1 | 3.2 | 0.0 | 1.3 | 0.5 | 4.3 | 0.2 | 24.9 |
| | Priority 2 | 1.9 | 4.3 | 11.0 | 19.4 | 0.0 | 2.8 | 4.0 | 3.3 | 1.0 | 47.7 |
| | Priority 3 & 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 |
| | Total | 7.5 | 11.0 | 14.1 | 22.5 | 0.5 | 4.1 | 4.5 | 7.6 | 1.2 | 73.2 |
| Tulsa 3 | Priority 1 | 7.2 | 8.0 | 3.7 | 4.0 | 1.4 | 1.7 | 0.6 | 5.5 | 0.2 | 32.4 |
| | Priority 2 | 2.8 | 6.8 | 16.8 | 26.0 | 3.3 | 5.0 | 4.3 | 4.5 | 1.5 | 70.9 |
| | Priority 3 & 4 | 0.0 | 0.0 | 0.0 | 0.0 | 14.5 | 0.0 | 0.0 | 0.0 | 0.2 | 14.7 |
| | Total | 10.0 | 14.8 | 20.5 | 30.1 | 19.2 | 6.8 | 4.9 | 9.9 | 1.8 | 118.0 |
| | Total | 26.0 | 38.2 | 48.7 | 80.0 | 38.2 | 15.3 | 14.5 | 26.0 | 4.8 | 291.7 |

Note: Priority 3 and Priority 4 nonemergency transfers are shown in this table under interfacility transfers.

Observations:

- Response area Tulsa 3 was the busiest area, with 41,147 runs and 43,063 hours of deployed time for the year. Priority 1 calls accounted for 26 percent of these runs and 27 percent of the deployed time.
- Response area Tulsa 2 was the least busy area, with 26,549 runs and 26,706 hours of deployed time for the year. Priority 1 calls accounted for 31 percent of these runs and 34 percent of the total deployed time.

Analysis of Busiest Hours

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. CPSM tabulated the data for each of the 8,760 hours in the year.

Table 5-8 shows the number of hours in the year where there were from zero to 20 or more calls during the hour. Table 5-9 shows the ten one-hour intervals during the year with the most calls.

TABLE 5-8: Frequency Distribution of the Number of Calls

| Calls in an Hour | Frequency | Percentage |
|------------------|-----------|------------|
| 0 | 15 | 0.17 |
| 1 | 74 | 0.84 |
| 2 | 194 | 2.21 |
| 3 | 359 | 4.10 |
| 4 | 502 | 5.73 |
| 5 | 530 | 6.05 |
| 6 | 616 | 7.03 |
| 7 | 615 | 7.02 |
| 8 | 631 | 7.20 |
| 9 | 633 | 7.23 |
| 10 | 660 | 7.53 |
| 11 | 618 | 7.05 |
| 12 | 553 | 6.31 |
| 13 | 510 | 5.82 |
| 14 | 461 | 5.26 |
| 15 | 398 | 4.54 |
| 16 | 339 | 3.87 |
| 17 | 285 | 3.25 |
| 18 | 254 | 2.90 |
| 19 | 172 | 1.96 |
| 20+ | 341 | 3.89 |

TABLE 5-9: Top Ten Hours with the Most Calls Received

| Hour | Number of Calls | Number of Runs | Total Deployed Hours |
|--------------------------------|-----------------|----------------|----------------------|
| 6/5/2015 – 5 p.m. to 6 p.m. | 28 | 44 | 33.1 |
| 3/11/2015 – 11 a.m. to noon | 28 | 32 | 35.3 |
| 5/5/2015 – 6 p.m. to 7 p.m. | 28 | 28 | 31.2 |
| 5/5/2015 – 5 p.m. to 6 p.m. | 28 | 27 | 21.6 |
| 3/13/2015 – 3 p.m. to 4 p.m. | 27 | 37 | 40.4 |
| 11/5/2015 – 3 p.m. to 4 p.m. | 27 | 33 | 35.4 |
| 7/20/2015 – 10 a.m. to 11 a.m. | 27 | 32 | 25.3 |
| 7/9/2015 – 10 a.m. to 11 a.m. | 26 | 35 | 29.3 |
| 12/4/2015 – Noon to 1 p.m. | 26 | 31 | 36.1 |
| 1/15/2015 – 2 p.m. to 3 p.m. | 26 | 30 | 35.0 |

Note: The total deployed hours is the total time spent responding to calls received in a given hour. These calls may extend into the next hours. The number of runs only includes dispatches of EMSA units.

Observations:

- The highest number of calls to occur in an hour was 28, which happened four times.
- The hour with the most calls and most runs was 5:00 p.m. to 6:00 p.m. on June 5, 2015. The 28 calls involved 44 individual dispatches resulting in 33.1 hours of deployed time. There were nine Priority 1 calls, eighteen Priority 2 calls, and one Priority 3 call. Combined there were four cancelled calls.
- The hour with the most calls and most deployed time was 11:00 a.m. to noon on March 11, 2015. The 28 calls involved 32 dispatches resulting in 35.3 hours of deployed time. There were seven Priority 1 calls, thirteen Priority 2 calls, and eight Priority 3 calls. There were no cancelled calls.
- May 5, 2015, from 5:00 p.m. to 7:00 p.m. also saw 28 calls received during each of the two hours. The 56 calls involved 55 dispatches resulting in 52.8 hours of deployed time. In these two hours there were fourteen Priority 1 calls, twenty-four Priority 2 calls, and eighteen Priority 3 calls. Combined there were nine cancelled calls.

Response Time

Here we present response time statistics for different call types and priority levels.

Different terms are used to describe the components of response time. Dispatch time is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch. Turnout time is the difference between dispatch time and the time a unit is en route. Travel time is the difference between the time en route and arrival on scene. Response time is the total time elapsed between receiving a call to arriving on scene.

Here, we focus on Priority 1 and Priority 2 calls. Our analysis includes those units that had complete time stamps, that is, units with all response time components recorded so as to be able to calculate each segment of response time. The main focus is the response time of the first arriving, non-administrative unit. As a result, in this section, a total of 62,660 calls are included in the analysis.

This analysis is not intended to be an assessment of EMSA contractual response times. While the measurement of response times is the same, there are significant differences in which calls are included in the analyses. One key difference is that EMSA contractual response time compliance is based on transport calls only, while we have included nontransport calls as well. In addition, EMSA contractual response time requirements include exceptions for weather and periods of unusually high call volume, and there is special handling of calls with a change in call priority.

Response Times by Priority and Type of Call

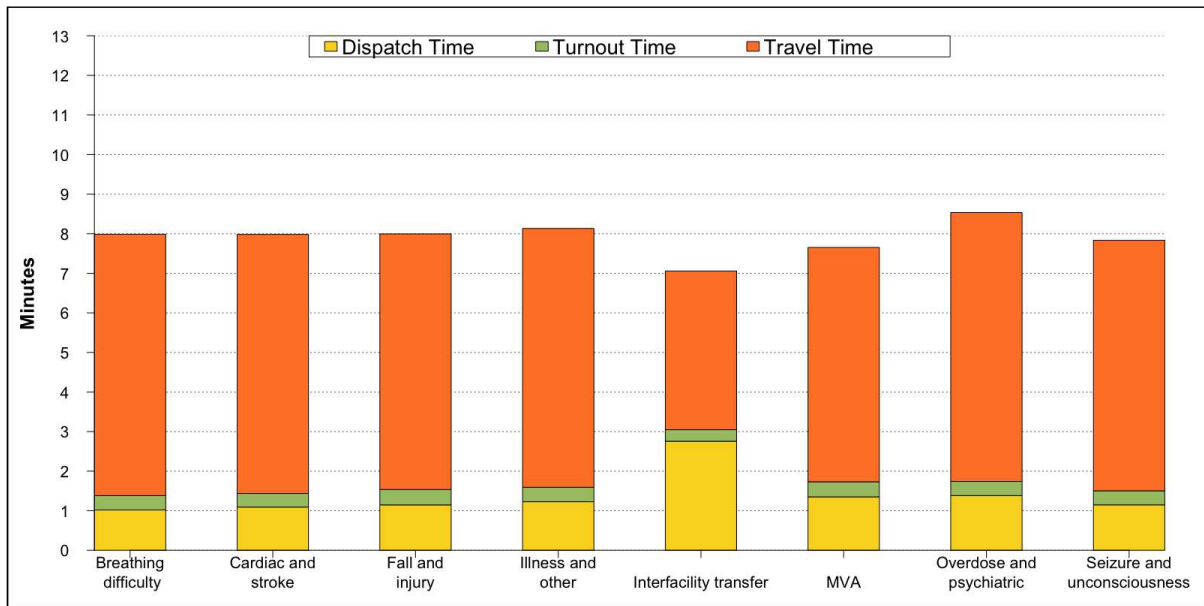
Table 5-10 provides average dispatch, turnout, travel, and total response times for the first arriving units, broken out by call type. Figures 5-5 and 5-6 illustrate the same information. Table 5-11 provides the 90th percentile time broken out in the same manner. A 90th percentile time means that 90 percent of calls had dispatch, turnout, travel, or total response times at or below that number.

TABLE 5-10: Average Response Times of First Arriving Unit, by Priority and Call Type (Minutes)

| Priority | Call Type | Dispatch Time | Turnout Time | Travel Time | Response Time | Sample Size |
|--------------------------------|-----------------------------|---------------|--------------|-------------|---------------|---------------|
| Life Threatening Emergency | Breathing difficulty | 1.0 | 0.4 | 6.6 | 8.0 | 4,255 |
| | Cardiac and stroke | 1.1 | 0.3 | 6.5 | 8.0 | 4,838 |
| | Fall and injury | 1.1 | 0.4 | 6.5 | 8.0 | 2,355 |
| | Illness and other | 1.2 | 0.4 | 6.5 | 8.1 | 2,778 |
| | Interfacility transfer | 2.8 | 0.3 | 4.0 | 7.1 | 374 |
| | MVA | 1.4 | 0.4 | 5.9 | 7.7 | 1,014 |
| | Overdose and psychiatric | 1.4 | 0.4 | 6.8 | 8.5 | 387 |
| | Seizure and unconsciousness | 1.1 | 0.4 | 6.3 | 7.8 | 3,327 |
| | Priority 1 Total | 1.2 | 0.4 | 6.4 | 8.0 | 19,328 |
| Non-Life Threatening Emergency | Breathing difficulty | 1.5 | 0.4 | 9.1 | 11.0 | 1,654 |
| | Cardiac and stroke | 1.3 | 0.4 | 8.9 | 10.6 | 3,719 |
| | Fall and injury | 1.4 | 0.4 | 9.2 | 11.1 | 10,054 |
| | Illness and other | 1.4 | 0.4 | 9.2 | 11.0 | 17,124 |
| | Interfacility transfer | 3.4 | 0.5 | 6.8 | 10.6 | 1,014 |
| | MVA | 1.5 | 0.4 | 8.3 | 10.1 | 3,199 |
| | Overdose and psychiatric | 1.5 | 0.5 | 8.6 | 10.5 | 3,874 |
| | Seizure and unconsciousness | 1.4 | 0.4 | 9.1 | 10.8 | 2,694 |
| | Priority 2 Total | 1.5 | 0.4 | 9.0 | 10.9 | 43,332 |
| Total | 1.4 | 0.4 | 8.2 | 10.0 | 62,660 | |

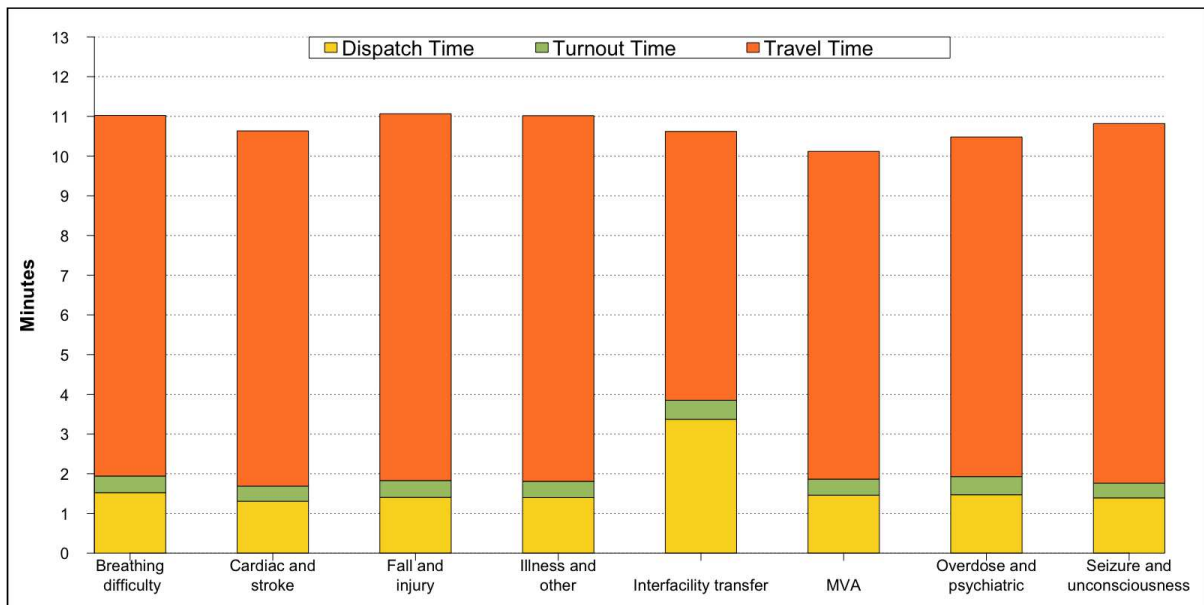
Note: Dispatch time is for the first arriving unit. Another unit may have been dispatched first but reassigned to a higher priority call or cancelled when another, closer, unit became available and was dispatched. Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

FIGURE 5-6: Average Response Times, Priority 1 Calls by First Arriving Unit and Call Type



Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

FIGURE 5-7: Average Response Times, Priority 2 Calls by First Arriving Unit by Call Type



Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

TABLE 5-11: 90th Percentile Response Times of First Arriving Unit, by Priority and Call Type (Minutes)

| Priority | Call Type | Dispatch Time | Turnout Time | Travel Time | Response Time | Sample Size |
|--------------------------------|-----------------------------|---------------|--------------|-------------|---------------|---------------|
| Life Threatening Emergency | Breathing difficulty | 2.3 | 0.8 | 10.5 | 12.0 | 4,255 |
| | Cardiac and stroke | 2.5 | 0.7 | 10.4 | 12.1 | 4,838 |
| | Fall and injury | 2.7 | 0.8 | 10.4 | 12.1 | 2,355 |
| | Illness and other | 2.7 | 0.9 | 10.6 | 12.6 | 2,778 |
| | Interfacility transfer | 4.2 | 0.6 | 8.6 | 11.0 | 374 |
| | MVA | 2.9 | 0.9 | 10.4 | 12.4 | 1,014 |
| | Overdose and psychiatric | 3.5 | 1.0 | 10.8 | 13.3 | 387 |
| | Seizure and unconsciousness | 2.7 | 0.8 | 10.1 | 11.8 | 3,327 |
| | Priority 1 Total | 2.7 | 0.8 | 10.4 | 12.2 | 19,328 |
| Non-Life Threatening Emergency | Breathing difficulty | 4.3 | 0.9 | 14.8 | 18.5 | 1,654 |
| | Cardiac and stroke | 3.1 | 0.8 | 14.6 | 17.5 | 3,719 |
| | Fall and injury | 3.7 | 0.9 | 15.1 | 18.0 | 10,054 |
| | Illness and other | 3.5 | 0.9 | 15.0 | 17.8 | 17,124 |
| | Interfacility transfer | 5.3 | 1.2 | 14.6 | 19.6 | 1,014 |
| | MVA | 3.8 | 0.9 | 14.2 | 16.9 | 3,199 |
| | Overdose and psychiatric | 3.8 | 1.0 | 14.5 | 17.3 | 3,874 |
| | Seizure and unconsciousness | 3.6 | 0.8 | 14.7 | 17.6 | 2,694 |
| | Priority 2 Total | 3.7 | 0.9 | 14.8 | 17.8 | 43,332 |
| Total | 3.2 | 0.9 | 13.9 | 16.4 | 62,660 | |

Note: Dispatch time is for the first arriving unit. Another unit may have been dispatched first but reassigned to a higher priority call or cancelled when another, closer unit became available and was dispatched. Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

Observations:

- The average dispatch time was 1.4 minutes.
- The average turnout time was 0.4 minutes.
- The average travel time was 8.2 minutes.
- The average response time was 8.0 minutes for Priority 1 calls and 10.9 minutes for Priority 2 calls.
- The 90th percentile dispatch time was 3.2 minutes.
- The 90th percentile turnout time was 0.9 minutes.
- The 90th percentile travel time was 13.9 minutes.
- The 90th percentile response time was 12.2 minutes for Priority 1 calls and 17.8 minutes for Priority 2 calls.

Response Times by Priority and Response Area

Unlike the Tulsa Fire Department, EMSA does not have stations; thus, ambulances do not have first-due areas. Rather, EMSA uses system status management to strategically place ambulances around the city based on past trends and numerous other factors. EMSA does, however, divide the city into three areas. Table 5-12 shows 90th percentile response times by first arriving unit by response area and call priority.

TABLE 5-12: 90th Percentile Response Times of First Arriving Unit, by Area and Call Priority (Minutes)

| Response Area | Priority | Dispatch Time | Turnout Time | Travel Time | Response Time | Sample Size |
|---------------|--------------|---------------|--------------|-------------|---------------|---------------|
| Tulsa 1 | Priority 1 | 2.7 | 0.9 | 10.2 | 12.0 | 6,537 |
| | Priority 2 | 3.8 | 0.9 | 14.1 | 16.9 | 14,810 |
| | Total | 3.3 | 0.9 | 13.1 | 15.7 | 21,347 |
| Tulsa 2 | Priority 1 | 2.5 | 0.8 | 10.6 | 12.3 | 5,630 |
| | Priority 2 | 3.2 | 0.9 | 14.6 | 17.4 | 11,890 |
| | Total | 2.8 | 0.9 | 13.6 | 16.0 | 17,520 |
| Tulsa 3 | Priority 1 | 2.8 | 0.8 | 10.4 | 12.1 | 7,161 |
| | Priority 2 | 4.1 | 0.9 | 15.6 | 18.7 | 16,632 |
| | Total | 3.5 | 0.9 | 14.6 | 17.3 | 23,793 |
| Total | | 3.2 | 0.9 | 13.9 | 16.4 | 62,660 |

Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

Observations:

- 90th percentile response times for Priority 1 calls are similar for all response areas, ranging from 12 minutes to 12.3 minutes (12 minutes and 18 seconds).
- 90th percentile response times for Priority 2 calls vary across areas by nearly two minutes from 16.9 minutes in Tulsa 1 to 18.7 minutes in Tulsa 3. The difference is primarily due to travel time which varies from 14.1 minutes in Tulsa 1 to 15.6 minutes in Tulsa 3.

Response Times by Hour

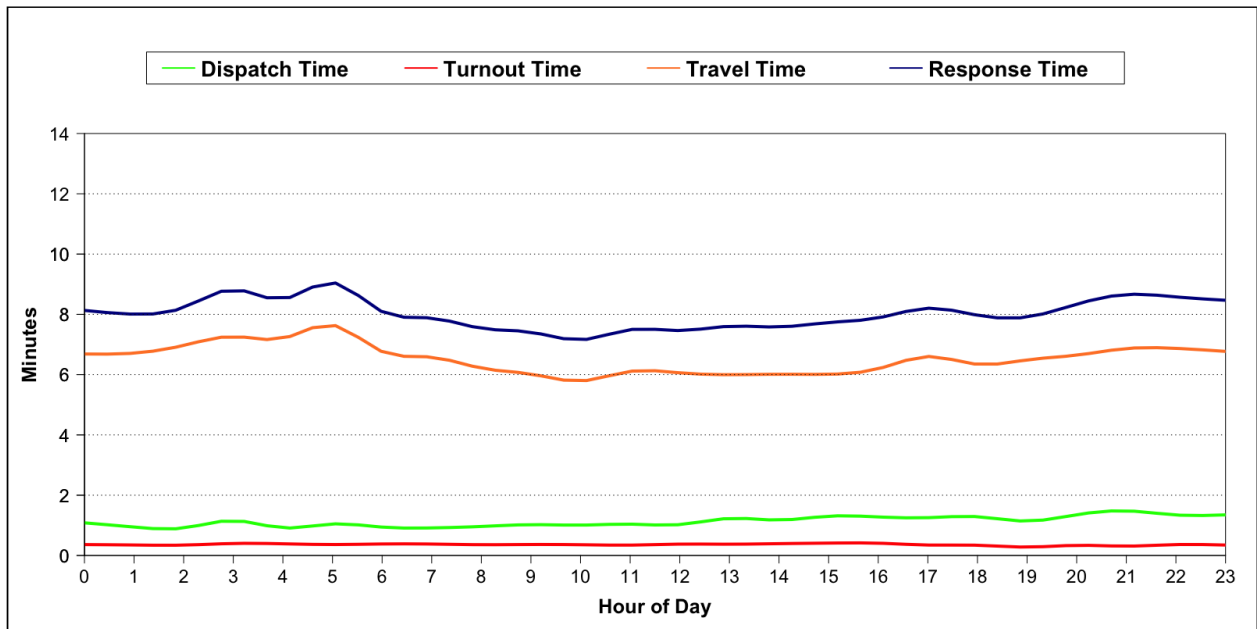
Average dispatch, turnout, travel, and total response times by hour are shown in Table 5-13 and Figure 5-7 for Priority 1 calls and in Table 5-14 and Figure 5-8 for Priority 2 calls. The tables also show 90th percentile total response times.

TABLE 5-13: Average and 90th Percentile Response Times of First Arriving Unit, by Hour of Day, Priority 1 Calls

| Hour | Dispatch Time | Turnout Time | Travel Time | Response Time | 90th Percentile Response Time | Sample Size |
|------|---------------|--------------|-------------|---------------|-------------------------------|-------------|
| 0 | 1.1 | 0.4 | 6.7 | 8.1 | 12.5 | 655 |
| 1 | 0.9 | 0.3 | 6.7 | 8.0 | 12.0 | 564 |
| 2 | 0.9 | 0.3 | 7.0 | 8.2 | 12.0 | 483 |
| 3 | 1.2 | 0.4 | 7.3 | 8.8 | 13.1 | 422 |
| 4 | 0.9 | 0.4 | 7.2 | 8.5 | 12.6 | 379 |
| 5 | 1.0 | 0.4 | 7.6 | 9.1 | 13.3 | 391 |
| 6 | 0.9 | 0.4 | 6.8 | 8.1 | 12.4 | 498 |
| 7 | 0.9 | 0.4 | 6.6 | 7.9 | 11.5 | 579 |
| 8 | 1.0 | 0.4 | 6.2 | 7.5 | 11.2 | 690 |
| 9 | 1.0 | 0.4 | 6.0 | 7.4 | 11.0 | 850 |
| 10 | 1.0 | 0.4 | 5.8 | 7.2 | 10.9 | 853 |
| 11 | 1.0 | 0.3 | 6.1 | 7.5 | 11.3 | 992 |
| 12 | 1.0 | 0.4 | 6.1 | 7.5 | 10.9 | 1,010 |
| 13 | 1.2 | 0.4 | 6.0 | 7.6 | 11.5 | 1,003 |
| 14 | 1.2 | 0.4 | 6.0 | 7.6 | 11.6 | 1,064 |
| 15 | 1.3 | 0.4 | 6.0 | 7.7 | 11.7 | 1,033 |
| 16 | 1.3 | 0.4 | 6.2 | 7.9 | 12.3 | 1,076 |
| 17 | 1.3 | 0.3 | 6.6 | 8.2 | 12.6 | 1,060 |
| 18 | 1.3 | 0.3 | 6.3 | 8.0 | 12.1 | 1,044 |
| 19 | 1.1 | 0.3 | 6.5 | 7.9 | 12.1 | 1,109 |
| 20 | 1.4 | 0.3 | 6.6 | 8.3 | 13.0 | 1,068 |
| 21 | 1.5 | 0.3 | 6.9 | 8.7 | 13.1 | 947 |
| 22 | 1.3 | 0.4 | 6.9 | 8.6 | 12.8 | 871 |
| 23 | 1.3 | 0.3 | 6.8 | 8.5 | 13.2 | 687 |

Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

FIGURE 5-8: Average Response Time of First Arriving Unit, by Hour of Day, Priority 1 Calls



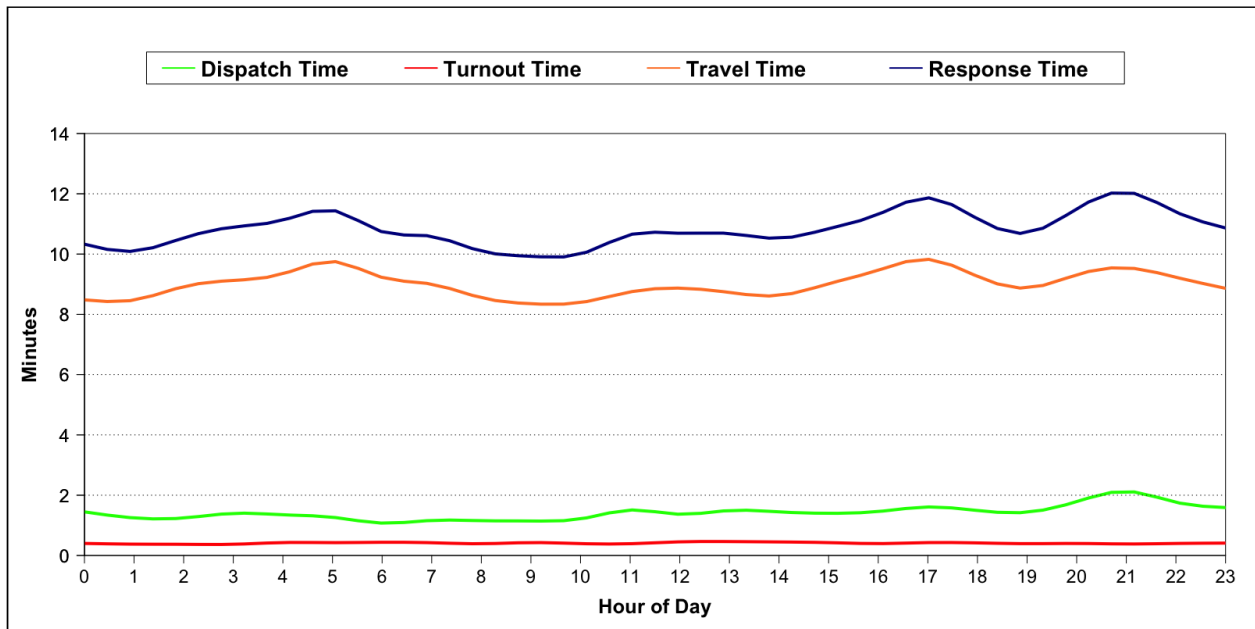
Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

TABLE 5-14: Average and 90th Percentile Response Times of First Arriving Unit, by Hour of Day, Priority 2 Calls

| Hour | Dispatch Time | Turnout Time | Travel Time | Response Time | 90th Percentile Response Time | Sample Size |
|------|---------------|--------------|-------------|---------------|-------------------------------|-------------|
| 0 | 1.4 | 0.4 | 8.5 | 10.3 | 16.9 | 1,373 |
| 1 | 1.2 | 0.4 | 8.5 | 10.1 | 15.8 | 1,220 |
| 2 | 1.2 | 0.4 | 8.9 | 10.5 | 16.7 | 1,065 |
| 3 | 1.4 | 0.4 | 9.1 | 10.9 | 18.1 | 907 |
| 4 | 1.4 | 0.4 | 9.3 | 11.1 | 17.6 | 854 |
| 5 | 1.3 | 0.4 | 9.8 | 11.5 | 18.0 | 822 |
| 6 | 1.1 | 0.4 | 9.2 | 10.7 | 17.1 | 1,076 |
| 7 | 1.2 | 0.4 | 9.0 | 10.6 | 16.6 | 1,349 |
| 8 | 1.2 | 0.4 | 8.6 | 10.1 | 16.0 | 1,603 |
| 9 | 1.1 | 0.4 | 8.4 | 9.9 | 16.0 | 1,790 |
| 10 | 1.2 | 0.4 | 8.4 | 10.0 | 16.6 | 2,228 |
| 11 | 1.5 | 0.4 | 8.7 | 10.6 | 17.6 | 2,258 |
| 12 | 1.4 | 0.5 | 8.9 | 10.7 | 17.2 | 2,358 |
| 13 | 1.5 | 0.5 | 8.7 | 10.7 | 17.3 | 2,341 |
| 14 | 1.4 | 0.4 | 8.6 | 10.5 | 17.1 | 2,414 |
| 15 | 1.4 | 0.4 | 9.0 | 10.8 | 18.0 | 2,509 |
| 16 | 1.5 | 0.4 | 9.5 | 11.3 | 18.7 | 2,557 |
| 17 | 1.6 | 0.4 | 9.8 | 11.9 | 19.8 | 2,360 |
| 18 | 1.5 | 0.4 | 9.3 | 11.2 | 18.3 | 2,405 |
| 19 | 1.4 | 0.4 | 8.9 | 10.7 | 17.6 | 2,359 |
| 20 | 1.8 | 0.4 | 9.3 | 11.5 | 18.8 | 2,249 |
| 21 | 2.1 | 0.4 | 9.5 | 12.1 | 19.8 | 2,013 |
| 22 | 1.8 | 0.4 | 9.2 | 11.4 | 18.9 | 1,759 |
| 23 | 1.6 | 0.4 | 8.9 | 10.9 | 17.1 | 1,463 |

Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

FIGURE 5-9: Average Response Time of First Arriving Unit by Hour of Day, Priority 2 Calls



Note: Dispatch time does not include dispatch call-taking time, only EMSA call processing time.

Observations:

Priority 1 – Life Threatening Emergency

- Average Priority 1 dispatch time was between 0.9 minute (1:00 a.m. to 3:00 a.m.; 4:00 a.m. to 5:00 a.m.; and 6:00 a.m. to 8:00 a.m.) and 1.5 minutes (9:00 p.m. to 10:00 p.m.).
- Average Priority 1 turnout time was between 0.3 minute and 0.4 minute.
- Average Priority 1 travel time was between 5.8 minutes (10:00 a.m. to 11:00 a.m.) and 7.6 minutes (5:00 a.m. to 6:00 a.m.).
- Average Priority 1 response time was between 7.2 minutes (10:00 a.m. to 11:00 a.m.) and 9.1 minutes (5:00 a.m. to 6:00 a.m.).

Priority 2 – Non-Life Threatening Emergency

- Average Priority 2 dispatch time was between 1.1 minutes (6:00 a.m. to 7:00 a.m. and 9:00 a.m. to 10:00 a.m.) and 2.1 minutes (9:00 p.m. to 10:00 p.m.).
- Average Priority 2 turnout time was between 0.4 minute (22 hours of the day) and 0.5 minute (Noon to 1:00 p.m.).
- Average Priority 2 travel time was between 8.4 minutes (9:00 a.m. to 11:00 a.m.) and 9.8 minutes (5:00 a.m. to 6:00 a.m. and 5:00 p.m. to 6:00 p.m.).
- Average Priority 2 response time was between 9.9 minutes (9:00 a.m. to 10:00 a.m.) and 12.1 minutes (9:00 p.m. to 10:00 p.m.).

Emergency Transports

Here, we analyze the number of calls that involved transporting patients, the variations by hour of day, duration by call type and priority, and offload times at the six hospitals that most commonly receive transports. We identified transport calls by requiring that at least one EMSA responding ambulance had recorded a “beginning to transport” time.

Number of Transports

Table 5-15 shows the number of Priority 1 and Priority 2 calls by type, separated by whether or not the call resulted in at least one transport. Calls may have resulted in multiple transports but are counted here once.

TABLE 5-15: Number of Transports by Call Type and Priority

| Priority | Call Type | Number of Calls | | | |
|--------------------------------------|---------------------------------|-----------------|---------------|---------------|----------------|
| | | Nontransport | Transport | Total | Transport Rate |
| Life Threatening Emergency | Breathing difficulty | 621 | 4,396 | 5,017 | 87.6 |
| | Cancelled | 1,090 | 0 | 1,090 | 0.0 |
| | Cardiac and stroke | 737 | 4,917 | 5,654 | 87.0 |
| | Fall and injury | 529 | 2,201 | 2,730 | 80.6 |
| | Illness and other | 914 | 2,326 | 3,240 | 71.8 |
| | Interfacility transfer | 0 | 434 | 434 | 100.0 |
| | MVA | 411 | 776 | 1,187 | 65.4 |
| | Overdose and psychiatric | 108 | 350 | 458 | 76.4 |
| | Seizure and unconsciousness | 807 | 3,102 | 3,909 | 79.4 |
| | Priority 1 Total | 5,217 | 18,502 | 23,719 | 78.0 |
| | Priority 1 Daily Average | 14.3 | 50.7 | 65.0 | — |
| Non-Life Threatening Emergency | Breathing difficulty | 383 | 1,539 | 1,922 | 80.1 |
| | Cancelled | 5,731 | 0 | 5,731 | 0.0 |
| | Cardiac and stroke | 623 | 3,755 | 4,378 | 85.8 |
| | Fall and injury | 4,464 | 7,192 | 11,656 | 61.7 |
| | Illness and other | 4,508 | 15,479 | 19,987 | 77.5 |
| | Interfacility transfer | 0 | 1,157 | 1,157 | 100.0 |
| | MVA | 2,192 | 1,520 | 3,712 | 41.0 |
| | Overdose and psychiatric | 2,136 | 2,344 | 4,480 | 52.3 |
| | Seizure and unconsciousness | 742 | 2,381 | 3,123 | 76.2 |
| | Priority 2 Total | 20,779 | 35,367 | 56,146 | 63.0 |
| | Priority 2 Daily Average | 56.9 | 96.9 | 153.8 | — |
| Total | 25,996 | 53,869 | 79,865 | 67.5 | |
| Daily Average | 71.2 | 147.6 | 218.8 | — | |

Observations:

Overall

- Overall, 74 percent of Priority 1 and Priority 2 calls to which EMSA responded involved transporting patients.
- On average, EMSA responded to 219 Priority 1 and Priority 2 calls per day, and 148 involved transporting patients.

Priority 1 – Life Threatening Emergency

- Priority 1 calls resulted in a transport 82 percent of the time.
- On average, EMSA responded to 65 Priority 1 calls per day, and 51 involved transporting patients.
- Priority 1 calls had an overall transport rate of 78 percent.
- Excluding interfacility transfers, Priority 1 breathing difficulty calls had the highest transport rate at an average of 88 percent. Cardiac and stroke calls had the second highest transport rate for Priority 1 calls at an average of 87 percent.

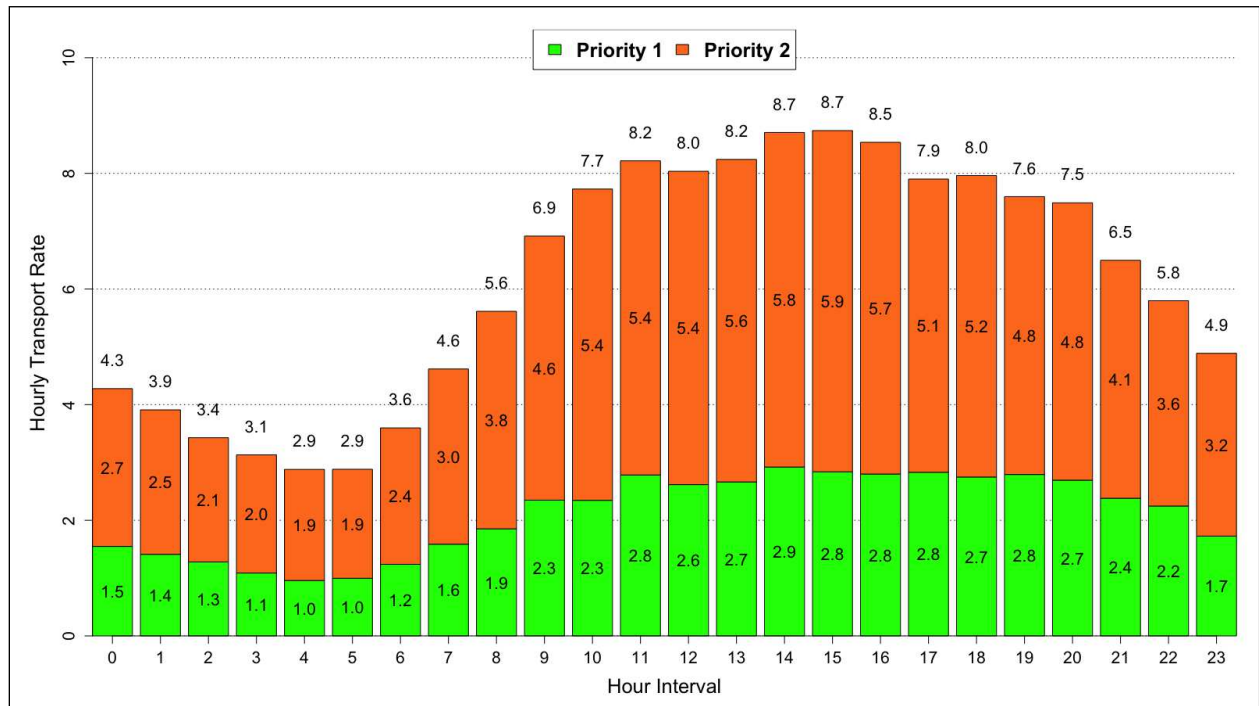
Priority 2 – Non-Life Threatening Emergency

- Priority 2 calls resulted in a transport 70 percent of the time.
- On average, EMSA responded to 154 Priority 2 calls per day, and 97 involved transporting patients.
- Priority 2 calls had an overall transport rate of 63 percent.
- Excluding interfacility transfers, Priority 2 cardiac and stroke calls had the highest transport rate at an average of 86 percent. Breathing difficulty calls had the second highest transport rate for Priority 2 calls at an average of 80 percent.

TABLE 5-16: Average Number of Calls with Transports, by Hour of Day

| Hour | Priority 1 Hourly Transport Calls | Priority 2 Hourly Transport Calls | Total Hourly Transport Calls |
|-------------|--|--|---|
| 0 | 1.5 | 2.7 | 4.3 |
| 1 | 1.4 | 2.5 | 3.9 |
| 2 | 1.3 | 2.1 | 3.4 |
| 3 | 1.1 | 2.0 | 3.1 |
| 4 | 1.0 | 1.9 | 2.9 |
| 5 | 1.0 | 1.9 | 2.9 |
| 6 | 1.2 | 2.4 | 3.6 |
| 7 | 1.6 | 3.0 | 4.6 |
| 8 | 1.9 | 3.8 | 5.6 |
| 9 | 2.3 | 4.6 | 6.9 |
| 10 | 2.3 | 5.4 | 7.7 |
| 11 | 2.8 | 5.4 | 8.2 |
| 12 | 2.6 | 5.4 | 8.0 |
| 13 | 2.7 | 5.6 | 8.2 |
| 14 | 2.9 | 5.8 | 8.7 |
| 15 | 2.8 | 5.9 | 8.7 |
| 16 | 2.8 | 5.7 | 8.5 |
| 17 | 2.8 | 5.1 | 7.9 |
| 18 | 2.7 | 5.2 | 8.0 |
| 19 | 2.8 | 4.8 | 7.6 |
| 20 | 2.7 | 4.8 | 7.5 |
| 21 | 2.4 | 4.1 | 6.5 |
| 22 | 2.2 | 3.6 | 5.8 |
| 23 | 1.7 | 3.2 | 4.9 |

FIGURE 5-10: Number of Transports, by Hour of Day



Observations:

- Average hourly transport calls ranged from 2.9 to 8.7 transport calls per hour.
- Transport calls were highest between 2:00 p.m. and 4:00 p.m., averaging 8.7 calls per hour.
 - Priority 1 transport calls were highest between 11:00 a.m. and 9:00 p.m., averaging 2.6 to 2.8 transport calls per hour.
 - Priority 2 transport calls were highest between 2:00 p.m. and 4:00 p.m., averaging 5.8 to 5.9 calls per hour.
- Transport calls were lowest between 4:00 a.m. and 6:00 a.m., averaging 2.9 transport calls per hour.

Transport Call Duration

Table 5-17 shows the average duration of calls with a transport compared to calls without a transport, broken out by call priority and call type.

TABLE 5-17: Transport Call Duration, by Call Type and Priority

| Priority | Call Type | Average Duration | | |
|--------------------------------------|-----------------------------|------------------|-------------|-------------|
| | | Nontransport | Transport | Total |
| Life Threatening Emergency | Breathing difficulty | 49.8 | 87.4 | 82.7 |
| | Cancelled | 12.9 | NA | 12.9 |
| | Cardiac and stroke | 54.0 | 88.1 | 83.7 |
| | Fall and injury | 37.7 | 88.1 | 78.3 |
| | Illness and other | 36.3 | 87.1 | 72.7 |
| | Interfacility transfer | NA | 92.3 | 92.3 |
| | MVA | 39.3 | 95.2 | 75.8 |
| | Overdose and psychiatric | 40.5 | 91.4 | 79.4 |
| | Seizure and unconsciousness | 48.2 | 90.2 | 81.5 |
| | Priority 1 Total | 37.8 | 88.6 | 77.4 |
| Non-Life Threatening Emergency | Breathing difficulty | 48.4 | 87.6 | 79.8 |
| | Cancelled | 14.6 | NA | 14.6 |
| | Cardiac and stroke | 48.7 | 88.5 | 82.8 |
| | Fall and injury | 44.4 | 90.3 | 72.7 |
| | Illness and other | 39.9 | 86.1 | 75.7 |
| | Interfacility transfer | NA | 87.1 | 87.1 |
| | MVA | 37.5 | 93.3 | 60.3 |
| | Overdose and psychiatric | 35.1 | 87.8 | 62.7 |
| | Seizure and unconsciousness | 51.0 | 89.4 | 80.3 |
| | Priority 2 Total | 33.9 | 88.0 | 68.0 |
| Total | 34.7 | 88.2 | 71.0 | |

Note: Duration of a call is defined as the longest deployed time of any of the EMSA units responding to the same call.

Observations:

Overall

- Overall, the average duration for Priority 1 and Priority 2 calls was 71 minutes.
- The overall average duration for Priority 1 and Priority 2 calls not resulting in a transport was 34.7 minutes.
- The overall average duration for Priority 1 and Priority 2 calls resulting in a transport was 88.2 minutes, which is 2.5 times longer than a nontransport call.

Priority 1 – Life Threatening Emergency

- Priority 1 calls had an average duration of 77.4 minutes.

- Priority 1 calls not resulting in a transport had an average duration of 37.8 minutes while calls with a transport lasted 2.3 times longer, with an average duration of 88.6 minutes.
- Interfacility transfers lasted the longest overall with an average duration of 92.3 minutes.
- Motor vehicle accident calls had the longest average duration for Priority 1 transports, with an average duration of 95.2 minutes.

Priority 2 – Non-Life Threatening Emergency

- Priority 2 calls had an average duration of 68 minutes.
- Priority 2 calls not resulting in a transport had an average duration of 33.9 minutes while calls with a transport lasted 2.6 times longer, with an average duration of 88 minutes.
- Interfacility transfers lasted the longest overall with an average duration of 87.1 minutes.
- Motor vehicle accidents had the longest average duration for Priority 2 transports, with an average duration of 93.3 minutes.

Ambulance Off-load Times

Ambulance off-load time, or patient transfer time, is the time between the ambulance arriving at the hospital and the ambulance being cleared, or going back into service, and becoming available for another call. In this analysis we looked at the six hospitals receiving the most transports during the period studied. Off-load times were calculated for each transport with an arrived-at-hospital time. If a call had multiple transports, the call duration was only counted once.

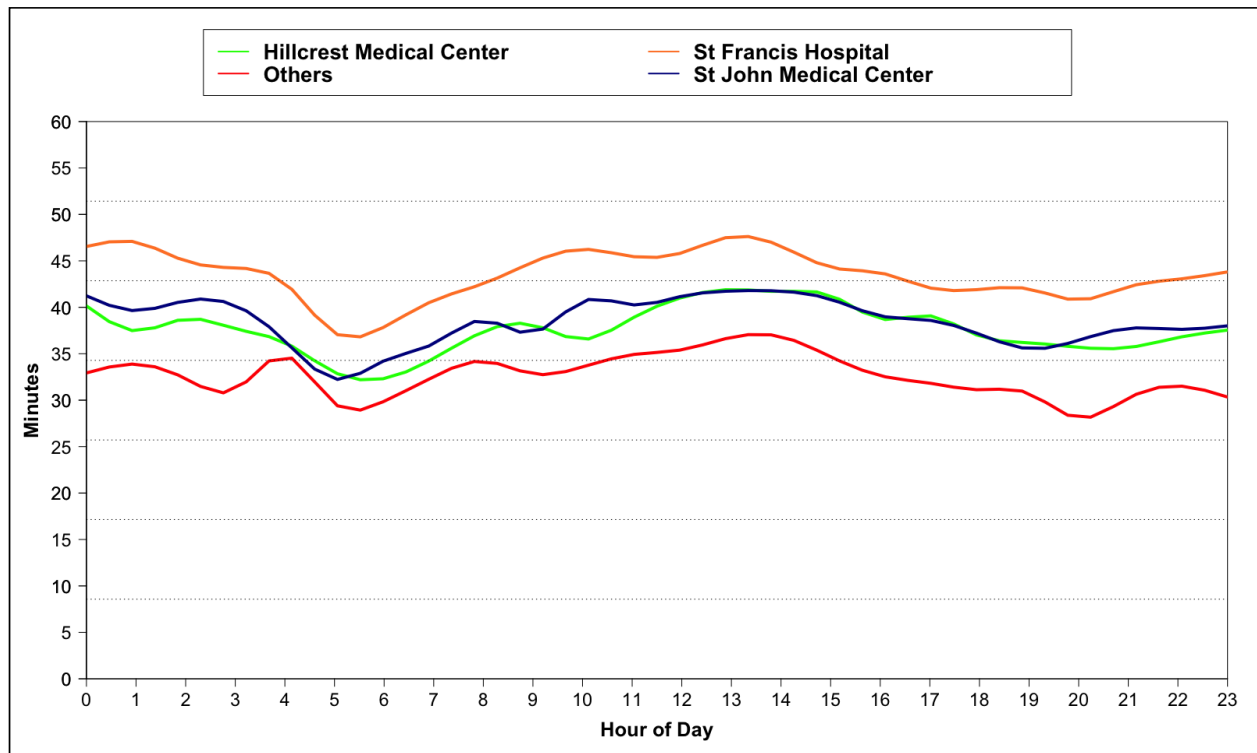
TABLE 5-18: Average and 90th Percentile Off-load Time and Call Duration, by Transport Destination

| Priority | Transport Destination | Average Off-load Time | 90th Percentile Off-load Time | Average Call Duration | 90th Percentile Call Duration | Number of Transports |
|--------------------------------|----------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|----------------------|
| Life Threatening Emergency | Hillcrest Medical Center | 40.5 | 61.6 | 86.2 | 113.8 | 4,043 |
| | Hillcrest South Hospital | 36.7 | 56.1 | 84.6 | 110.4 | 437 |
| | OSU Medical Center | 34.5 | 52.0 | 78.7 | 103.7 | 1,812 |
| | St. Francis Hospital | 46.2 | 70.7 | 93.3 | 121.9 | 6,439 |
| | St. Francis Hospital South | 33.9 | 52.4 | 84.3 | 106.8 | 279 |
| | St. John Medical Center | 41.7 | 64.3 | 88.5 | 115.9 | 5,487 |
| | Priority 1 Total | | 42.0 | 65.5 | 88.6 | 116.7 |
| Non-Life Threatening Emergency | Hillcrest Medical Center | 36.9 | 56.1 | 85.3 | 113.6 | 7,920 |
| | Hillcrest South Hospital | 32.9 | 49.6 | 84.3 | 110.8 | 958 |
| | OSU Medical Center | 31.5 | 47.8 | 77.0 | 102.5 | 4,274 |
| | St. Francis Hospital | 42.5 | 65.3 | 94.5 | 124.0 | 11,399 |
| | St. Francis Hospital South | 32.7 | 52.1 | 85.6 | 114.1 | 737 |
| | St. John Medical Center | 37.2 | 56.2 | 88.4 | 116.0 | 9,784 |
| | Priority 2 Total | | 37.9 | 58.4 | 88.1 | 117.2 |
| Total | | 39.4 | 60.9 | 88.3 | 117.1 | 53,569 |

TABLE 5-19: Average Off-load Time by Destination, by Hour of Day

| Hour | Hillcrest Medical Center | Hillcrest South Hospital | OSU Medical Center | St. Francis Hospital | St. Francis Hospital South | St. John Medical Center |
|------|--------------------------|--------------------------|--------------------|----------------------|----------------------------|-------------------------|
| 0 | 40.2 | 29.9 | 33.2 | 46.5 | 35.1 | 41.2 |
| 1 | 37.5 | 31.6 | 34.7 | 47.0 | 29.0 | 39.6 |
| 2 | 38.8 | 30.6 | 33.2 | 45.0 | 27.7 | 40.7 |
| 3 | 37.7 | 35.4 | 31.5 | 44.2 | 22.0 | 40.2 |
| 4 | 36.2 | 34.1 | 35.4 | 42.6 | 32.1 | 36.4 |
| 5 | 33.0 | 33.2 | 28.8 | 37.2 | 30.8 | 32.3 |
| 6 | 32.3 | 31.9 | 30.0 | 37.9 | 26.7 | 34.2 |
| 7 | 34.5 | 35.5 | 32.2 | 40.7 | 28.6 | 36.1 |
| 8 | 37.4 | 34.9 | 34.1 | 42.5 | 33.5 | 38.6 |
| 9 | 38.1 | 33.3 | 32.5 | 44.9 | 33.6 | 37.2 |
| 10 | 36.5 | 36.9 | 32.9 | 46.3 | 31.9 | 40.7 |
| 11 | 38.8 | 37.2 | 34.2 | 45.5 | 35.7 | 40.3 |
| 12 | 41.1 | 38.8 | 34.0 | 45.9 | 36.3 | 41.2 |
| 13 | 41.9 | 37.3 | 35.7 | 47.6 | 40.7 | 41.8 |
| 14 | 41.7 | 35.8 | 36.4 | 46.6 | 41.4 | 41.7 |
| 15 | 41.3 | 36.7 | 34.2 | 44.3 | 34.0 | 40.9 |
| 16 | 38.7 | 35.0 | 31.6 | 43.7 | 35.1 | 39.1 |
| 17 | 39.1 | 33.7 | 31.5 | 42.1 | 31.5 | 38.6 |
| 18 | 36.9 | 31.6 | 31.3 | 41.9 | 29.4 | 37.1 |
| 19 | 36.2 | 32.8 | 30.0 | 42.0 | 33.6 | 35.5 |
| 20 | 35.7 | 27.4 | 28.3 | 40.8 | 27.3 | 36.5 |
| 21 | 35.7 | 30.4 | 30.5 | 42.2 | 27.8 | 37.7 |
| 22 | 36.7 | 31.1 | 31.6 | 43.0 | 31.7 | 37.6 |
| 23 | 37.5 | 29.3 | 30.6 | 43.8 | 29.9 | 38.0 |

FIGURE 5-11: Average Off-load Time by Destination, by Hour of Day



Observations:

- The top three transport destinations accounted for 84 percent of all transports.
 - St. Francis Hospital was the most common transport destination, receiving 33 percent of all transports.
 - St. John Medical Center received 29 percent of all transports.
 - Hillcrest Medical Center received 22 percent of all transports.
- Hospital off-load times for Priority 1 transports ranged from an average of 33.9 minutes at St. Francis Hospital South to 46.2 minutes at St. Francis Hospital
- Hospital off-load times for Priority 2 transports ranged from an average of 31.5 minutes at Oklahoma State University Medical Center to 42.5 minutes at St. Francis Hospital.
- 90 percent of Priority 1 transports had hospital off-load times of 65.5 minutes or less.
- 90 percent of Priority 2 transports had hospital off-load times of 58.4 minutes or less.
- The longest hospital off-load time during the period studied was 290.5 minutes (4 hours and 50.5 minutes)
- Hospital off-load times are highest in the middle of the day, between 11:00 a.m. and 2:00 p.m.
- Hospital off-load times are lowest in the early morning, between 5:00 a.m. and 6:00 a.m.

Shared Response with TFD

The Tulsa Fire Department provides first responder support to EMSA for many emergency medical services calls. We looked at the calls to which both TFD and EMSA responded during the study period to measure call response time from a citizen’s perspective.

Response Time of First Arriving TFD or EMSA Unit

TFD and EMSA responded to 40,426 calls together during the study period. Cancelled calls were excluded, as were calls where a unit from only one agency arrived. On 32,194 calls, a unit from both agencies arrived on scene.

TABLE 5-20: Average Response Time of the First Arriving TFD or EMSA Unit

| Priority | First Arriving Agency | | | | Overall | |
|--------------------------------|-----------------------|-----------------|---------------|-----------------|---------------|-----------------|
| | TFD | | EMSA | | | |
| | Response Time | Number of Calls | Response Time | Number of Calls | Response Time | Number of Calls |
| Life Threatening Emergency | 6.0 | 13,010 | 5.7 | 4,477 | 5.9 | 17,487 |
| Non-Life Threatening Emergency | 6.5 | 12,381 | 6.8 | 2,326 | 6.5 | 14,707 |
| Total | 6.2 | 25,391 | 6.1 | 6,803 | 6.2 | 32,194 |

TABLE 5-21: 90th Percentile Response Time of the First Arriving TFD or EMSA Unit

| Priority | First Arriving Agency | | | | Overall | |
|--------------------------------|-----------------------|-----------------|---------------|-----------------|---------------|-----------------|
| | TFD | | EMSA | | | |
| | Response Time | Number of Calls | Response Time | Number of Calls | Response Time | Number of Calls |
| Life Threatening Emergency | 8.0 | 13,010 | 8.3 | 4,477 | 8.1 | 17,487 |
| Non-Life Threatening Emergency | 9.0 | 12,381 | 11.4 | 2,326 | 9.3 | 14,707 |
| Total | 8.5 | 25,391 | 9.1 | 6,803 | 8.6 | 32,194 |

Observations:

- TFD arrived on scene first 79 percent of the time with an average response time of 6.2 minutes and a 90th percentile response time of 8.5 minutes.
- When EMSA arrived first, the average response time for the first arriving unit was 6.1 minutes and the 90th percentile response time was 9.1 minutes.
- Overall, the average response time for a unit from either TFD or EMSA was 6.2 minutes and the 90th percentile response time was 8.6 minutes.

TABLE 5-22: Time Between First Arriving Agency and Second Arriving Agency

| Priority | First Arriving Agency | Time Between First and Second Arriving Agency | | Number of Calls |
|--------------------------------|-----------------------|---|-----------------|-----------------|
| | | Average | 90th Percentile | |
| Life Threatening Emergency | EMSA | 1.7 | 3.6 | 4,477 |
| | TFD | 3.6 | 6.9 | 13,010 |
| | Total | 3.1 | 6.3 | 17,487 |
| Non-Life Threatening Emergency | EMSA | 3.8 | 10.4 | 2,326 |
| | TFD | 7.0 | 14.6 | 12,381 |
| | Total | 6.5 | 14.1 | 14,707 |
| Overall | EMSA | 2.4 | 5.0 | 6,803 |
| | TFD | 5.3 | 11.2 | 25,391 |
| | Total | 4.7 | 10.4 | 32,194 |

Observations:

- On average, when TFD arrived first, it arrived 3.6 minutes before EMSA on Priority 1 calls and 7 minutes before EMSA on Priority 2 calls.
- In 90 percent of the calls where TFD arrived first, it arrived on scene at most 11.2 minutes before EMSA.
- When EMSA arrived first, it arrived on average 1.7 minutes before TFD on Priority 1 calls and 3.8 minutes before TFD on Priority 2 calls.
- In 90 percent of calls where EMSA arrived first, it arrived on scene at most 5.0 minutes before TFD.

Difference in Call Received Times

For the calls to which both EMSA and TFD responded, EMSA received the call first 94 percent of the time. Because there were so few calls where TFD received the call first, we looked only at the calls that EMSA received first. Table 5-23 shows the average time difference between EMSA call received time and TFD call received time for the calls when EMSA received the call first.

TABLE 5-23: Difference in Call Received Times When EMSA Received Call First

| Priority | Average | Number of Calls |
|--------------------------------|----------------|------------------------|
| Life Threatening Emergency | 1.6 | 16,963 |
| Non-Life Threatening Emergency | 2.4 | 13,253 |
| Total | 2.0 | 30,216 |

Observations:

- For 30,216 (94 percent) of the calls to which both agencies responded, EMSA received the call first.
- On average, EMSA received a call 2.0 minutes before TFD.