DEVELOPING AND EVALUATING RESPONSE TIME CRITERIA
EXECUTIVE DEVELOPMENT

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An applied research project submitted to the National Fire Academy
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Abstract

The problem was Washington County, MD does not have response time goals to measure performance. The purpose of this applied research project is to develop recommended response time goals and determine if Washington County’s emergency medical services have been meeting those goals. This is an action research project. The following research questions were posted:

1. Why should emergency service agencies measure operational performance such as response time?
2. Are there any national or local recognized response time goals used in emergency services that can be applied in Washington County?
3. Does having established response time goals in place lead to an improvement in the quality and performance of emergency services?
4. How do the Washington County emergency medical service statistics compare with the proposed criteria?

Five steps were used to complete this research. First, information found in fire and public administration publications and on the Internet was reviewed. Fire departments were contacted to obtain copies of response time goals. Interviews were conducted with the custodian of records at the Washington County Department of Emergency Services. Finally, statistical methods were applied to evaluate compliance with the recommended goals.

Evidence exists that fire departments should measure performance. Several fire departments were found to have response time goals and many national agencies promote the use of goals. Most of Washington County’s emergency medical services met the 50th percentile response time goal but all failed to meet the 90th percentile goal.
Recommendations included the adoption of response time goals and to monitor them monthly. Data collecting procedures should be developed. Response time goals should be based on service and zone. Washington County should integrate software with their computer aided dispatch system to automate the statistical analysis. Finally, the findings should be presented to the Volunteer Fire & Rescue Association for endorsement.
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Introduction

The problem that prompted this applied research project is Washington County (Maryland) does not have response time goals to measure the performance of their emergency services. The purpose of this applied research project (ARP) is to develop recommended response time goals and determine if Washington County’s emergency medical services have been meeting those goals. This is an action research project. The following research questions were posted:

1. Why should emergency service agencies measure operational performance such as response time?
2. Are there any national or local recognized response time goals used in emergency services that can be applied in Washington County, Maryland?
3. Does having established response time goals in-place lead to an improvement in the quality and performance of emergency services?
4. How do Washington County emergency medical service (EMS) statistics compare with the proposed criteria?

Background and Significance

Washington County is a predominantly rural county located in western Maryland. The County’s population is 131,900 (Maryland Manual, 2002). The County encompasses approximately 467 square miles of land (Washington County Planning Commission, 2002, p. 26). The County seat is the City of Hagerstown with a population of 36,700 (Maryland Manual, 2002).

Emergency services in Washington County are provided by a combination of career and volunteer companies. These companies are partially funded from tax dollars collected by the
local government. The tax dollar contribution to fire and emergency services in Washington County exceeds $5,000,000 annually (Washington County Operating Budget, 2002, pp. 7-8). The emergency service companies include 20 fire stations, 8 emergency medical service stations and 2 specialties or support stations. Each year the emergency service companies submit requests to the county government for funding to sustain operations. In-turn, the taxpayers demand that elected officials expend tax dollars in a prudent and cost-effective manner. As such, the county government needs a system of measures in place to determine if the emergency service companies are providing public services consistent with expectations of the citizenry and appropriate industry standards.

At the present time, Washington County fire and emergency services do not have response time goals to allow government officials to evaluate the level of service provided to the public. Delays in excess of national standards have been encountered in the past (WCDES, 2002, pp. 10-13). By implementing this policy, in the future Washington County’s fire and emergency services will be cognizant of actual response times. This knowledge will allow them to clearly identify changes in emergency service resource deployment to improve services provided to the public.

This research is relevant to the National Fire Academy’s (NFA), *Executive Development Course* in that a significant portion of the course was dedicated to service quality and improvement.

This ARP relates to the United States Fire Administration’s operational objective “to promote within communities a comprehensive, multi-hazard risk reduction plan led by the fire service organization” (NFA, 2002, p. II-2) by improving responsiveness of the fire and emergency services.
Literature Review

The literature review was performed to set the practical foundation for this ARP. The literature review involved a search of trade journals, textbooks, and the Internet.

Four basic questions need to be addressed. First, why should emergency service agencies measure operational performance such as response time? Performance measurement, as it has come to be understood in the public sector, is the process of quantifying – or assigning a number to – the operation of a process, program, or any other activity through which a public agency delivers products or services to its customers. Fire departments should measure their operation and activities such as, response time, the number of fire inspections conducted, the number of code violations corrected, and a multitude of other indicators that reflect how well the department is providing service to their customers (Keehley et al., 1997, p. 31).

Any cooperative initiative needs to have a set of performance goals against which its effectiveness can be judged. This is particularly important when the cooperation is linked to important public services and financial goals of a community (Forsman, 2002, p. 500).

The most important measure of an EMS organization’s performance is its emergency response time. While clinical performance is essential, it is not as commonly understood or as easily measured as response time (Fitch, 1993, p. 207). The key issue for most patients and the public is: How long does it take to get an ambulance after making the call for help? This interval must be measured in every EMS system (Fitch, 1993, p. 207). Equitable response times should occur throughout the EMS system’s service area. While it is impossible for most systems to have equal response time performance to areas of high demand and those sparsely populated areas with low demand, there should be defined performance requirements among all areas. Performance should then be measured on a system-wide and zone basis (Fitch, 1993, p. 208).
For EMS providers and the patients they serve, time is indeed the enemy. To enable direct comparisons of EMS providers and to meet EMS provider goals for response times, consistent sensible measures must be used. Masking long response times by varying the events that start and stop the clock, rounding down to the next whole minute, or averaging time serves only the interests of substandard EMS providers (IAFF, 1999, p. 62).

The fact that citizens are insisting on a bottom-line look at what government is producing is one very good reason for pursuing performance measurement. That, in turn, is why an increasing number of jurisdictions are publishing basic “report cards” on their own performance. Another persuasive reason why performance measurement is worth a second look is that the practice either is, or soon will be, mandatory for all levels of government (Walters, 1998, p. 7).

Nothing is more important than the element of time when an emergency is reported. Fire growth can expand at a rate of many times its volume per minute. Time is the critical factor for the rescue of occupants and the application of extinguishing agents (Barr and Caputo, 1997, pp. 10-250).

In response to the second question: Are there any national or local recognized response time goals used in emergency services that can be applied in Washington County? The literature review revealed several publications and fire departments that recommend response time goals as a measure of performance.

The National Fire Protection Association’s (NFPA), Standard 1710 - Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments, recommends arrival of the first engine company within 4 minutes and arrival of the entire assignment within 8 minutes to 90 percent of all fire incidents (NFPA 1710, 2001, 5.2.3.1). Section 5.3.3.4 of NFPA 1710
recommends arrival of an advanced life support ambulance within 8 minutes to 90 percent of all EMS incidents (NFPA 1720, 2001, 5.3.3.4.3). The corresponding standard for the volunteer fire service, NFPA 1720 - *Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by volunteer fire departments*, omits any reference to response time goals. However, the NFPA 1720 standard recommends “upon assembling the necessary resources at the emergency scene, the fire department shall have the capability to safely initiate an attack within 2 minutes 90 percent of the time” (NFPA 1720, 2001, 4.2.2.1).

The Houston (Texas) Fire Department (HFD) has adopted response time goals as part of their strategic planning process. HFD has agreed to evaluate emergency response times monthly and compare the results with the following goals. The response time goal for EMS first responder and fire incidents is to arrive within 8 minutes 90 percent of the time and 6 minutes 70 percent of the time (HFD, 1999, pp. 35-36). The EMS advanced life support response time goal is to arrive within 12 minutes 90 percent of the time and within 10 minutes 70 percent of the time (HFD, 1999, pp. 35-36).

The International Association of Firefighters (IAFF) outlined response time goals in their publication, *Emergency medical services – A guidebook for fire based systems*. The IAFF emphasized the connection between response time and the wide variety of situations firefighters respond to such as, trauma, burns, poisoning and cardiac arrests. The IAFF stated, “a common factor in all these situations is the critical need for a rapid response. As such, all ambulances that respond to emergency incidents must meet response time performance standards” (IAFF, 1999, p. 55).
The IAFF goals are presented based on service area land use and are expected to be met 90 percent of the time. Table 1 summarizes the response time performance goals recommended by the IAFF. The IAFF further recommends actual response time be calculated and monitored on a monthly basis (IAFF, 1999, appendix B).

Table 1

*IAFF recommended response time performance goals*

<table>
<thead>
<tr>
<th>Land use classification</th>
<th>Time goal</th>
<th>Maximum response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>6 min.s</td>
<td>9 min.s</td>
</tr>
<tr>
<td>Rural</td>
<td>9 min.s</td>
<td>13.5 min.s</td>
</tr>
<tr>
<td>Remote</td>
<td>14 min.s</td>
<td>21 min.s</td>
</tr>
</tbody>
</table>

The National Institute of Health’s reference, *Staffing and equipping emergency medical services systems: Rapid identification and treatment of acute myocardial infarction*, states a first responder should arrive at the scene less than 5 minutes from the time of dispatch in 90 percent of all such calls (IAFF, 1999, p. 57).

The Montgomery County (Maryland) Department of Fire and Rescue Services have adopted a tiered system of response time goals based on land use categories similar to the IAFF recommendation. Areas of the County have been classified as urban, suburban or rural. Response time goals are then recommended for each respective area classification based on citizen expectations and the County’s ability to sustain operations within these areas. These recommendations were subsequently adopted by the Montgomery County Fire & Rescue Commission (Montgomery County Fire & Rescue Commission, 1999, pp. 6-8). Table 2 summarizes Montgomery County’s response time goals.
Table 2

*Montgomery County Emergency response time goals:*

<table>
<thead>
<tr>
<th>Response time Goal</th>
<th>Urban – percentage of incidents&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Suburban – percentage of incidents&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Rural - percentage of incidents&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 minute BLS Ambulance</td>
<td>85%</td>
<td>65%</td>
<td>25%</td>
</tr>
<tr>
<td>6 minute engine</td>
<td>85%</td>
<td>65%</td>
<td>25%</td>
</tr>
<tr>
<td>8 minute ALS Ambulance</td>
<td>95%</td>
<td>90%</td>
<td>50%</td>
</tr>
</tbody>
</table>

From: Montgomery County (Maryland) Fire and Rescue Master Plan, Fire and Rescue Commission, 1999. (p. 8).

<sup>a</sup> Percentage of total incidents meeting the response time goal.

The Washington D.C. Department of Fire & EMS have adopted the emergency response time goals outlined in the NFPA 1710 standard. Interim Chief Adrian H. Thompson directed his staff to reduce their response time in compliance with the national standard after the department was publicly criticized for delayed responses (Fahrenthold, 2002, October 18, p. B-2).

The Prince William County (Virginia) Department of Fire & Rescue Services and the Prince William County Volunteer Fire & Rescue Association have adopted response time goals. The Prince William County system is built around land use designations and the type of emergency service provided (i.e. fire, EMS). The land use definitions are described as high density, medium density and low density (Prince William County, 1996). Prince William County evaluates compliance with their response time goals every six months and completely reviews the policy annually based on geographical, demographic and technological changes (Prince William County, 1996).

The response time goals for Prince William County are summarized in Table 3.
Table 3

*Prince William County emergency response time goals*

<table>
<thead>
<tr>
<th></th>
<th>Fire suppression and BLS ambulance</th>
<th>ALS Ambulance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High density</td>
<td>Medium density</td>
</tr>
<tr>
<td>70% of the time</td>
<td>4.5 min.s</td>
<td>6 min.s</td>
</tr>
<tr>
<td>80% of the time</td>
<td>5.5 min.s</td>
<td>7 min.s</td>
</tr>
<tr>
<td>90% of the time</td>
<td>6.5 min.s</td>
<td>8 min.s</td>
</tr>
</tbody>
</table>

From: Prince William County Volunteer Fire & Rescue Association, Performance Standards, 1996

Next, answering the question: Does having established response time goals in place lead to an improvement in the quality and performance of emergency services?

The improvements in quality and efficiency that private industry has obtained through best practices and benchmarking have been so profound and widespread that states, counties, cities, nonprofit organizations, and federal agencies, known for their slow pace in planning and implementing change, are waking up to the benefits of this powerful tool (Keehley et al., 1997 pp. 1-2).

Endicott (2002) wrote the following regarding response time goals in *Managing fire and rescue services*:

The presumption is that if properly trained and equipped emergency responders are dispatched, arrive and deploy at the emergency more quickly, the specific actions they
will be able to take will mitigate the negative consequences of the event. As a result, the level of deaths, injuries, and fire losses should be lower than it would have been if response times had been longer. By tracking response times and their critical sub-components, an organization can begin to see the effects of changes in the response process more quickly and can begin to judge whether these changes are having the desired results (Endicott, 2002, p. 300).

It is reported that 1.25 million Americans will suffer a heart attack each year, with up to 40 percent being potentially fatal. Numerous published reports indicate the importance of quick action when someone has suffered cardiac arrest. The quicker CPR is initiated, defibrillation performed, and advanced cardiac life saving measures are begun, the better the odds the patient will survive without neuralgic deficit. Researchers point out that any decrease in response time will result in an increase in the probability of successful pre-hospital defibrillation (IAFF, 1999, p. 58).

By setting goals you can, achieve more, improve performance, improve the quality of training, increase your motivation to achieve, and increase your pride and satisfaction in your performance (Mind Tools, retrieved January 5, 2003).

Regardless of whether an organization is large or small, career or volunteer, performance measurement and goal setting is a valuable tool in the effort to improve organizational performance. Performance measurement is the foundation for improving and monitoring an organization’s programs, activities, and processes; it is the foundation for benchmarking with similar organizations to identify best practices and improve operations; and it is the key ingredient in results-based systems (Endicott, 2002, p. 332). Endicott (2002) went on to write:
One may well ask what makes performance measurement such a powerful agent for change and why all that work is worth doing. Simply put, what gets measured gets done. If a fire and rescue department measures the right things and regularly and accurately reports the results to managers and first-line supervisors, the people in a position to make needed changes will be aware of what is happening and will be able to take steps to affect it (Endicott, 2002, p. 291).

When properly developed, monitored and reported, performance measures can influence the effectiveness and efficiency of government operations; they can contribute to improved management; they can offer systematic evidence in defense of worthwhile public operations that find themselves under attack; and they can influence the public’s perception of its local government (Ammons, 1997, p. 11).

Response time data for the EMS companies in Washington County is collected and maintained by the Washington County Department of Emergency Services (WCDES). Incident data including, but not limited to, date, time of day, location, units responding and the response time of each dispatched unit were provided by the custodian of records for the WCDES.

A comprehensive study of fire and emergency services was completed in 1999 for Washington County by the consulting firm Carroll Buracker & Associates, Inc. Chapter 8 of the Buracker study list average response times for Washington County’s fire and emergency service stations. Table 4 summarizes the published average response times from the Buracker study for the County’s EMS stations (Buracker, 1999, p. 271).
Table 4

Average response time by EMS station, Washington County, MD, 1998

<table>
<thead>
<tr>
<th>Station</th>
<th>Average response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>13.80 min.s</td>
</tr>
<tr>
<td>26</td>
<td>6.39 min.s</td>
</tr>
<tr>
<td>29</td>
<td>9.66 min.s</td>
</tr>
<tr>
<td>49</td>
<td>9.83 min.s</td>
</tr>
<tr>
<td>59</td>
<td>12.99 min.s</td>
</tr>
<tr>
<td>69</td>
<td>13.58 min.s</td>
</tr>
<tr>
<td>75</td>
<td>7.84 min.s</td>
</tr>
<tr>
<td>759</td>
<td>8.78 min.s</td>
</tr>
<tr>
<td>79</td>
<td>12.09 min.s</td>
</tr>
</tbody>
</table>

From: Comprehensive study of emergency fire and medical services delivery for Washington County (1998 data).

In summary, based on this review, departments use different factors and time lines when establishing their response time goals. As recommended by national standards, many fire departments are adopting the fractile or percentile method of measuring response time performance. Averaging response time is not considered an acceptable best practice. The fire department response time goals observed vary slightly from published standards, allowing a minor time extension for geographical areas of sparse development and very low population densities.

Procedures

For this action research project five primary processes were undertaken. First, the research began with a literature search in the Learning Resource Center at the National Emergency Training Center in Emmitsburg, Maryland. The literature search was continued at
the public library in Washington County, MD, Montgomery County, MD and the author’s personal library. Both periodical and non-periodical, fire service and public administration, publications were reviewed. The search for relevant publications was narrowed using keywords such as: performance measurement, response time, benchmarking, goals, and service quality.

Second, fire departments in the Maryland geographical area were sent a letter requesting information regarding any response time goals they may have.

Third, the research included browsing the worldwide web for information on response time, performance measurement, and benchmarking. Non-proprietary and proprietary academic databases such as Lexis-Nexis© and MDUSA were employed to search for relevant information. The Internet search was used to locate fire departments outside the Maryland geographical area that had published response time goals.

Fourth, interviews were conducted with Mr. Roy Lescalleet, Deputy Chief, with the WCDES - Fire and Rescue Communications. Deputy Chief Lescalleet is the custodian of fire and EMS dispatch records in the County. WCDES provides all 911 call-taking and dispatching for the emergency services in Washington County. He provided detailed data on approximately 11,600 emergency medical response incidents which occurred between July 1, 2001 and June 30, 2002. These data, including the incident date, time, location, units responding and the response time to the nearest one-hundredth of a minute (R. Lescalleet, personal communication, August 16, 2002).

Finally, the data provided by the WCDES was analyzed using standard statistical procedures to evaluate how Washington County’s emergency medical services performed in comparison to the proposed response time goals.
The ARP was prepared in accordance with the *Executive Fire Officer Program – Operational policies and procedures applied research guidelines* (NFA, 2002) and the *Publication Manual of the American Psychological Association* (APA, 2001).

**Limitations and assumptions**

It was assumed that all of the data provided by the WCDES was accurate. There is no secondary source available to confirm the data received to the same accuracy level. There was no means to segregate the data into ALS and BLS priority incidents.

The number of fire departments observed having response time goals was insufficient to be representative of all fire departments within the United States. This conclusion is established in accordance with the recommended sample size for research activities based on research work of R.V. Krejcie and D.W. Morgan, published in the NFA, *Executive Development* course text (NFA, 1998, p. SM-3-40). The United States has an estimated 34,000 fire departments (USFA, 2001, p. 18). To assure that establishing response time goals is a “best practice” to a 95 percent confidence level, approximately 380 fire departments would have to be surveyed (NFA, 1998, p. SM 3-40).

**Definition of terms**

ALS - Advanced Life Support, basic life support measures, plus invasive medical procedures, including: intravenous therapy, cardiac defibrillation, administration of antiarrhythmic medications and other specified drugs, medications and solutions, use of adjunctive ventilation devices, and other procedures which may be authorized by state law and performed under medical control.
BLS - Basic Life Support, generally limited to airway maintenance, ventilation (breathing) support, CPR, hemorrhage control, splinting of fractures, management of spinal injury, protection and transportation of the patient with accepted procedures.

High density – density range of 1-4 dwellings per acre. Housing types included are single family detached, single family attached (townhouses), apartments, use for planned unit development in cluster housing (Prince William County, 1996).

Low density – The density range is 1-2 dwelling units per acre (5-10 acre lots). Cluster housing and use of planned unit development are permitted forms of development with primary uses to include forestry, agricultural, residential, and compatible community facilities (Prince William County, 1996)

Medium density – density range is 1-2 dwelling units per acre for 1-5 acre lots. This diversification is to provide areas of the County with wide-range lot residential development. Cluster housing and use of the planned unit development concepts are permitted (Prince William County, 1996).

MDUSA – University of Maryland, University systems academic computer search engine and protected Internet database.

Remote zone – undeveloped, natural land, wilderness area with extremely low population densities. Typically far removed from general services such as fire protection, emergency medical and commercial services.

Response time – the amount of time, in minutes, that elapses from the time a company receives notification of the incident and the dispatched unit arrives at the scene.

Rural zone – relatively undeveloped and low population density area of a county, city or town. Consisting of sparse residential, agricultural, meadow, and pasture areas. May include
some sparsely spaced commercial and industrial uses that support residential or agricultural land uses.

Suburban zone – predominantly residential and light commercial land use typically located on the fringe area of an urban zone. Moderate population density.

Urban zone – the most fully developed and densely populated area of a county, city or town. Consisting of residential, commercial, and industrial uses. Typically, fire and emergency service demand is very high in this land use area.

Results

After review of fire service and public administration publications and the practices of fire departments, it was determined that having response time goals was a prudent step toward improving public safety services. Conclusive evidence exists from the literature review that fire departments should measure operational performance such as response time. Fitch summed up the response to research question No. 1 when he stated, “the most important measure of an EMS organization’s performance is it’s emergency response time” (Fitch, 1993, p. 207).

The research revealed several fire departments that have published response time goals. The Montgomery County (Maryland) Department of Fire & Rescue Services, Washington D.C. Department of Fire & EMS, Prince William County (Virginia) and Houston (Texas) Fire Department have adopted response time goals.

Several national standards and agencies recommend the use of response time goals. National agencies and advocates of such standards discovered include the National Fire Protection Association, International Association of Fire Fighters, and the National Institute of Health.
Variation from the national standard was not uncommon. Some agencies and departments customized the goals to meet the needs of their jurisdiction. The NFPA 1710 standard allows for these variations as evidenced in Section 1.3 of the standard which states, “Nothing in this standard is intended to prohibit the use of systems, methods, or approaches of equivalent or superior performance to those prescribed in this standard” (NFPA 1710, 2001, 1.3). The variations from national standards were based on different land use classifications and the type of service provided to the public (i.e. fire, EMS).

Any of these published standards or goals could be applied in Washington County. Due to the variety of land uses found in Washington County it is reasonable to incorporate a land use classification system similar to those recommended by the IAFF, Montgomery County, and Prince William County Department of Fire and Rescue.

Research leading to an answer for question No. 3 was not as clear and concise as other research questions. The work reviewed indicates by setting goals, one can achieve more, improve performance, improve the quality of training and increase your motivation to achieve (Mind Tools, retrieved January 5, 2003). Clearly, setting goals establishes the foundation for future improvements. The literature demonstrated, regardless of the type of organization, career or volunteer, large or small, performance measurement and goal setting is a valuable tool in the effort to improve organizational performance (Endicott, 2002, p. 332).

Determining how the Washington County emergency medical services complied with the recommended response time goals required processing the voluminous data provided by the WCDES using standard statistical computations. Data provided by Deputy Chief Roy Lescalleet covered all EMS responses in Washington County between July 1, 2001 and June 30, 2002. This data was sorted by station; then the statistical average and percentile response times were
computed. The results where then compared against the recommended response time goals developed for Washington County. Table 5 summarizes the Xth percentile response time for Washington County by EMS station in minutes.

Table 5

<table>
<thead>
<tr>
<th>Station designation</th>
<th>25&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>50&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>75&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>90&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>95&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>100&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>7.21</td>
<td>9.84</td>
<td>13.34</td>
<td>17.60</td>
<td>20.57</td>
<td>54.62</td>
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<td>26</td>
<td>4.37</td>
<td>5.84</td>
<td>7.84</td>
<td>9.62</td>
<td>11.16</td>
<td>27.58</td>
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<td>29</td>
<td>5.01</td>
<td>7.15</td>
<td>10.28</td>
<td>13.64</td>
<td>16.31</td>
<td>41.91</td>
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<td>49</td>
<td>5.84</td>
<td>8.71</td>
<td>11.72</td>
<td>15.11</td>
<td>17.77</td>
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<td>59</td>
<td>6.15</td>
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<td>23.01</td>
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<td>6.26</td>
<td>9.16</td>
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<td>16.70</td>
<td>18.96</td>
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<td>7.66</td>
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<td>11.09</td>
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<td>8.72</td>
<td>11.04</td>
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<td>79</td>
<td>4.94</td>
<td>7.76</td>
<td>11.23</td>
<td>15.01</td>
<td>17.89</td>
<td>31.56</td>
</tr>
<tr>
<td>Average</td>
<td>5.49</td>
<td>7.99</td>
<td>11.01</td>
<td>14.21</td>
<td>16.61</td>
<td>40.05</td>
</tr>
</tbody>
</table>

Note: Time given in minutes.

To compare the performance of Washington County’s EMS companies against the recommended response time goals each station must be assigned a general land use designation of either urban or rural. Considering the definitions given in this ARP, stations 19, 49, 59, 69, and 79 are considered rural and stations 26, 29, 75, and 759 are considered urban. Table 6 summarizes compliance with the proposed response time goals.
Table 6

Washington County EMS compliance with the recommended response time goals

<table>
<thead>
<tr>
<th>Station</th>
<th>Urban</th>
<th>Rural</th>
<th>50%</th>
<th>90%</th>
<th>Max.</th>
<th>50%</th>
<th>90%</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Yes</td>
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</table>

Note: Yes indicates the goal was met, No indicates the goal was not met.

By inspection of the results shown in table 6, most companies have met the 50th percentile response time goal. However, all stations have failed to meet the 90th percentile and maximum response time goal.

The proposed response time goal policy for Washington County is shown in Appendix B of this ARP. The proposal encompasses recommendations from the national standards and best practices of fire departments across America. The proposed goals are specific to land uses using two land use classifications (i.e. urban and rural). The policy specifies the land use assigned to each station.

Both the fire department policies and the published standards observed recommended response time compliance be reviewed monthly. The proposed policy for Washington County
also includes the same review period. The review will be completed by the WCDES and the results distributed to various individuals and organizations having interests in emergency services.

Discussion

The use of response time measurement is prevalent in today’s “customer service driven” emergency services. The literature reviewed tells us that the most common measure of emergency service performance is response time.

There appears to be strong linkage between the information found in the literature review and the best practices of fire departments.

Much discussion has recently centered on how a fire and EMS system’s response times should be measured and reported. The most common reporting method traditionally has been an average response time. Although the easiest to calculate, the average response time provides an incomplete definition of the system’s performance and may represent a false picture of what is actually occurring (Ficth, 1993, p. 208). A good average response time for a service may indicate only that the service places its ambulances in areas of highest demand, therefore, generating short response times to patients in those areas, while other less busy areas have extended response times. To address this weakness, modern emergency services have made two significant changes in the way they measure response times. First, response times are monitored by zone, and second, response times are reported on a percentile basis. This presents a clear picture of the level of performance provided to the public (Fitch, 1993, p. 208).

More modern and progressive EMS systems now measure response time based on percent compliance to a specified goal. This measurement method is referred to as fractile or percentile response time. It defines a certain percentage of calls that are responded to within a
set period of time. For example, 90 percent of the calls are responded to within 10 minutes. This method provides a much more accurate representation of EMS system performance levels. Percentage compliance measurement is most effective when specified levels are defined (Fitch, 1993, p. 208).

Having completed the research, the author encourages the development of response time goals similar to those reported in the literature review. It is clear that the response time goals should follow the percentile/zone guidelines. The expected implications of this study are that emergency service delivery will improve if this policy is implemented. The results to research question four indicate room for improvement exists in Washington County’s EMS system.

The benefits of implementing these goals include improved citizen perception of public services, identification of system deficiencies that may lead to improved service, and most importantly an increase in the resuscitation and survival rates of patients in Washington County.

Recommendations

When considering the research questions posed, the best practices of fire departments across America, and the publications reviewed, they all support the decision to accept response time goals as a measure of service performance. Based on these findings, it is recommended that Washington County, MD adopt response time goals.

Response times must be monitored on a monthly basis for compliance with the recommended goals (IAFF, 1999, appendix B). A thorough review of response time goal compliance should be completed on an annual basis. Operational changes that could bring about an improvement in response times should be noted. Also, from this analysis, deficiencies should be identified and recommendation made to reduce response times until compliance with the goals is obtained and maintained by each station.
An understanding or procedure should be formally adopted to collect the response time data and analyze the results. It appears the current procedures used in the WCDES are acceptable for collecting and maintaining accurate response time data. The WCDES should continue to be the custodian of records for this information.

Compiling the raw data and performing the statistical analysis to evaluate the response time compliance was very time consuming. It is recommended that the WCDES acquire a commercially available software package that integrates with the computer aided dispatch system to complete the analysis. Such a system would allow the user to change the query parameters and review multiple scenarios easily.

It is further recommended that Washington County adopt a similar land use classification system as described by the IAFF, Montgomery County, and Prince William County. The land use classification system should be clearly defined. Each station service area shall be classified as either urban or rural. The classifications should also be reviewed annually to incorporate changes in land use and development. The chief operational officer from each station should be consulted when designating and reviewing the land use classification system.

A cross section of the various recommendations reviewed lead to the development of Washington County’s proposed response time goals. They are summarized in Table 7.
Table 7

*Recommended response time goals for Washington County, MD*

<table>
<thead>
<tr>
<th>Service</th>
<th>Urban Zone</th>
<th>Rural Zone</th>
<th>Rural Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50%</td>
<td>90%</td>
<td>Max.</td>
</tr>
<tr>
<td>EMS/Ambulance</td>
<td>7 min.s</td>
<td>9 min.s</td>
<td>15 min.s</td>
</tr>
<tr>
<td>Fire/EMS assist</td>
<td>6 min.s</td>
<td>8 min.s</td>
<td>10 min.s</td>
</tr>
<tr>
<td>Specialty service a</td>
<td>8 min.s</td>
<td>10 min.s</td>
<td>15 min.s</td>
</tr>
<tr>
<td>Support service b</td>
<td>10 min.s</td>
<td>20 min.s</td>
<td>30 min.s</td>
</tr>
</tbody>
</table>

a Specialty service includes aerial ladder trucks, rescue squads.

b Support service includes Fire Department Special Operations, Emergency Air Unit and Rehab Units.

Finally, it is recommended that the findings of this research are presented for endorsement and adoption by the Washington County Emergency Services Advisory Council and the Volunteer Fire & Rescue Association.
References


Montgomery County Fire and Rescue Commission. (1999). *Proposed amendments to the fire, rescue and emergency medical services master plan.* (p. 6-8). Montgomery County, MD: Montgomery County Fire and Rescue Commission


Washington County Department of Budget & Finance (WCDBF), (2002). *Approved operating budget for Washington County, MD 2002.* (pp. 7-8). Hagerstown, MD: Department of Budget & Finance


Washington County Planning Commission, (2002). Background data. In *Plan for the County 2002.* (p. 26). Hagerstown, MD: Department of Planning & Community Development
District Chief Elwood EY
Manager, Research and Planning
Department of Fire & Rescue Services
Montgomery County, Maryland
101 Monroe Street, 12th Floor
Rockville, Maryland 20850

Ref: Request for Information
Response Time Goals
N.F.A. – Executive Fire Officer Program

Dear Chief EY:

I am a student enrolled in the Executive Fire Officer Program at the National Fire Academy.

Part of my academic requirement is to complete a fire service related applied research project. I have selected the development of emergency response time goals as my topic.

If your agency has established response time goals, could you provide me with a copy of your policy for review. You may fax a copy of your response time goals to 240-313-2901 or mail to the address listed hereon.

Thank you in advance for your cooperation. If you have any questions, please do not hesitate to contact me.

Sincerely,

Joe Kroboth, III, PE, Director
Department of Emergency Services
Appendix B:

Subject: Response Time Goals
Number: V.01.01
Date: December 2002 – Draft Edition

PURPOSE:

To establish response time goals for fire and emergency services response.

This standard is intended to meet the requirements of the National Fire Protection Association Standard 1710 and 1720, Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career and Volunteer Fire Departments. This policy represents a minor deviation from the applicable NFPA standard based on conditions and practices acceptable to the Authority Having Jurisdiction.

It is important to recognize this standard is presented in the form of a performance goal or target and not intended for mandatory compliance.

I. DEFINITIONS:

ALS Ambulance - Advanced Life Support, basic life support measures, plus invasive medical procedures, including: intravenous therapy, cardiac defibrillation, administration of antiarrhythmic medications and other specified drugs, medications and solutions, use of adjunctive ventilation devices, and other procedures which may be authorized by state law and performed under medical control.

BLS Ambulance- Basic Life Support, generally limited to airway maintenance, ventilation (breathing) support, CPR, hemorrhage control, splinting of fractures, management of spinal injury, protection and transportation of the patient with accepted procedures.

Response time – the elapsed time from the time the alerted company receives notification of the incident until a primary response vehicle arrives at the location of the emergency.

Response time goal – non-mandatory target value in minutes.

Rural zone – relatively undeveloped and low population density area of the county, city or town. Consisting of sparse residential, agricultural, meadow and pasture areas. May include some smaller commercial and industrial developments. Predominantly unprotected by public water distribution systems.

Urban zone – the most fully developed and densely populated area of the county, city or town. Consisting of residential, commercial and industrial land uses. Typically, fire and emergency service demand is very high. Predominantly protected by a public water distribution system.
Appendix B (Continued):

II. POLICY:

The recommended response time goals for fire and emergency services are as follows:

<table>
<thead>
<tr>
<th>Service</th>
<th>Urban Zone</th>
<th>Rural Zone</th>
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<tr>
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<tr>
<td>Support service b</td>
<td>10 min.s</td>
<td>20 min.s</td>
</tr>
</tbody>
</table>

a Specialty service includes aerial ladder trucks, rescue squads and other primary specialty resources.

b Support service includes Fire Department Special Operations, Emergency Air Unit and Rehab Units.

III. LAND USE CLASSIFICATION SYSTEM:

Response time goals shall be based on predominate land use classification of the service area for each respective station. The classification system includes two designations (urban and rural). The following fire protection areas shall be designated as urban: all stations of the Hagerstown Fire Department, 2, 10, 13, 26 and 27. The remaining fire protection areas: 1, 4, 5, 6, 7, 8, 9, 11, 12, and 16 shall be considered rural. The following emergency medical stations (EMS) shall be designated as urban: 26, 29, 75 and 759. The remaining EMS stations service areas: 19, 49, 59, 69 and 79 shall be considered rural.

Land use classifications are subject to review annually based on a recommendation from the fire and rescue chief operational officer from the respective station, the Volunteer Fire & Rescue Association and the Department of Emergency Services.

IV. MONITORING AND EVALUATION:

Response time compliance shall be monitored by the Department of Emergency Services on a monthly basis by station and combined county total. The results of the monitoring shall be distributed to each station, the Medical Director and the Office of the Volunteer Fire & Rescue Association. Annually the Department of Emergency Services will facilitate a review of response times with the Volunteer Fire & Rescue Association by station for each month of the preceding year. From this analysis, recommendations will be made to the Board of County Commissioners and the Volunteer Fire & Rescue Association for reducing response times until all stations are in compliance with this policy.