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Evaluating the Effectiveness of Rockford Fire Department's EMS Delivery

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CERTICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed:_____

Abstract

As with many fire departments across the United States, the delivery of Emergency Medical Service (EMS) has become an increasingly important role in the Rockford Fire Department's duties. However, this service has not been evaluated. The purpose of this study was to assess the effectiveness and quality of Rockford's EMS service delivery. In order to do so, the following key research questions were addressed through relevant literature, department policies and standard operating procedures, and survey research:

a. Based on criteria from National Fire Protection Association 1710 (NFPA 1710) and the American Heart Association, is the Rockford Fire Department (RFD) meeting national standards for cardiac arrest, trauma victims, and extrications?
b. What does survey data state about what citizens want and need from the Rockford Fire Department's EMS delivery?
c. Is it cost effective to provide fire-based EMS delivery, which includes covering the cost of all personnel, pensions, vehicles, fuel, repairs, and miscellaneous expenses?

A review of RFD standards and performance statistics regarding EMS delivery, as well as results of the focus group were used as procedures to address the research questions stated above. Results showed that current service levels are acceptable, but recommendations are that Rockford's Fire Department should aim to improve its EMS service.

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Introduction

The Rockford Fire Department provides fire suppression, EMS services, river rescue, Hazmat response, Aircraft rescue and firefighting, and technical rescue teams to The City of Rockford and the surrounding jurisdictions. Rockford is located about 70 miles northwest of Chicago and has an estimated population of 150,115 according to the 2000 United States Census. It covers an area of 64 square miles and is considered to be the central city of the Greater Rockford Area (Standards of Cover, 2010). The Rockford Fire Department also provides service to surrounding towns that make up the Greater Rockford Area. These towns include Belvidere, Cherry Valley, Loves Park, Machesney Park, New Milford, Rockton, Roscoe, South Beloit, and Winnebago. Since 2004 the department has maintained company strength of 252 to serve the Greater Rockford Area's total population of 339,178 (Standards of Cover, 2010). Since 1980, when the Rockford Fire Department (RFD) entered into a Mutual Aid Box Alarm System (MABAS) with the surrounding communities, it has taken on a role of paramount importance. RFD has needed to provide emergency services to the northern Illinois region by way of MABAS Division 8. To fulfill all of these obligations, the department makes use of eight engine companies, three quint companies, two ladder companies, and 5 Advanced Life Support (ALS) ambulances.

With the passage of time, the demand for EMS service within the City of Rockford has grown exponentially. The area's increasing need of EMS service, as well as the amount of resources the department is required to employ for this service, make the assessment of its efficiency an overdue necessity. The purpose of this study is to evaluate Rockford Fire Department's EMS service and to provide recommendations for improving service for the City of Rockford and surrounding communities. The descriptive research method utilizing analysis of data was used for this project. In order to properly assess the department's EMS service, three

particular research questions were analyzed: (a) Using criteria from NFPA 1710 and the American Heart Association, is the Rockford Fire Department meeting national standards for cardiac arrest, trauma victims, and extrications? (b) What do the citizens of Rockford want from the department regarding EMS service delivery? (c) Is it cost effective for the department to provide fire-based EMS delivery? By investigating the answers to these questions, the department can better assess the quality and scope of its EMS service and make use of resources in a more efficient manner to benefit the community.

Nationally, EMS generally consists of two main components: first response and patient transport to a hospital or other medical facility. The protocol in many communities is such where the fire department handles the first response portion and a private ambulance firm takes care of the patient transport aspect. Sixty-two percent of fire departments from the 200 largest U.S. cities provide first response EMS and transport, while 38% of the in cities private ambulances handle the transport duties (Balaker & Summers, 2003). Fire-based EMS is paid for largely through local tax dollars and patient fees, the average bill for a patient in the U.S. being $448 as of 2001 (Balaker & Summers, 2003). However, with current financial strains facing many cities, some are reconsidering whether the benefits of fire-based EMS services are truly worth their costs. This places many fire departments in the precarious position of having to prove to their communities that public EMS services are essential to their overall health and well-being.

Background and Significance

The Rockford Fire Department began providing EMS services in 1977 when it assumed responsibility for the city's ambulance service from the Rockford Police Department. It initially made use of two ambulances, Charlie 27 and 28, which were staffed with existing personnel.

Not long after, the department began to expand training to paramedic level. This led to an increase in staffing raising the number of paramedics on duty from five in 1978 to 28 by 1981. In 1986, a third ambulance was added to the department's fleet, followed by a fourth in 1991 (Standards of Cover, 2010). By this time, the expanding number of EMS calls were forcing Rockford's fire department to quickly expand its EMS service capabilities. During the 1990s the RFD increased its number of Advanced Life Support (ALS) certified paramedics and began working toward staffing all fire response vehicles with a minimum of one licensed paramedic. Additionally, it began to equip all fire response vehicles with automated external defibrillators (AEDs) to augment the department's first response abilities. In 2002, the department added a fifth ambulance in response to the city's growing EMS needs. During this period the department reconfigured itself to include a separate training division in an effort to meet the advancing needs of the community, especially in the area of EMS service delivery. In 2009, the Rockford Fire Department achieved ALS First Response licensure through the Illinois Department of Public Health, guaranteeing ALS first response on all EMS incidents.

The Rockford Fire Department currently takes a number of steps to supply the city with the best possible EMS services. For any given medical incident the department's response plan provides for one fire apparatus (four personnel) and one ambulance (two personnel), with special emphasis being placed on preparedness for cardiac arrest incidents. The department also strives to provide equal distribution of coverage in order to help achieve an effective response force (ERF). To make this possible, RFD's five ambulances have been strategically placed at five different stations throughout the city. Furthermore, the department has agreements with local private ambulance providers to ensure the best possible coverage with ALS transport vehicles.

The Rockford Fire Department has three classifications of medical responses which determine the fee charged to the customer. These include basic life support (BLS), advanced life support, level 1 (ALS-1), and advanced life support, level 2 (ALS-2). Due to the differences in levels of service provided by each of these three classifications, the fees for service vary.

For basic life support services, a Resident fee of $580 is charged and the fee for a Non-Resident is $1160. Additional expenses include a mileage charge of $16 per mile and a possible oxygen charge of $16 if that service is utilized. BLS service includes transportation by ground ambulance and the provision of medically necessary supplies and services. Generally, BLS service also includes a fundamental patient assessment and requires only a minimal amount of intervention. This commonly consists of the EMT taking blood pressure, a pulse, and evaluating respirations. Additional, but less commonly required, services include administering oxygen, immobilizing trauma patients, and ensuring that fractured bones are splinted for stabilization on the ride to the hospital.

Advanced life support level 1 is defined as any provision of transportation via ground ambulance along with an ALS assessment or at least one ALS intervention. The Resident fee for this type of service is $630 and Non-Residents are charged a fee of $1260. The mileage and oxygen charges are each $16 as they are with BLS service. ALS crews are dispatched for service when a patient's reported condition requires ALS capabilities to perform the assessment. The primary difference between ALS-1 and BLS services is a requirement of more advanced care, which typically includes the administration of IV fluids to the patient. The most common types of ALS-1 dispatches are for routine cardiac calls.

Advanced life support level 2 is the highest level of medical transport care provided by the Rockford Fire Department. As a result, the fees charged for ALS-2 care are also the highest at $730 and $1460 for Resident and Non-resident fees respectively. The costs for mileage and oxygen are identical to those charged for all other types of EMS services provided by the department. To fall under the designation of ALS-2 service, the medical necessary supplies and services must include at least one of the following elements: at least three separate administrations of one or more medications by intravenous push/bolus or by continuous infusion (excluding crystalloid fluids) and/or at least one of seven ALS-2 procedures. These procedures include manual defibrillation/cardioversion, endotracheal intubation, central venous line, cardiac pacing, chest decompression, surgical airway, and intraosseous line. Advanced life support level 2 services are generally provided in the cases of critically injured trauma patients, acute medical emergencies, and severe allergic reactions.

As a result of the financial issues facing many municipalities today, it is vital to ensure that all services provided to the community are being delivered in the most efficient and practical method possible. As for the delivery of EMS, it is a component of fire service that has been adopted by a majority of fire departments across the country. EMS has come to play a major role in the Rockford Fire Department since its adoption in 1977. In fact, 72% of all service calls to which the Rockford Fire Department responds are for EMS (Standards of Cover, 2010). The research conducted for this project will provide RFD a significant base of information to evaluate the effectiveness of its EMS delivery to the citizens of the Greater Rockford Area. Therefore, the data and analysis produced in this research project will have an impact on the organization in supporting its efforts for the future of EMS as part of the Rockford Fire Department.

The research purpose of evaluating the effectiveness of the Rockford Fire Department's EMS delivery fits well with the third year Executive Analysis of Fire Service Operations in Emergency Management course objectives of preparing senior officers to handle the administrative functions necessary to manage the operational component of a fire and rescue department effectively. The process of identifying the national standards for the delivery of EMS will lead to a more effective basis on which to evaluate the delivery of EMS. In addition, it will provide more managerial expertise to the Rockford Fire Department commanders by giving them the necessary information to effectively evaluate the delivery of EMS to the citizens of Rockford. Identifying and analyzing the citizens' expectations of their local fire department will also provide RFD with what the citizens feel is most important. This knowledge will create an increased awareness on the part of every firefighter of the importance of the department's EMS functions and give them a better understanding of how EMS is evaluated and what the citizens of Rockford expect from the fire department.

This applied research project will attempt to meet two of the United States Fire Administration Operational Objectives: *"To promote within communities a comprehensive multi-hazard risk reduction plan led by the fire service organization" and "To respond appropriately in a timely manner to emerging issues."* These objectives will be met by producing quality data from NFPA 1710, the American Heart Association and citizen surveys, and by using the findings of that research create reports that will inform Rockford firefighters and citizens of the comparative value and effectiveness of the RFD's EMS delivery.

Literature Review

For years Emergency Medical Service nationwide has been evolving into a more central aspect of fire service. This is especially the case in larger cities, which tend to require more responses to medical incidents. Since the need for EMS service is on the rise, the decision to provide a city with fire-based or private service is one facing many departments across the country. Of the 200 largest cities in the United States, 97% now have fire-based, pre-hospital 911 EMS that includes advanced life support (Roberts, 2010). It has also become commonplace to cross-train firefighters in EMS, with almost every firefighter across the country receiving some sort of medical training (Roberts). In fact, it has been found that crossed-trained personnel allow for fire departments to help in the development of new EMS provisions. In the past, fire department personnel have been essential to the testing and development of equipment and emergency procedures which are in common use today (McCormack, 1995). It has also been argued that fire departments' transitioning into larger roles in EMS provision is only natural. Due to fire stations being strategically located throughout cities and the fact that response-time modeling is used for EMS just as it is for fire suppression, having the two services housed under one department seems intuitive. Moreover, since firefighters are already trained to manage high-stress and high-risk situations it seems the furthering of life-saving skills would be the next logical step (Roberts, 2010).

Fire Service-Based EMS Advocates' Chairman Steve Austin described the decision of whether to employ fire-based EMS as a question of quality of life in a city by stating "Good fire protection and good emergency services are a quality-of-life issue. If fire departments step up to provide medical services, it is going to improve the quality-of-life in that community." (Roberts, 2010). There is also a steady stream of support for adding more paramedics to fire departments,

especially through cross-training. Officials in Columbus, Ohio, found the presence of paramedics to be vital to saving more lives in the community. This view was supported by the statistic that the City of Columbus boasts a cardiac arrest survival rate of 12 percent, compared to only 6.4% nationally (Hoholik, 2009).

Viewpoints from both sides of EMS service regarding the quality of employees and the service they provide have also been argued. One issue at the center of the debate is the professionalism of EMS crews. Public sector EMS workers are generally paid higher wages and receive better benefits than their private counterparts (Bodane, 1999). In addition, the turnover rates for private EMS employees have been found to be considerably higher, raising further concern among cities. As a result, the movement of competent workers within the private sector to the public sector has become a common occurrence (Bodane, 1999). Over time, this migration of higher skilled EMS workers has the potential to create a significant divide in service quality between the two sectors. This concern stems from how low salaries of private workers could lead to high levels of attrition, which would then have far-reaching negative effects on the well-being of populations served by these EMS workers (Balaker & Summers, 2003).

If studying this issue purely from the perspective of obtaining EMS service as cheaply as possible, the route of going private makes sense. However, the reality of such a decision is much more complicated than that. Cutting costs in this area brings about questions as to whether the public interest is being served as well as it could be. One view argues the reasons for cost savings on labor should be examined carefully to determine exactly why private service is considerably cheaper (Brown, 1991). In a survey conducted by the Carol Stream Illinois Fire Protection District in 1999, fire departments demonstrated confidence in believing their personnel were the best for EMS services. Out of those surveyed, 56 percent said they had better control over paramedic

workers by keeping the service in-house and 54 percent of departments indicated that their employees were capable of providing better service than private EMS workers (Bodane, 1999). This view was reinforced in a study done on the first responder network in Bexar County Texas the same year. Dispatchers working for the county reported having a more difficult time working with medics from the private firm, American Medical Rescue (AMR), which they attributed largely to a lack of experience (Winn, 1999). Along with pay, research has also shown that there are significant gaps in levels of job satisfaction between public and private EMS workers. One study found an especially notable link between satisfaction levels of EMS workers in the dual role of firefighter/paramedic. It was observed that having these dual roles actually reduced job-related stress and even contributed to enhanced performance (Benson, 1993).

Those in favor of privatizing EMS service over using fire-based service argue that it has a number of advantages. One argument contends that private providers generally combine more advanced technologies, as well as better system designs into their service (Balaker & Summers, 2003). A major component discussed in this argument is automatic vehicle location (AVL) technology. This important system gives EMS providers the ability to quicken response times by locating and then dispatching the ambulance currently closest to an emergency site. According to the Journal of Emergency Medical Service (JEMS), private providers are much more likely to possess this technology, with 40 percent reporting use of this system compared to only 20 percent of fire departments (Balaker & Summers, 2003). Other key technologies used by EMS providers are defibrillation devices used for treatment in cardiac emergencies. JEMS found that 70 percent of private EMS providers reported using this equipment, while use by fire departments was only 40 percent (Balaker & Summers, 2003).

The difference in methods for staffing between public and private providers is also a point of contention. Many private EMS services utilize "peak-load staffing" that breaks from the traditional 24-hour shifts employed by fire departments. As a result, more private EMS employees are staffed to work shorter shifts during peak call times (Balaker & Summers, 2003). Since fire departments dominate first responder services, especially in America's 200 largest cities, the "peak-load staffing" used by private EMS companies certainly has the ability to reduce response times and improve service to citizens.

Privatization advocates also point to the idea that even if EMS service is privatized, elected officials and public administrators will still maintain control over services with strong oversight roles. Furthermore, if contracts with private providers are shrewdly crafted, accountability and strong performance can be assured (Balaker & Summers, 2003). This would be accomplished by establishing clear performance objectives and a given timeframe for their achievement. If objectives are not met, EMS providers would face financial penalties or even cancellation of the contract in the most extreme cases. Advocates of EMS privatization make sure to add that service contracts only last for limited amounts of time, so once a contract expires the local government can make changes to EMS services in an effort to best fulfill the needs of its citizens (Balaker & Summers, 2003).

Other proponents of privatized ambulance companies for EMS service contend that there are many distorted perceptions about the privatization of this service. First, they emphasize that privatization promotes a specific process of open, competitive bidding that helps to provide the customers (i.e. the taxpayers) with the best possible service for the most competitive price (Balaker & Summers, 2003). They maintain that rather than being a debate of public versus private or an altruistic motive versus a profit-driven motive, the issue is really about competition

versus monopoly. An emphasis on this point is that private firms are not the only ones who are self-interested. Public agencies, such as fire departments, want to maintain responsibilities in order to increase their budgets, thus protecting jobs (Balaker & Summers, 2003).

On the whole, nearly all of the literature researched seems to share one common theme: in most cases a hybrid system of public and private EMS providers working together will be the most effective. There are a multitude of examples citing cities and counties across the U.S. that created cooperative agreements between fire departments and private providers in order to supply their citizens with the best possible EMS service. Notable examples of communities demonstrating success with such a union include Lincoln, Nebraska, Salt Lake City, Utah, and Clackamas County, Oregon (Heightman, 1994). The City of Richmond, Virginia, also revamped its EMS system in 1991 by embracing a public-private partnership model that greatly improved the effectiveness and efficiency of its services and is now considered a worldwide model for performance (Balaker & Summers, 2003). Although each community is going to be different based on the unique challenges and advantages it possesses, willingness between public and private sectors to work together on EMS service has been shown to pay dividends in many cases.

Finally, regardless of the type of system chosen to provide Emergency Medical Service, the National Fire Academy did provide a useful six-step plan for assembling EMS service with its "EMS Leadership/Management Process" plan (Sachs, 1995). The first step involves developing and adopting a clear vision for an effective and viable EMS system that can be consistent. Second, a system of analysis must be established to provide a baseline from which to lead that system toward fulfillment of its mission. The third step consists of establishing plans that will lead to the accomplishment of the vision. Fourth, the plans and policies decided on must be directly implemented and then monitored effectively through the use of sound

techniques in the fifth step. Finally, the plan should be revised effectively to fix any issues within the system and improve it for the future (Sachs, 1995).

Procedures

The procedural methodology for assessing the three research questions concerning the Rockford Fire Department's delivery of EMS service involved making use of a variety of materials. The first question addressed in this research was: Based on criteria from NFPA 1710 and the American Heart Association, is the Rockford Fire Department meeting national standards for cardiac arrest, trauma victims, and extrications? Two main sources were primarily used to answer this question. These are the 2010 Edition of NFPA 1710-Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments and the latest edition of the Rockford Fire Department's Standards of Cover, released June 1, 2010.

The second research question posed in this research was: What do the citizens of Rockford want from the Rockford Fire Department regarding EMS delivery? This question was addressed via a community external stakeholder group meeting held on September 12, 2007. The department sent out a total of 309 invitations to a diverse group of citizens within the community in order to capture an accurate portrait of Rockford's population. The list of participants was compiled using a neighborhood association list, RFD past survey participants, names provided by city Aldermen, and the Chamber of Commerce list, as well as an additional list compiled by the city. The community meeting yielded a total of 81 citizen participants.

This meeting consisted of three sections which were a discussion of strategic planning, a service prioritization exercise, and a customer input form. The discussion of strategic planning allowed for department leaders to share with citizens their vision and mission for the fire department's short-term and long-term future. It helped to clarify questions about the Rockford Fire Department and its role within the Rockford community. A service prioritization exercise was also handed out to all meeting participants to determine how they valued nine core services provided by the department. These services included fire suppression, basic rescue, advanced rescue, advanced life support emergency medical services, fire inspections, fire investigation, hazardous materials mitigation, community fire/EMS safety education, and response to weapons of mass destruction/bioterrorism. Participants were asked to rank these services on a point scale ranging from 1 to 9, 1 being least satisfactory and 9 being most satisfactory. The point totals were then tallied to determine how participants ranked each individual service. The third exercise used during the external stakeholders meeting consisted of a customer input form that encouraged citizens to voice their specific thoughts and suggestions concerning the department and its future. This was essentially the "comments" section of the meeting, wherein participants had the freedom to share more specific ideas.

The final research question presented was: Is it cost effective to provide fire-based EMS delivery, including covering all costs of personnel, pensions, vehicles, fuel, repairs, and other miscellaneous expenses? This third question made use of the most data out of all the questions, largely due to its quantitative nature. Billing information from the past year, through the department's billing agency, Med3000, was utilized to show charges and revenues over the past year, as well as department records documenting current rates for various EMS services. Additionally, the department made use of a survey it took documenting the rates charged by

private ambulance providers within the City of Rockford. The 2009 update of the Naperville Fire Department Ambulance User Fee Survey was used to assess charges by other departments and providers within the Chicago/Northern Illinois region. The 2010 Rockford Fire Department Standards of Cover was also used for assessing response times by the department for comparison with those of private ambulance providers.

There were a few limitations on the methods used to assess the quality of EMS delivery by the Rockford Fire Department. In order to gain more comprehensive feedback from the citizens of Rockford, additional focus groups or surveys could have been employed to provide a larger data sample. This was especially true of the focus group, whose 81 citizen participants were most likely not an accurate representation of Rockford's population of roughly 150,000. Furthermore, additional survey data regarding ambulance user fees in the area would have allowed for this research to paint a better picture of the average costs for similar cities.

Results

(a) Based on criteria from NFPA 1710 and American Heart Association, is the Rockford Fire Department meeting national standards for cardiac arrest, trauma victims, and extrications?

Realizing the growing concern over the importance of providing the best possible EMS service delivery, the Rockford Fire Department has continued to strive toward constant improvement in this area. One of the central aspects of this task is ensuring that the department is in compliance with the criteria of both NFPA 1710 and the American Heart Association. More specifically, the department is trying to focus on ensuring that all standards are met in the areas of cardiac arrest, treatment of trauma victims, and extrications. In addition, RFD is also focusing on constant improvement in EMS response times. By placing a strong emphasis on

these areas, the Rockford Fire Department is working toward making Rockford an even better protected city.

NFPA 1710 provides a number of guidelines pertaining to EMS services provided by the Rockford Fire Department. Its sections cover EMS system functions, treatment levels, training levels, staffing, service delivery deployment, quality management, medical personnel review, and special operations response. NFPA 1710 Section 5.3.1 requires that the department clearly document its roles, responsibilities, and functions. Once these factors have been determined, the department must organize its emergency medical capabilities to include the proper personnel, equipment, and resources accordingly.

Section 5.3.3 of NFPA 1710 covers EMS system functions, which includes five core components. First, the initial response must be able to provide medical treatment at the location of the emergency. This requires that all first responders have at a minimum an automatic external defibrillator. Also required are ALS response, BLS response, and patient transport in an ambulance or other vehicle capable of providing uninterrupted patient care while en route to a medical facility. In addition, this section stipulates that staffing requirements be based on minimum levels needed to provide sufficient patient care along with member safety.

To meet the standards set by NFPA 1710, the Rockford Fire Department has established a number of parameters. First, all department fire response vehicles are licensed at the ALS level and equipped with AEDs. Additionally, they are all staffed with a minimum of one EMT-Paramedic and three EMT-basics. All of the department's five ambulances are licensed at the ALS level and are also staffed with one EMT-paramedic, as well as one EMT-

basic. Medical incidents are responded to with an effective response force (ERF) of a fire apparatus and ambulance to comply with Section 5.2 of NFPA 1710.

Another central aspect of NFPA 1710 standards are service delivery deployment times. Standard 5.3.3.3 requires that the department's EMS provide a first responder equipped with AED within a 240 second (4 minute) travel time to 90 percent of established incidents. To assess whether or not the department was in compliance with this standard, it evaluated EMS arrival times over a three-year period encompassing July 2006 to June 2009. During this period, the 90th percentile first arrival time on EMS calls averaged a time of 5:16. During year one of evaluations the average time was 6:00; in the second year time dropped to an average of 4:43; and the third year averaged a similar time of 4:48. Additional analysis showed that the department was able to comply with the NFPA 1710 standard approximately 74% of the time (Standards of Cover, 2010). These results indicate that the Rockford Fire Department needs to show significant improvement in its EMS response times. However, these numbers also demonstrate that the department is within range of the benchmarks and, with continued progress, will be able to fully comply within the foreseeable future.

Along with first responder arrival time standards, NFPA 1710 guidelines also require arrival of an ALS responder within 480 seconds (8 minutes) 90 percent of the time. During the three-year evaluation period, the department's average time was 8:09 for this requirement (Standards of Cover, 2010). Like the first responder arrival time guideline, RFD's EMS units are close but still fall short of fully meeting the benchmark. Incidents that required extrication services were included in the three-year analysis of response times done between July 2006 and June 2009. During this period, a total of 61 incidents required extrication. For these incidents,

the average first-arrival time was 5:18 and the effective response force (ERF) averaged a time of 8:09 (Standards of Cover, 2010).

(b) What do the citizens of Rockford want from the Rockford Fire Department regarding EMS delivery?

To adequately answer this question, the Rockford Fire Department arranged and held an External Stakeholder Meeting which took place on September 12, 2007. This meeting brought together a variety of stakeholders from throughout the City of Rockford to gain input on the past and present performance of the fire department, as well as to help determine its direction for the future. A significant part of this assessment involved examining the strengths and weaknesses of EMS service delivery by the department. The 81 stakeholders that participated in this event gave important feedback that helped to supplement feedback supplied from surveys the department conducts on a regular basis. A sample of this survey is located in Appendix A.

The external stakeholders meeting provided the department with a significant amount of insight on its EMS strengths and weaknesses. This meeting also helped clarify department expectations and priorities held by citizens in the Rockford area. Citizens' feedback was measured by ranking nine basic services delivered by the department in terms of importance. These services included ALS (Paramedic) EMS, Fire Suppression, Basic Rescue, Advanced Rescue, Hazardous Materials Mitigation, WMD/Bioterrorism, Fire Inspection, Fire Investigation, and Community Fire/EMS Safety Education. The survey allowed participants to rank each of the nine services against one another, head-to-head, with a point being awarded to each service that was more highly prioritized. The points were then added to determine which of the nine

services should be given top priority by the department. As indicated in Appendix B, the results of the survey indicated that ALS (Paramedic) EMS was considered to be the most important service by Rockford citizens (Standards of Cover, 2010). ALS beat out Fire Suppression Service by a score of 487 to 465, supporting the idea that EMS service is becoming an increasingly important aspect of the fire service.

The external stakeholders meeting also allowed citizens the opportunity to voice more specific concerns and expectations by using a customer input form. The form had sections for citizens to cite their expectations, concerns, views on the strengths and weaknesses of the department, as well as any other additional remarks. From this data, a number of important insights on the department's EMS services were obtained. Citizens expected the department to respond quickly to all types of medical emergencies and to do so with the proper expertise, as well as up-to-date equipment. Additionally, citizen remarks showed that RFD personnel were expected to be knowledgeable, well-trained, courteous, and professional. Furthermore, results also demonstrated a strong expectation that the department form active partnerships with local healthcare providers in order to provide a smoother patient experience. Lastly, citizens expected that the department work continuously toward improvement in the area of EMS services to ensure the attainment of higher standards and the best possible quality.

In addition to expectations, this meeting also produced a number of citizen concerns regarding the Rockford Fire Department's EMS services. Many concerns centered around the issue of response times and the department's ability to thoroughly cover all parts of the city. These included concerns about the number and location of fire stations, the number of ambulances in use at any given time, and more specifically, coverage on the expanding far east side of the city. The Rockford Fire Department's eleven stations and locations are illustrated in Appendix C. Also of major concern to

citizens, was whether or not the amount of EMS staff and equipment was keeping up with the growth of the community and its demand for the service. Some citizens perceived the department as not placing as high a priority on EMS service as compared to fire, resulting in questions about equipment quality and proper training of personnel.

Overall, the external stakeholders meeting provided mostly positive feedback regarding the Rockford Fire Department's delivery of EMS services. Most considered the service provided to be excellent, with personnel being compassionate and professional. However, there was also quite a bit of sentiment echoing a concern over the size of the Rockford Fire Department's EMS operations and the ability to adequately cover the city.

(c) Is it cost effective to provide fire-based EMS delivery with all the included costs of personnel, pensions, vehicles, fuel, repairs, and miscellaneous expenses?

Achieving a cost-effective way to provide quality EMS service delivery to the citizens of Rockford is one of the primary goals of the Rockford Fire Department. One central issue surrounding delivery of EMS is the amount of revenue the department is able to realize from providing this service. Over the past year, from August 2009 to July 2010, the department's EMS services generated total gross revenur of $9,962,301 and collected total gross receipts of $4,525,463 on an aggregate of 14,028 transports. This resulted in an average of $322.60 per transport for an average intake of approximately $377,122 per month (MED3000 Fire/EMS Administrator Summary, 2010). Unfortunately, yield rates were disappointing, as an average of only 45.4% of gross charges were actually collected. The overwhelming majority of gross receipts were received from insurance payers. The top insurance payers included Illinois Medicare, the Illinois Department of Public Aid,

Blue Shield of Illinois, Commercial Electronic, Commercial Paper, Medicare HMO, auto insurance, United Healthcare, and workers' compensation.

To gain some perspective on its ambulance user fee charges and receipts, the Rockford Fire Department made use of a 2009 survey conducted by the Naperville Fire Department. In its 14th year of being conducted, this survey is considered a very valid and helpful tool for both fire departments and ambulance services in the Chicago area. To gain a wide-enough perspective on how various agencies across the area administer fees for ambulance services, 75 different agencies were surveyed. The results found that 68 of them (91%) charged a resident user fee and 71 agencies (95%) charged a non-resident fee. The average resident costs for BLS, ALS-1, and ALS-2 were $411.11, $536.72, and $456.30, respectively. The same fees for non-residents averaged $562.17 for BLS, $724.87 for ALS-1, and $582.76 for ALS-2 (Naperville Ambulance User fee Survey, 2009). The Rockford Fire Department resident fees are currently $730 for ALS-2, $630 for ALS-1, and $580 for BLS services. For non-residents, the ALS-2 fee is $1460, the ALS-1 charge is $1260, and BLS is $1160.

The survey also found that a large majority of agencies within the area charged a mileage fee for distance traveled during transport with 80% of those surveyed reporting this practice. The average fee per mile for residents was $10.65 while it was $10.l7 for non-residents. The majority of agencies surveyed made use of private billing services with 64 out of the 75 agencies (85%) participating in this practice. Not as common were the practices of updating fees in the past year (only done by 27% of those surveyed) or utilizing itemized billing for services (just 17% took part in this). Finally, the overall average collection rate for the agencies surveyed was 72%.

When comparing the statistics of the Rockford Fire Department's EMS services to those in this survey, some important inferences can be made. The most alarming of these is the immense difference in collection rates between RFD's EMS service and the average rate of the agencies surveyed. At 45.4%, the collection rate by the RFD EMS service in the last year is almost 27 percentage points lower than that of the 75 surveyed agencies. This number could largely be attributed to demographic differences between the City of Rockford and the Chicago area. Factors such as unemployment rate, average income, and demographic groups that make use of EMS, as well as how often they do so, likely played a significant role in the difference in collection rate.

In Rockford there are currently four private firms providing ambulance service. These firms are ATS Medical Service, Lifeline Ambulance, Metro Medical Services, and Superior Ambulance. Data on fees charged for ALS-1, ALS-2, and BLS services as well as cost for mileage was collected for each of these companies with the exception of Superior Ambulance, which could not be reached. The fees were then compared directly with those charged by the Rockford Fire Department for EMS service.

This research revealed that for basic life support services ATS charged a fee of $370, compared to Lifeline charging $444, and Metro at $430. For the same service, the Rockford Fire Department charges a considerably larger fee of $580. Other EMS services that are provided by both the Rockford Fire Department and the private ambulance providers are advanced life support services, ALS-1 and ALS-2. For ALS-1 service, ATS charges a fee of $570, Lifeline charges $528, and Metro is $517.50. Again, the RFD's EMS fee for this service is higher at $630. For ALS-2, the ATS fee is $670, for Lifeline it is $774, and Metro is $634.50. The fire department's charge for ALS-2 is $730, a fee higher than all but Lifeline. Lastly the mileage

charge for the Rockford Fire Department weighs in at $16, while it is only $12 for both ATS and Lifeline, and $13 for Metro Ambulance.

If one goes purely by fee charges, the private ambulance services in Rockford are less expensive than the EMS services provided by the fire department. However, when taking in these numbers it should be noted that, although the services may be the same on paper, they are not necessarily equal in practice. In the analysis of emergency medical service ERF travel times documented between July 2006 and June 2009, alarming differences between RFD ambulances and private ambulances were found. During the first year of this analysis, the average travel time for an RFD ambulance was 7:20, while for its private equivalent it was 10:56. For year two, RFD averaged a time of 8:19 and private providers clocked in at 12:43. Similar results were found during the third year with RFD's time being 8:36 compared to 12:30 for private EMS providers (Standards of Cover, 2010). The overall average time came to 8:03 for the Rockford Fire Department versus 12:32 for private ambulance companies. This data shows almost a 50% increase in response times for cases where private ambulances were utilized rather than RFD ambulances. The consequences of these dramatically slower response times are further reaching than it initially appears. Slower service by private providers could cost lives as the rapidly growing volume of calls within the city in recent years has resulted in lower availability of RFD ambulances, which are tied up with calls approximately 70% of the time. The end result is more difficulty for the department in the way of achieving its performance goals in providing the highest possible levels of protection for the city.

Another issue lies in how private providers have to contend with a much higher employee turnover rate than the Rockford Fire Department. The private ambulance personnel are less likely to be as experienced and skilled in their positions. Even if they are skilled,

competent professionals, they may tend to change positions more frequently (Winn, 1999). Fire department personnel are also likely to be more passionate and meticulous about their job duties, as well as likely to be more motivated by better compensation. Moreover, many Rockford Fire Department responders are crossed-trained and therefore more prepared to deal with extensive types of situations while providing life-saving services to the citizens of Rockford. Finally, because private providers do not have strategically placed stations throughout the city as the fire department does, they may be limited in their ability to obtain the fastest possible response times or coverage areas.

Discussion

The major purpose of this research was to evaluate the effectiveness of the Rockford Fire Department's EMS delivery with regards to criteria from NFPA 1710, the American Heart Association, and feedback from citizens of Rockford. The cost effectiveness of providing fire-based EMS delivery was also investigated. The first research question focused on whether or not the Rockford Fire Department is meeting national standards for EMS delivery for cardiac arrest, trauma victims, and extrications. The importance of being able to respond in a timely manner for these types of calls for service has been documented by researchers for many years.

The Rockford Fire Department believes, as do most fire departments, that they offer the best possible service to the community. When looking at how to evaluate that statement and more specifically, the delivery of EMS to the citizens of Rockford, the research data needed to be compared to national standards to determine the effectiveness of the EMS delivery of the Rockford Fire Department.

The Rockford Fire Department has made it an organizational objective to meet or exceed the NFPA 1710 Standard for EMS response. Over the years the department has continued to improve on its EMS delivery by working closely with resource hospitals and by researching new and improved methods of emergency medicine. The adoption of AEDs, Continuous Chest Compressions (CCC), all ALS fire trucks staffed accordingly and responding to scenes within the NFPA Standard 74% of the time (Standards of Cover, 2010) has significantly impacted that goal. With the adoption of CCC the department has been able to improve the save rate for cardiac arrest to 23.64 percent, compared to the national average of only 5 percent (Standards of Cover, 2010). Fire Service-Based EMS Advocates Chairman Steve Austin described the decision on whether to employ fire-based EMS as a question of quality of life in a city by stating "Good fire protection and good emergency services are a quality-of-life issue. If fire departments step up to provide medical services, it is going to improve the quality-of-life in that community" (Roberts, 2010). The adoption of the Continuous Chest Compression (CCC) program is a direct result of the fire department working closely with the resource hospital to implement a trial program and determine if there is a better way to treat cardiac arrest patients and have better success. In fact, it has been found that crossed-training personnel allows fire departments to help in the development of new EMS provisions. In the past, fire department personnel have been essential to the testing and development of equipment and emergency procedures which are in common use today (McCormack, 1995).

This research along with the Standards of Cover identified deficiencies in the area of response to extrications by the Rockford Fire Department. In the three-year period analyzed, the ERF time was 8:09, which is a direct result of having only two extrication units to cover the city

of Rockford. Typically, the majority of trauma victims in Rockford are a result of motor vehicle crashes (Standards of Cover, 2010).

Soliciting input from the citizens of Rockford identified that the cross section selected rated the ALS EMS delivery the most important service provided by the Rockford Fire Department. Providing a consistent level of care to all citizens that call for EMS service in the City of Rockford is an organizational goal (Standards of Cover, 2010). Providing the same level of service to a person in need regardless of race, color and socio-economic factors is the foundation for public service. A trained, consistent workforce that respects the community it protects is vital to the success of consistent treatment. Turnover rates for private EMS employees have been found to be considerably higher, raising further concern among cities. Stemming from this occurrence is the common movement of better workers within this area to the public sector when the opportunity presents itself (Bodane, 1999).

Conducting a cost analysis of EMS delivery for fire departments is an exercise that is not common throughout the industry. The challenges that many municipalities are experiencing with increasing expenses and dwindling revenue is causing communities and elected officials to examine every service that is provided to taxpayers. The analysis of the Rockford Fire Department taking all costs associated with providing EMS and comparing that with the revenue generated from EMS billing for the year of 2009 showed that it is cost effective to provide EMS service. The revenue generated in 2009 was more that the expenses generated, which includes personnel, pension, health care, vehicles, fuel, repairs, and supplies.

Organizational Impact

The results of this research will provide important information for immediate application in the operational, administrative, and EMS sections of the Rockford Fire Department.

Agency personnel will be able to: (a) evaluate current responses for EMS with standard criteria; (b) focus on needs and expectations of the community; (c) create continuous data to analyze the effectiveness of the EMS delivery; (d) provide a detailed cost analysis of the fire-based EMS delivery model for the Rockford Fire Department; and (e) create an annual model that will allow for the evaluation of effectiveness of the Rockford Fire Department's EMS delivery.

Recommendations

This research identified criteria that can be applied to improve on the EMS delivery of the Rockford Fire Department. Prior to this research, the effectiveness of the Rockford Fire Department's EMS delivery has never been evaluated with regard to survival rates, customer expectations, or cost effectiveness.

It is recommended that the Rockford Fire Department begin addressing the deficiencies in response coverage for fire suppression units along with ALS ambulances. The prolonged response times are a direct result of the increase in calls for service and the deficiency of coverage. The current resources need to be improved upon by redistribution or adding additional coverage to meet the NFPA 1710 Standard and American Heart Association criteria for cardiac arrest, trauma victims and extrications. Once changes are implemented it is recommended that

the evaluation of response times and deployment of resources be evaluated again to determine the effectiveness of the EMS delivery.

In order for any organization to be successful they must know what customers want and expect. It is imperative that any fire department solicit input from the community that they are protecting to determine what the citizens expect from their department. In doing so, the Rockford Fire Department learned that ALS EMS was the most important service to the cross section of individuals solicited during the Accreditation process. Further solicitation of input should be gathered from the community on an annual basis to involve the community in service that directly impacts their lives. It is logical that citizens would rate the service that they would be most likely to utilize as the most important. It is now the responsibility of the Rockford Fire Department to continue to improve on the delivery of that service.

One component that many fire departments are reluctant to analyze is the cost effectiveness of the EMS delivery provided. This is something that has never been completed by the Rockford Fire Department prior to this research. It is essential for any business whether private or public to know what costs are involved in the service they provide. Analyzing the entire EMS delivery by calculating the personnel, pension, healthcare, vehicles, fuel, repairs and supplies has provided tremendous insight on what is the true cost of providing EMS delivery. It is recommended that every agency conduct a cost analysis of their EMS delivery on an annual basis. During these challenging financial times departments must have the information necessary to justify the cost effectiveness of providing EMS to their communities.

In summary, the data and research in this study show a path for conducting an executive analysis of EMS delivery in fire service operations that will allow the senior staff, elected officials,

and public to evaluate the effectiveness of the EMS delivery. The evaluation will be based on national standards, community expectations and the cost effectiveness of providing the service.

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Appendix A

Customer Centered Strategic Plan

Prioritization of Services

Listed below are the services that the Rockford Fire Department will be evaluating during the strategic planning process. We will take a moment before we ask you to prioritize these items (through a direct comparison process) to explain the services so you have a good understanding of each.

Once this explanation is given, please compare each service against the others, circling the service that you feel is more important in each instance. The facilitator will give you an example.

SERVICES

1. Fire suppression (any type of fire extinguishment, i.e. buildings, vehicles, natural cover)
2. Basic rescue (vehicle extrication, machinery entrapment)
3. Advanced rescue (confined space, high-angle, water, trench, collapse)
4. Advance Life Support emergency medical services (ALS – Paramedic Service)
5. Fire inspections (fire code enforcement in occupancies)
6. Fire investigation (fire cause and origin determination and investigation)
7. Hazardous materials mitigation (dangerous substances threatening life or environment)
8. Community Fire/EMS Safety Education (public education activities)
9. Response to Weapons of Mass Destruction/Bioterrorism (response to terrorist action)

1	1	1	1	1	1	1	1
2	3	4	5	6	7	8	9

2	2	2	2	2	2	2
3	4	5	6	7	8	9

3	3	3	3	3	3
4	5	6	7	8	9

4	4	4	4	4
5	6	7	8	9

5	5	5	5
6	7	8	9

6	6	6
7	8	9

7	7
8	9

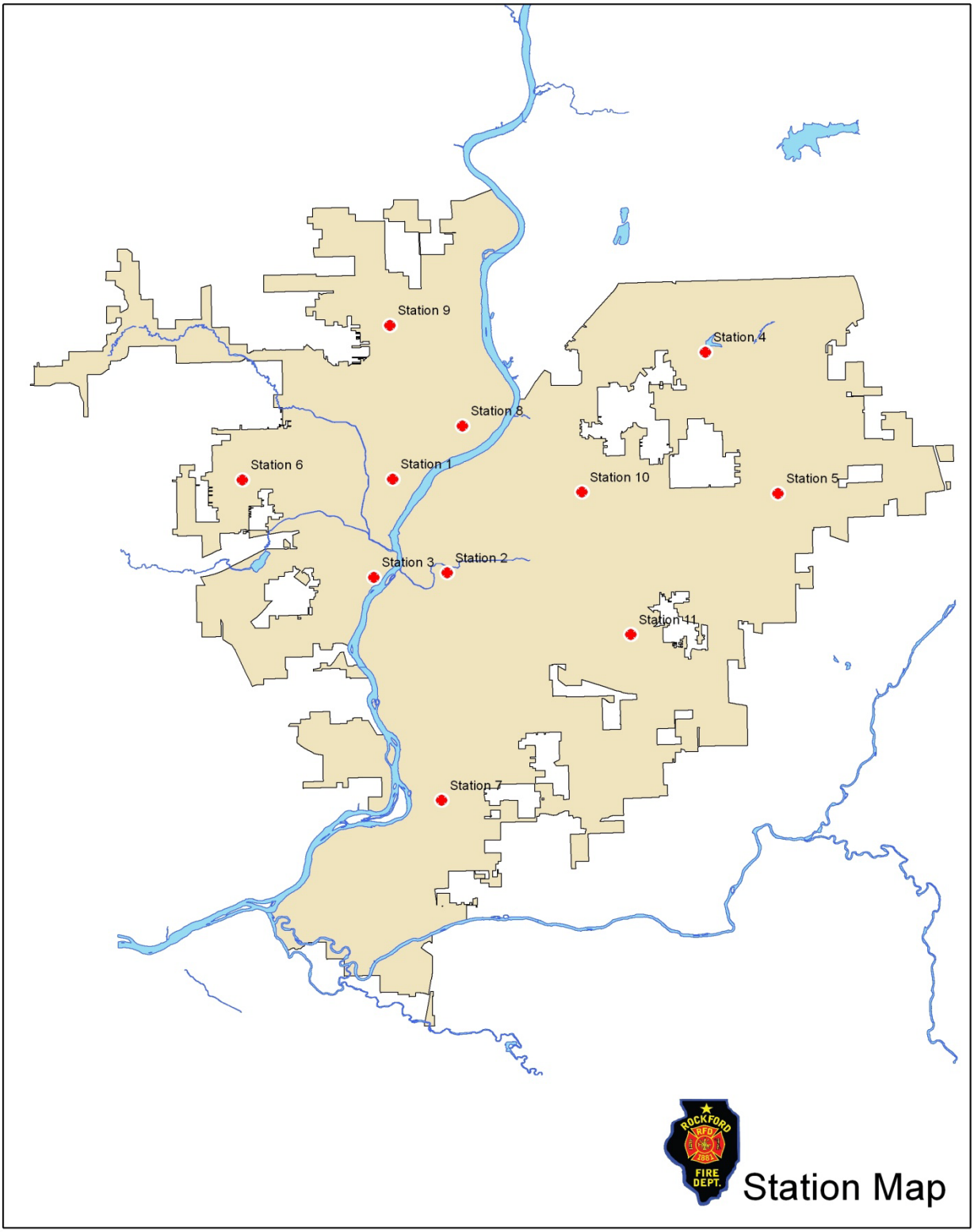
8
9

Appendix B

Service Priorities as Identified by the Citizens' Group for the Rockford Fire Department

Services	Ranking	Score
ALS (Paramedic) EMS	**1**	**487**
Fire Suppression	**2**	**465**
Basic Rescue	**3**	**373**
Advanced Rescue	**4**	**341**
Hazardous Materials Mitigation	**5**	**320**
WMD/Bioterrorism	**6**	**251**
Fire Inspection	**7**	**203**
Fire Investigation	**8**	**161**
Community Fire/EMS Safety Education	**9**	**134**

Appendix C


Station 9
Station 4
Station 8
Station 6
Station 1
Station 10
Station 5
Station 3
Station 2
Station 11
Station 7
ROCKFORD
RFD
1911
2881
FIRE
DEPT.
Station Map