

Running Head: EMS TRANSPORT MODELS

The Evaluation of EMS Transport Models for the Boulder Rural Fire Department.

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Certification 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.

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Abstract

The problem was that the Boulder Rural Fire Department did not know what the advantages and disadvantages of the two existing department EMS transport models were. As such the department was in a prime position to compare and contrast aspects of both fire-based EMS and private ambulance EMS transport service. The purpose was to determine what the advantages and disadvantages of the two existing department EMS transport models were.

Descriptive research was utilized to study the existing models in order to determine a course of action and to arrive at a series of recommendations for the department. The research included literary review of industry recommendations, models, and reports on service delivery, as well as reviews of response data, drive time maps, interview information from the private ambulance company director, and financial reports from the fire district. The results indicated that the department was on a responsible path; however, there were opportunities to either change the service model slightly to improve quality and continuous quality improvement endeavors or to look into sole source fire-based EMS transport through the creation of joint response areas with neighboring volunteer agencies.

Recommendations were made to Boulder Rural Fire Department to improve their in-house EMS program and thereby initiate a leadership role in the EMS delivery and CQI program in their current partnerships, and to continue to evaluate EMS delivery systems and costs to determine what the optimal time to consider sole source fire-based EMS transport would be if appropriate.

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Introduction

Following the publication of the white paper *America Burning*, commissioned by President Richard Nixon in 1972 and completed/submitted in 1973, fire agencies began to re-examine their roles in the delivery of emergency medical service (EMS) to the communities they serve (Neville, 1973). Since that time there has been a substantial investment in research, time, capital and training to provide the recommended service to their communities.

Boulder Rural Fire Department is in a particularly unique position in that they have partnered with a neighboring fire department, Mountain View Fire Department in Longmont Colorado, and Boulder County's private ambulance service provider, Pridemark Paramedic Service (now a subsidiary company of Rural Metro corporation) to provide EMS transport service in concert with our fire-based advanced life support (ALS) company level service. What is particular to this arrangement is that the district is divided geographically for response time and utilizes the EMS transport service located to provide the fastest response capability.

The problem is that the Boulder Rural Fire Department does not know what the advantages and disadvantages of the two existing department EMS transport models are. On the one hand, the private company that services the Boulder County contract for ALS transport provides service at no cost to the department; the costs are covered through transport billing. On the other hand, Boulder Rural Fire Department provides three full time career EMTs, including benefits and pension, to the status two ambulance crews based in the Mountain View Fire Department district. Mountain View Fire Department provides the full time career paramedics, ambulance, and quarters for the staffed apparatus. Boulder Rural Fire Department needs to study

the situation to determine which if either of these models is more beneficial to the taxpayer, or if continuing in the current model is in the best interest of the community.

The purpose of this applied research project is to determine what the advantages and disadvantages are of the two existing department EMS transport models. This applied research project will use the descriptive research method as instrument to ascertain the answers to the following questions: a) What are the costs associated with each of the two models to the department and to the patient? b) What are the service quality challenges with each of the two models? c) What are the emergency and non-emergency response times for each of the two models? d) What quality assurance mechanisms does each of the models provide?

Background and Significance

The Boulder Rural Fire Protection District encompasses 25 square miles in unincorporated Boulder County. There are approximately 17,000 full-time residents living in approximately 7,000 residences. The fire department serves the following response models: light industrial, commercial, residential in the following demographics: suburban, rural and mountain rural. The department provides structure fire, wildland fire, advanced life support (ALS) EMS, hazardous materials, light crash rescue, ice rescue, water rescue, low-angle rope rescue and car seat inspection services from a single engine company manned station.

Boulder Rural Fire Department is a combination fire department utilizing both career and volunteer members. The response staffing for the engine is status four, a paid officer, a paid engineer, and either one paid firefighter and one volunteer firefighter or two volunteer firefighters. The hiring process for career and volunteer members is identical, and all members are held to the same training and certification standards. All members are Colorado State certified at their level of training, and all certifications must be maintained as current. The volunteer membership self-assigns four 12 hour shifts a month, the career members are assigned to a 48/96 shift platoon schedule. There are 15 career members and 30 volunteer members currently at Boulder Rural Fire Department.

The district was formed in 1957 to provide protection for the county areas east, north and west of the City of Boulder. Originally, the Boulder Rural Fire Protection District provided fire services to their proscribed area. Through their response and assessment of community needs, they added first responder level emergency medical service (EMS) to their response services. At that time, the goal was to have at least one member from the fire department on scene to initiate

scene stabilization and assist the ambulance crew as needed. So began an evolutionary process within the department where first responders were trained to the emergency medical technician-basic (EMT-B) level to provide more comprehensive assistance and patient care on-scene.

Boulder Rural Fire Department is a progressive department, and as a result of the voluntary certification of EMT-Bs the service goals and levels of the department grew from all-volunteer with a mix of certification and abilities to the homogenous group it is today. Boulder Rural utilizes both career and volunteer members, and provides first due engine companies staffed with a firefighter paramedic.

In April 2007 Boulder Rural Fire Department entered into a joint response agreement with the Mountain View Fire Department, which borders the district on the north and east. The agreement, which came to be known as the Joint Response Area (JRA), provided for the Mountain View ambulance, jointly staffed with a paramedic from the Mountain View Fire Department and an EMT-B from the Boulder Rural Fire Department, would provide ALS ambulance first response to the Boulder Rural fire protection district to a certain boundary on the south and west sides of the district, and in exchange, in addition to providing one career EMT-B per shift for the ambulance, Boulder Rural Fire Department would respond into the Mountain View fire protection district as the first due fire company, to a point determined through ARCview® software where the next closest engine from Mountain View Fire Department would meet the Boulder Rural engine during a response.

For the western portions of the district, the Boulder Rural uses the County contracted private ALS ambulance provider, Pridemark Paramedic Service. The posting locations routinely utilized by Pridemark places them geographically in an opportune position for rapid response

into the western/mountain portions of the district, often allowing them to arrive prior to the engine. Given the status of the County contract, the ambulance service is provided by Pridemark for only the expense of the transport which is billed to the patient. The district incurs no additional expense for this service.

The intended benefits of the JRA included exploration into fire-based EMS without an enormous capital expenditure for staffing and equipment. By utilizing the agreement, Boulder Rural needed to hire three EMT-Bs to staff an existing ambulance, but did not need to hire a full crew to staff the ambulance or carry the burden of the additional capital expenditure of an ambulance and equipment. Additionally, the goal was to be able to respond to all calls with two more trained all-hazard responders. Pridemark Paramedic Service provides highly trained well qualified medical responders who are not cross-trained for all hazards response. In the event of any response outside the scope of a medical call that required an ambulance stand-by saw the crew from Pridemark waiting patiently in case their service was needed.

The response model that has been developed by Boulder Rural Fire Department is unique in that it allows one to objectively look both at fire-based EMS and private ambulance service side by side in a single district. This is significant both from an economic and a service delivery perspective. The economic perspective is derived from the cost of the service provided, both the front-end or initial staffing costs and projections to the personnel budget for providing the additional personnel required to mount fire-based ALS EMS response, and on the delivery end through direct ambulance service cost to the patient. The service delivery perspective is derived through the accountability and accessibility of response personnel, and begs the question whether speed of delivery affects the quality of service or the ability to manage personnel and provide appropriate oversight delivers better quality EMS service. This problem can be correlated to the

Executive Fire Officer Program Executive Development course unit 10 terminal objectives: "The student will recognize the importance of quality in the fire service and the role of the Executive Fire Officer (EFO) in encouraging quality" (US Department of Homeland Security, 2010, pp. 10-1). Additionally, by studying the advantages and disadvantages of the two EMS transport response models this research relates to the United States Fire Administration's operational objective to improve local planning and preparedness (U.S. Department of Homeland Security, 2010).

Literature Review

In 1972, President Nixon commissioned a study into the fire services. The men and women appointed to the commission were tasked with reviewing all aspects of the fire service to create a comprehensive guideline for directing the improvement of service. This document was *America Burning*, published by the commission in 1973. In terms of service delivery, they identified areas of improvement both in type and coverage. One of the recommendations concluded that fast response required more than enough fire stations and apparatus placed throughout a given district, but also that they are staffed appropriately and properly trained to perform their assigned functions. Personnel are the backbone of the fire service, and as such are essential to the vital functions of emergency services (Neville, 1973). Another recommendation from the study was that ambulance service provision would add value to the fire service. They recognize that this would require additional staffing and training, however they felt it was an important aspect of community service that the fire agencies provide ambulance, paramedical and rescue services especially if located in areas where such service were not provided adequately by another agency (Neville, 1973) (United States Fire Administration, 1987).

In 1987, the U.S. Fire Administration in conjunction with the Federal Emergency Management Association hosted a three day workshop in Tyson's Corner, VA, and titled *America Burning Revisited*. The goal of the conference and the subsequently published recommendations were to follow up on the original 90 recommendations proposed in the original study *America Burning*. They found that not only was the original document *America Burning* still valid, they also found that there was an increasing demand for EMS services nationally. Their evidence pointed toward the fact that EMS could constitute 80% or more of an agency's

call volume, and could be expected to continue to rise based on the aging of the population (United States Fire Administration, 1987).

The delivery of EMS became an increasing challenge for fire agencies. Decisions regarding delivery needed to be addressed. Essentially, all fire agencies from rural volunteer through paid metropolitan needed to address the issues surrounding training, staffing and delivery. For delivery, there a series of choices would present themselves, from hospital based ambulance/EMS systems, private ambulance companies and fire based EMS.

Generally, EMS systems are configured based on several factors, including size, demographics, geography as well as the politics of the communities they serve. As recommended by NFPA 450 “Guide for Emergency Medical Services and Systems”: “For any one community, the components of the system and the level of service should be tailored to the needs and the wants of that community. While an EMS system is unique to the jurisdiction, the industry recognizes a standard approach to assessing local needs and meeting those needs with specific service elements.”

There is not a great deal of information available for how services are organized outside of large urban areas, the residency of up to 75% of the nation’s population (MacKenzie & Carlini, 2008). Looking at the problem by demographics, it is useful to employ the rural-urban continuum in order to establish patterns of various features unique to EMS configurations. The US Census defines urban areas as those with an overall population density of 1000 people per square mile, urban clusters as those with an overall population density of 500 people per square mile, and rural as all areas outside of urban areas or urban clusters (US Census, 2009). It stands to reason that urban systems are more utilized due to their higher density demographics, and as

such are less likely to use volunteer responders, and tend to be more likely to use a tiered response structure. Rural populations are more likely to rely on volunteer responders, which typically results in longer response times, face higher personnel turnover and service coverage issues. (MacKenzie & Carlini, 2008). MacKenzie continues on to point out that urban areas tend to rely on fire-based EMS for transport, where rural areas relied more on third-service (hospital based) or private agencies to provide transport.

The National Fire Protection Association (NFPA) has recognized the differences for deployment between professional response organizations and volunteer response organizations in their 1710 and 1720 standards. NFPA 1710 2010 edition provides for an 80 second turnout time for fire and special operations and a 60 second turnout time for EMS response, 240 seconds or less travel time for the arrival of the first responder unit with an automatic external defibrillator unit (AED) or higher level of capability, 480 seconds or less travel time for the arrival of an advanced life support unit (ALS) (NFPA, 2010).

The NFPA 1720 2010 edition recognizes that there are a variety of zones, defining remote areas as those requiring a travel distance of at least 8 miles from the fire station to provide service, a rural area as defined by the U.S. Census Bureau as less than 500 people per square mile density, suburban areas likewise to the urban cluster from the U.S. Census Bureau of between 500 and 1000 people per square mile density and urban areas reflect the 1000 people per square mile density as defined by the U.S. Census Bureau. While the 2010 edition 1720 does not define turnout times due to the fact that many volunteer stations are not continuously staffed, they do recommend response times based on demographics: Urban areas require a 9 minute response, suburban requires a 10 minute response, rural areas require a 14 minute response and remote areas are directly dependent on travel distance (NFPA, 2010).

So as we move away from urban areas and urban clusters, we need to be more creative in our service delivery models. It is possible to derive some answers by looking at businesses that rely on delivery as their primary commerce. Looking at a company like United Parcel Service (UPS), a world-wide leader in package delivery through distribution networks, we can understand the need to optimize the combination of modes to achieve economies of scope. By optimizing delivery times a company like UPS optimizes its overall efficiency (Rodrigue, 2010). We can compare this to EMS where the goal is to optimize service delivery to the customer through short response times. Dr. Rodrigue goes on to point out that hub network strategy is vital in the prompt delivery of service when approached from a geographical analysis (Rodrigue, 2010). Essentially, the hub network strategy is one that has been employed by the fire service consistently in regards to locating stations to best serve the community.

This hub network strategy is the basis for the recommendation by the *America Burning* committee that the fire service provide EMS as well, the fire service is well positioned within their communities to respond quickly to an emergency. Likewise, the members of a fire agency tend to be very familiar with the districts and communities they serve. Another example of a service delivery business is FedEx. FedEx employs a similar system for service delivery, referring to its model as hub and spoke. The business model to expedite shipping was not to transport more than an individual could handle, and to bring all packages to a central distribution point in the evening, and returning the aircraft from that point to the satellite distribution hubs at the ends of the spokes (Reference for Business, 2011). The use of multiple agency model first response and transport is consistent through the urban-rural continuum (MacKenzie & Carlini, 2008). As we move away from the densely populated urban centers serviced by fire-based EMS, we see more reliance on multiple mode transport delivery and a greater reliance on third-service

and private transport companies. Looking at response data from over 300 U.S. fire departments demonstrates that when both fire and ambulance are dispatched simultaneously, a first responder unit arrives prior to an ambulance in approximately 80% of the time on EMS responses (Moore-Merrell, et al., 2010)

So we can see the correlation between the necessity of expeditious service delivery and the limitations of demographics and geography from a physical standpoint. However, for fire departments to meet the recommendation of *America Burning* there were other challenges.

Training and staffing are two challenges that fire departments face in deciding whether to deliver EMS transport from within or create a partnership with either a third-service or private transport provider. For volunteer fire agencies in rural areas, medical direction and oversight are supported by an external director, where in career agencies or agencies in higher density areas in-house medical oversight was more likely, possibly due to the administrative structures in place in urbanized systems to support their size, budget and personnel (MacKenzie & Carlini, 2008). This access to oversight allows for greater training opportunity, and the delivery of training in a more consistent, organized fashion.

Access to medical oversight is one of the causal factors for rural volunteer agencies to look to partnerships with third-service or private transport agencies. In many cases, the agreements include a requirement for the transport agency to provide the continuing education required to maintain the EMS certification levels of the volunteer agency responders. In this way volunteer agencies are afforded some consistency in training and knowledge while meeting the requirement of providing EMS first response service to their community.

Partnerships between a secondary transport provider and providing fire-based EMS are typically designed to allow for an optimal number of responders on scene. In September 2010, the National Institute of Standards and Technology (NIST) released a study entitled “Report on EMS Field Experiments”. In that report the authors found that the optimal staffing for EMS calls was a first responder crew with three or four members and an ambulance crew of two. In many cases the tasks were completed up to 4.1 minutes faster than ambulance only crews (Moore-Merrell, et al., 2010). They went on to point out that the optimal combination of staffing was one ALS provider on the first responder crew and one ALS provider on the ambulance crew. Considering ALS placement, those crews responding with an ALS provider on the engine and an ALS provider on the ambulance completed all scene tasks more quickly than a basic life support (BLS) crew from the engine and two ambulance ALS providers (Moore-Merrell, et al., 2010).

Training both initial and ongoing can be a deterrent to the provision of EMS transport by fire agencies. For the BLS level, initial training can cost between \$300 and \$3,000, depending on program and residency status. For the ALS paramedic level, initial training can cost upwards of \$6,000, and the ALS EMT-Intermediate level can cost upwards of \$4,000. In rural or volunteer settings, the department may not have the budget to support such an endeavor for a member, which means that the cost is carried personally by the member. In urban settings, a department may have the budget to provide the training for an employee, but there will be additional costs associated with such a training like overtime for the replacement for the employee undertaking the training, pay increases and incentives for being trained to the BLS or ALS level and maintaining that level etc.

The City of Rochester N.Y. commissioned a study by the TriData Division of the System Planning Corporation in May of 2010. In the “Analysis of EMS Service Provision” report, they

found that the average cost associated with sending a recruit through EMT-B training was \$3,310 per recruit for line firefighters. In addition to the training program, Rochester firefighters receive a \$650 stipend for maintaining an EMT-B level certification. They also found that the Rochester FD invests approximately 9,400 hours annually in EMS training delivery. One of the recommendations of the report was to require new hires to complete their EMT-B prior to employment. They identified private and community college programs where the training is available that meets the national and New York State standards and requirements (TriData Division, 2010).

Moving from fire-based EMS transport back to private service poses some unique challenges. In many systems the response time standard for ALS units on calls is 8 minutes from dispatch, whereas the standard for BLS units on a BLS call is 15 minutes. (NFPA, 2009). For private transport agencies, coding calls that are priority 2 as BLS allows them nearly double the response time (TriData Division, 2010). While one could infer that this method indicates duplicity on the part of the private transport provider, it is actually a strategy that reinforces the goal of reducing risk both to the public and the transport provider by reducing the frequency of unnecessary emergency responses.

The International Association of Firefighters (IAFF) cautions public officials when considering a move from fire-based EMS transport to private, advising that public officials should recognize the economic value and the effectiveness of the fire department providing a complete EMS system as opposed to contracting pieces of that system to a private company. The report goes on to state that fire-based EMS transport systems are better able to maintain the shortest possible response times, and an ability to reduce duplication of services by utilizing employees who are cross-trained in fire, rescue and EMS. They assert that private providers rely

on fire departments to “frontload” the system by having fast initial response and EMS trained members who can make a determination as to whether an ambulance should continue to respond, and if so whether they should be emergent or non-emergent (IAFF, 1997). There are those who believe that fire first response in communities where private EMS transport is provided is cost neutral. There are direct costs which include labor, travel and equipment use. There are also indirect costs including dealing with safety risks and effect on services such as being out of position or engaged on a prior call (TriData Division, 2010).

The final piece of the puzzle is control and consistency of EMS transport service delivery. With different agencies providing EMS and transport, how does a fire department ensure consistent delivery and uniform care practice. Per the NFPA 450, it is up to the jurisdiction to determine the best service model (NFPA, 2009). Given the availability and interaction of medical oversight in rural volunteer areas, resolution between a transport service and a fire department could prove a lengthy resolution. Systems where the medical control and direction are part of the same administration and EMS and transport are provided by a single agency, the access is better and resolution of response issues may occur in a more timely fashion driving their quality assessment program into a continuous quality improvement program. This type of program is where there is consistent monitoring of activities and procedures and a dialogue to determine the best care model for the patient between the hospital and the agency. The goal is to establish a continuous quality improvement (CQI) program for every supervised EMS agency. In doing so, a CQI will assure the continued competency and performance of the EMS providers. The program will provide appropriate protocols and standing orders and provision for medical care audits, observation, critiques, continuing education and direct supervisory communications (Colorado Department of Public Health, 2011).

The advantage of providing CQI through a single agency as opposed to providing for multiple agencies is that the quality will be more consistent. If multiple agencies utilize the same direction for their CQI, the service delivery will be more consistent than if two or more agencies use unique directors overseeing individual programs.

Procedures

This research topic was conceived at the Boulder Rural Fire Department with the assistance of Fire Chief Bruce Mygatt and Deputy Chief Jeff Webb in November of 2010. It was initiated through research at the National Fire Academy's (NFA) Resource Center in November, 2010. The goal was to take advantage of the available research resources at the NFA during the instructional phase of the program. Searches of both the card catalogue and electronic databases yielded previous research papers and reports that were pertinent to this research project and the topic of fire-based and private EMS transport in the areas of cost-effectiveness, control, and issues.

Additional research was conducted on-line, looking at private industry models of service delivery programs, the IAFF database and reports on EMS delivery, and research conducted by fire agencies in other locations that were comparing recommendations on fire-based and private ambulance service. The search engines utilized for on-line research were Bing and Google. The final research was to review the response records and perform cost analysis through review of annual budget reports published both for the Boulder Rural Board of Directors and for public review.

The purpose of the literary review was to establish background information from previous research, to collect evidence of both similar study considerations, to ensure that the scope of the research was sufficient for the project at hand, and to answer the following questions: a) What are the costs associated with each of the two models to the department and to the patient? b) What are the service quality challenges with each of the two models? c) What are the emergency and non-emergency response times for each of the two models? d) What quality

assurance mechanisms does each of the models provide? Through the literary review, the response record review, and the cost analysis all of the proposed questions were addressed and answered.

When analyzing the costs, the Boulder Rural employee wage and benefits statements were reviewed in order to analyze the costs to the district for the fire-based EMS model. Those were weighed against the collection rates and revenue share between the Boulder Rural Fire Department and Mountain View Fire Department (Appendix A).

The staffing cost to the Boulder Rural Fire Department is shown in the Employee Compensation Levels for 2010 document (Appendix C). From that it was possible to extract the information needed to determine the approximate cost to the department and ultimately to the taxpayer. Once that cost was ascertained, it was possible to estimate the combined cost of a single ambulance transport, both to the patient and to the department.

In contrast, the county appointed private ambulance provider, Pridemark Paramedic Service (PPS), staffs ALS ambulances and provides EMS transport service at no charge to the county fire departments. PPS collects revenue both from transport and inter-facility transfer. Dave Pace, Boulder Director of Operations for PPS was interviewed by telephone on June 2nd, 2011. The questions asked included: What is the average billed cost for an ambulance transport to a medical facility? What is the cost of staffing an ALS ambulance? Will the billed rates increase and to what level?

When analyzing the service quality challenges associated with the two models, the research focused primarily on the response time data for EMS calls. In most systems this is the primary method for analyzing the quality level of the service provided. The Boulder Rural Fire

Department records database, Firehouse Software, records were collected; reports were generated and analyzed for response time (Appendix B).

Yet this addresses only part of a quality standard. To best analyze EMS transport and delivery, metrics such as the rate of adherence to established protocols, number of injuries/exposures, vehicle accident rate, number of continuing education hours provided, time from contact to resolution of customer inquiries/complaints, vehicle out-of-service time and employee retention (Rural Metro/Pridemark Paramedic Service, 2011). Best practices would indicate that a single EMS oversight entity would be the most appropriate choice for collecting and analyzing the data set, and for the delivery of a continuous quality improvement program.

In regards to the emergency and non-emergency response times for the two models, the primary tool used in the analysis were the response time data sets in the Boulder Rural Fire Department records and drive time mapping (Appendix B). Division Chief Jeff Webb of the Boulder Rural Fire Department created ARCview® maps based on drive time from Boulder Rural Fire Department central station, Mountain View Fire Department station 4, the base for the primary JRA ambulance, and Pridemark Paramedic Service's ambulance quarters. While Pridemark Paramedic Service uses a posting system, due to the fluidity of a system status network, the most reliable point of dispatch for an ambulance would be their ambulance quarters. In some cases the ambulance in a system status setting may be posted closer to an incident address than a housed ambulance, allowing faster response times even at non-emergent speeds.

In analyzing the quality assurance mechanisms in place, a review of the Boulder Rural EMS QA/QI process standard operating guideline (SOG) is utilized (Appendix D). This allows for a comprehensive look at the expectations and controls in a fire-based EMS system. The

SOGs in place were combined and adopted with the Mountain View Fire Department in February 2010, and as such both departments utilize the same SOG for QA/QI, providing a consistency of expectation.

Pridemark Paramedic Service utilizes proprietary metrics for quality assurance and control. They employ a clinical coordinator who is responsible for training oversight as well as protocol adherence oversight.

Both Boulder Rural Fire Department and Pridemark Paramedic Service function under the same physician advisor from Boulder Community Hospital. Mountain View Fire Department employs a physician advisor from Longmont United Hospital. Both physician advisors function and advise on the Boulder County EMS Protocols Board. All three agencies function under the Boulder County Protocols.

Results

By using descriptive research, sufficient information was found to yield appropriate results for the research topic. From these results, it is possible to derive recommendations.

In determining costs for EMS transport, the information in Appendix A, as well as the IAFF report and the City of Rochester NY report is relevant. The equipment, mileage, and supplies cost is only one portion of the cost of EMS transport, and that cost is the one typically passed on to the patient (TriData Division, 2010). As seen in the JRA collection spreadsheet, on the data page, it is possible to see that the average cost per transport to a medical facility in the fire-based EMS transport model is \$1,000. When the Joint Response Area (JRA) model was introduced, the revenue share between Boulder Rural Fire Department and Mt. View Fire Department was 75% to 25%, based on the fact that Boulder Rural Fire Department was providing the greater share of the response resources. In April, 2010, the share between the agencies was renegotiated to 50% to 50%.

The other cost of providing fire-based EMS is the personnel cost. The median base salary for a 56-hour firefighter/EMT-IV (JRA EMT) is \$51,446 before benefits (Appendix C). The mean benefits package amounts to 38% of salary rate, approximately \$20,000. The personnel cost to the Boulder Rural FD and by extension, to the taxpayers is approximately \$215,000 for the fiscal year 2010. That includes three 56-hour firefighter/EMT-IVs. This does not take into account certification pay or bonuses available to employees as decided by the board. When extrapolated, the personnel cost and the transport cost of EMS service averages \$3,000 per patient transport.

For county fire agencies utilizing the contracted private ambulance provider, the cost for transport to a medical facility to the patient on average is \$1,000. There is no personnel cost to the fire agency as the personnel costs are the responsibility of the private transport provider. During a telephone interview with Dave Pace, the Boulder Operations Director of Pridemark Paramedic Service, he stated that the cost per transport if Pridemark did not win the City of Boulder contract in conjunction with the County contract would rise to between \$1700-\$2000 per patient, and Pridemark would also require a stipend from the County to provide ALS ambulance of \$675,000 (Rural Metro/Pridemark Paramedic Service, 2011).

Third service ambulance transport was not researched as that model is not currently available as an option to Boulder Rural Fire Department.

Both fire-based and private ambulance transport services face the same quality challenges. Both use some form of CQI as recommended by the State of Colorado. The metrics for CQI are consistent for the fire-based EMS transport system due to the fact that there is a single oversight administrator for both the first response company and the ambulance crew. In the portion of the district served by combined fire and private EMS transport system, the oversight is not consistent although both share the same physician advisor. This is a result of each service having a unique EMS coordinator.

In terms of the status recommendations found in the NIST study, the optimal number of responders for an EMS call is 6, with one paramedic located on the first response unit and one paramedic on the ambulance (Moore-Merrell, et al., 2010). This supports that providing efficient quality service requires more than a simple two person ambulance crew response.

Response times for both models are consistent with the closest unit being the first arriving unit (Appendix B). In both models, there is an ALS provider on the engine first response unit and the ambulance, private or fire based. When the first arriving unit downgrades further response, the consequent units are dropped from response time statistics.

Another factor skewing the response time statistics is the total number of responses. The number is small enough that it is statistically inconsequential, which is to say that even one response falling outside of the parameters will cause a significant change in the success ratio. As demonstrated, the average number of transport calls per month in the JRA is 27, which means that three calls will skew the ratio by more than 10%. Given the response recommendations in NFPA 1720, three calls is greater than 10% of the calls in any given month, dropping that month from the required 90% response time recommendation (NFPA, 2010).

Boulder Rural Fire Department and Mountain View Fire Department share an EMS director in the person of Twink Dalton. Twink is responsible for continuing education at both the ALS and BLS levels. Twink also provides for patient follow-up with the receiving hospitals, and she provides oversight for run reports that need more than just basic review. Boulder Rural Fire Department handles report review in-house, with each of the assigned shift paramedics reviewing $\frac{1}{2}$ of the reports of the other paramedics.

Mountain View Fire Department utilizes a similar approach, where the paramedics review peer reports, kicking up any reports with protocol or delivery deviations to Twink for further review. In both cases, no paramedic reviews their own report unless there is a deviation.

In the case of Pridemark Paramedic Service, their run reports are peer reviewed, and those reports where ALS procedures occurred on a call, a death on a call, or a

procedural/protocol deviation occurred go to their clinical coordinator. In all cases, Boulder Rural Fire Department, Mountain View Fire Department, and Pridemark Paramedic Service, if there is a significant procedural or protocol deviation, the report is forwarded to the physician advisor.

Both Boulder Rural Fire Department and Pridemark Paramedic Service function under the same physician advisor. Mountain View Fire Department utilizes a physician advisor from Longmont United Hospital. Both physician advisors sit on the Boulder County medical protocol advisory board, as well as Twink Dalton. Boulder Rural Fire Department has had a paramedic as an at-large representative on the board occasionally through the last five years. Boulder Rural Fire Department does not have any reported procedure/protocol deviations or violations within the last five years.

Discussion/Implications

So we can see that the costs between the private ambulance provider and fire-based EMS are actually closer than the transport cost to the patient would indicate, especially when the private ambulance transport service would need a stipend to offset the true cost of transport service to the patient. The primary difference is that the costs are spread over more people for a longer period of time in smaller amounts through the fire-based EMS model as opposed to assessing the true cost of transport on the individual patient as a private provider would have to do if there was no stipend to offset their personnel costs.

A distinct advantage of the fire-based EMS system is that the response protocol brings six dual role responders to an incident, as recommended in the NIST report (Moore-Merrell, et al., 2010). A private ambulance transport provider typically staffs an ambulance status two unless they are training a member, in which case they are status 3. To bring the recommended 6 responders to scene, a private ambulance transport service would need to allocate up to 3 ambulances per EMS call, or rely on first responder units from the fire department. Given that first responder units arrive prior to an ambulance unit 80% of the time, and crews with an ALS provider on the engine and one on the ambulance were able to complete all tasks sooner and initiate later tasks sooner than crews with 2 ALS providers on the ambulance, the data points toward 6 persons on scene with at least one ALS provider on the first arriving unit and one on the ambulance (Moore-Merrell, et al., 2010). In a private ambulance EMS transport system, it would be cost prohibitive to provide that level of service to the patient. In those calls where Boulder Rural Fire Department is dispatched with the county private ambulance EMS transport provider, Boulder Rural provides the additional resources, and may cancel the ambulance if not

needed or may be cancelled by the ambulance if they determine that the additional resources are unnecessary.

One of the suggested methods of mitigating costs for the provision of EMS service to fire departments is to charge a first responder fee to the private ambulance EMS transport system. By using a moderate fee scale, the fire department can recoup some of the cost associated with hiring and training competent EMS first responders (TriData Division, 2010). Boulder Rural Fire Department currently does this through the cost share with Mountain View Fire Department; however there is no current first responder fee arrangement with the county private ambulance EMS transport provider, Pridemark. This first responder fee levied on a private ambulance EMS transport provider could lead to a rise in the per transport cost to the patient, which is less than optimal for both the fire department and the private ambulance EMS transport provider.

The cost to Boulder Rural Fire Department to provide 3 firefighter/EMTs on Mountain View Fire Department's ambulance is approximately \$215,000 including benefits (Appendix C). The cost to Boulder Rural to employ 3 paramedics to complete staffing an ambulance would be approximately \$230,000 including benefits (Appendix C). If Boulder Rural Fire Department was to purchase an ambulance for providing full-time, in-house ALS EMS transport service, the cost would be approximately \$145,000: Approximately \$125,000 for a Type III ambulance new; \$20,000 for maintenance via telephone interview with Front Range Fire Apparatus, June 30, 2011. So the approximate total cost to Boulder Rural Fire Department to provide fire-based ALS transport service in the first year would be approximately \$590,000. In subsequent years the costs would change based on the fact that the equipment would already be in place and the fluctuation of personnel costs, but there should be a decrease from the initial expenditure due to the ownership of the equipment. The personnel costs will rise slightly for Boulder Rural Fire

Department as the district board typically approves annual raises commensurate with the identified cost of living assessment for the area.

In order to improve the service quality from the existing service level provided, Boulder Rural Fire Department would have to become a fully integrated fire-based EMS system. Another challenge for the Boulder Rural Fire Department is the control of call response data.

The current service quality provided by Boulder Rural Fire Department is already high. Boulder Rural enjoys the ability to provide high level services with ALS on the first response engine. Likewise, they provide this high level of service at a very reasonable cost to the district through the use of the JRA model and the use of the county contracted private ambulance EMS transport provider in the area of the district where the JRA ambulance would be more than 5 minutes behind the engine (Appendix B). The most appropriate way to improve the service quality in this instance would be to retain full control over all services delivered, responding from the central station.

As evidenced by the drive time response maps in Appendix B, as the ambulance responding from the central station moves toward the outskirts of the district the response times slow. Given the geographical constraints and availability of access roads decreasing as the units move into the mountainous western areas, the response time would slow dramatically. To maintain ALS response times at the current level, the Boulder Rural Fire Department would be faced with requesting mutual aid from either the Mountain View Fire Department ambulance in the northeast end of the district or the county contracted private ambulance EMS transport provider in the western end of the district. However, asking for these resources will result in a

loss of revenue for the Boulder Rural Fire Department if the department provided fire-based EMS transport service.

Given the presence of ALS response both on ambulances and the primary fire engine, the response statistics shown in the reports can be skewed both due to the initial arrival of an ALS provider determining that no further emergency response is necessary, but also because the private ambulance response time is not tracked by the fire department. This information points to a quality control question regarding the utilization of separate dispatch centers. The private ambulance EMS transport provider maintains and reports from proprietary dispatch data which can be different from the county dispatch data. Due to the fact that a private ambulance EMS transport system operates a dispatch center independently of the 911 center, not all of the call response data is shared between the two dispatch systems. This can produce invisible dispatch delays due to the fact that the ambulance provider logs the time of call receipt as the ring-down time from the dispatch center, and not the true time of the call receipt at the 911 dispatch center (TriData Division, 2010). Ultimately this produces a discrepancy between the true time of the call receipt and the response time.

This evidences a need for the call data to be maintained in a single repository. The most obvious choice for record keeping of call response data is the 911 dispatch center. This is due to the fact that the County enters into a competitive bidding process for private ambulance EMS transport service every 5-7 years. The typical Boulder County contract for EMS transport services is five years, with an option to extend for one or two years. There is a potential to change private ambulance EMS transport providers with each bidding cycle. Having the private ambulance EMS transport provider maintain call records for the Boulder Rural Fire Department

or any other county agency could be detrimental to data recovery if that contractor was not the successful bidder in the following contract cycle.

Boulder Rural Fire Department maintains a CAD interface with the Boulder County Communications Center. This interface downloads and populates the National Fire Incident Reporting System (NFIRS) reports in the Firehouse® records database software the Boulder Rural Fire Department utilizes. The information downloaded into the program is the address, nature, and response times from dispatch through arrival and in service times for the Boulder Rural Fire Department (Appendix B). While the Boulder County Communications Center times are recognized as the definitive times for response performance by Boulder Rural Fire Department, the reported response times for the private ambulance EMS transport provider typically are derived from their own proprietary dispatch records (TriData Division, 2010). This information points to a need where there is a single records keeping and reporting database for all service providers, public and private.

Non-emergency response times are not tracked by Boulder Rural Fire Department in a significant way. The response times that are significant are for emergency response. The district has access to and utilizes ARCview® software that is capable of estimating non-emergency response times from the primary station. In an emergency, the response times that are significant are those that are for the arrival of the first unit, travelling emergent. Subsequent units figure in to the response statistics as well, however less prominently.

UPS and FedEx use distribution systems that allow for expeditious service delivery (Rodrigue, 2010). Fire departments, while not delivering a product, use similar models for delivering service to the public. By locating stations in certain call areas or centroids, they can

mount a fast response to a call for help. The response standards established by the NFPA direct the placement of new stations or the reassignment of stations to provide the fastest possible response to an area within the fire district. Boulder Rural Fire Department must meet a 9 minute response time 90% of the time as a combination fire department (NFPA, 2010). As shown in the response data, Boulder Rural is very successful at meeting the standard (Appendix B). The limitation of the data, as stated above is that the first arriving unit on an EMS call may downgrade or cancel further response. This downgrade or cancellation will cause the unit not to be recognized or counted in the National Fire Incident Recording System data, rendering the unit insignificant to the response. While the unit may appear insignificant to the response, it is still being utilized on the call unless it is cancelled and returned to service.

A better way of approaching the response time issue is through the examination of the ARCview® generated district maps (Appendix B). By examining the drive time maps we can see that the hub and spoke system utilized by FedEx and UPS is effective in this situation (Rodrigue, 2010). The Boulder Rural Fire Protection District is a geographically diverse area, with pockets of communities scattered among a 25 square mile district. In some cases there are no direct routes between areas. Also, the mountainous portion on the western side of the district provides other challenges such as roads steeper than 5% grade, making uphill response in heavy equipment slower due to the ability of the engines to climb the grade.

In many cases, the private EMS transport service based in Boulder is able to arrive at the same time as or before the first response engine when going to calls in the western portions of district (Appendix B). As shown in these drive time maps, the utilization of the co-staffed Mountain View Fire Department ambulance coming from the northeastern portion of the district and the county contracted private ambulance EMS transport provider available in the

southwestern portion of the district allow the Boulder Rural Fire Department expeditious times for ALS delivery (Appendix B).

While fire-based EMS service delivery from the Boulder Rural Fire Department's primary station may appear attractive, the ability to deliver ALS level care in a timely fashion is extremely important. Boulder Rural Fire Department does have a parcel of land in the western portion of the district which could provide space for a station. That station could be staffed by dual-role personnel, trained both in fire suppression and EMS. The station could house an ambulance and a brush fire truck to allow fast response to either fire or medical calls in that area. The drawback to such a situation is many-fold. The costs of building a new station are prohibitive, and there would be additional equipment and personnel costs required to properly staff the station. Finally the call load for the area would have to be taken into consideration.

Boulder Rural Fire Department is at an advantage in situations regarding personnel being a fire department staffed by a combination of paid and volunteer members. One way to address a staffing issue at a second station would be to enter into a similar agreement with the neighboring fire department as the agreement Boulder Rural Fire Department has with the Mountain View Fire Department in the form of a second Joint Response Area. This would allow Boulder Rural to draw from the volunteer personnel of the neighboring district to bolster the number of members available to staff. However, it would be in the best interest of the district to hire three full-time career firefighter/EMTs to staff the ambulance. ALS provision could be addressed by utilizing the ALS provider on the first response unit to staff the ambulance on their arrival if the incident was ALS in nature. Training and certification issues would have to be addressed for the individuals who would be staffing the second station, as well as oversight for an outlying station.

The costs for building a new station that would house two medium size apparatus (ambulance and brush truck) and two personnel are currently prohibitive for the Boulder Rural Fire Department. The utilization rate for the station would be too low as that area comprises 17% of the total call volume for the district and 3% of the revenue.

Likewise, there are two other fire/EMS agencies that share immediate borders with Boulder Rural Fire Department to the west. If the department was to enter into JRA style agreements with them to assist with staffing and increase transports for the district, the department could realize some additional revenue to aid with offsetting the cost of hiring additional personnel to staff a transport ambulance.

Quality assurance extends beyond expeditious service delivery. To be able to arrive quickly is of no value or importance if the arriving crew is unable to affect a positive or desired outcome for an incident. In certain circumstances there will be exceptions to that statement such as a patient that is expired or a structure fire that is a complete loss prior to arrival. Other factors that play in to quality assurance beyond timely response are the aforementioned metrics such as the rate of adherence to established protocols, number of injuries/exposures, vehicle accident rate, number of continuing education hours provided, time to resolution of customer inquiries/complaints, vehicle out-of-service time and employee retention (Rural Metro/Pridemark Paramedic Service, 2011).

Since Boulder Rural Fire Department is in an agreement with Mountain View Fire Department to provide fire-based EMS transport through co-staffing a Mountain View ambulance, these metrics for quality assurance apply. The primary pieces of a valuable CQI program are the review of call reports for adherence to protocols and treatment modality

changes, continuing education hours, and quality leadership from medical direction. While the other metrics are important, they are of lesser priority for a patient who will receive care from a crew.

Currently, each paramedic reviews the run reports of the paramedic from the shift immediately prior to and following their assigned shift. This way, each paramedic receives assessment, and gives feed back to the other paramedics. Also, no one individual carries the burden of reviewing all run reports. Paramedics are encouraged to review reports with an eye to any current changes in EMS delivery to ensure CQI standards are maintained (Appendix D). While peer review is an invaluable tool, there needs to be a supervisory role in place to ensure that the established standards are being adhered to. Boulder Rural Fire Department utilizes a dual approach to this direction. There is an EMS coordinator responsible for ensuring that the adopted standards in the SOG and the county protocol are met. Beyond that individual, there is an EMS director who oversees the delivery of EMS in the JRA. The penultimate level of oversight is the physician advisor under whose license the agencies deliver EMS care.

In the event that there is a deviation from practice or protocol, the Boulder Rural Fire Department EMS Coordinator will forward the report to the EMS Director for the JRA. That person will review the case and make recommendations, determining if it is a training issue or there is some other issue involved. If warranted, the EMS director will forward the report to the physician advisor for review. The physician advisor may make practice or protocol changes based on review of the report, or recommend appropriate action to remediate a situation that needs correction.

Boulder Rural Fire Department and Mountain View Fire Department utilize the same EMS director; however they have separate physician advisors. Both of the physician advisors sit on the Boulder County Protocol Board and provide oversight for EMS delivery in the county.

Boulder Rural Fire Department and Pridemark Paramedic Service have the same physician advisor, but they have separate EMS directors. For the Boulder Rural Fire Department to deliver EMS consistently with its EMS transport partners, it will have to find a way to unify the oversight chain. Arguably, the simplest way to unify the oversight chain would be to provide in-house fire-based EMS transport service. As the current system stands, the common denominator is Boulder Rural Fire Department, yet the department does not have a developed EMS program, relying on the program offered by Mountain View Fire Department and their EMS director.

Recommendations

The following recommendations are made for the Boulder Rural Fire Department based on the original research, analysis, and literature review in this project:

- The costs associated with EMS transport currently levied on the district are reasonable for the level of service received by the citizens of the district.
- Boulder Rural Fire Department should continue to evaluate the costs associated with delivering EMS transport; there may be a time in the future when it would be in the best interest of the district to move from the current EMS delivery partnerships to sole source fire-based EMS transport delivery.
- Boulder Rural Fire Department should weigh and consider the possibilities of charging the county contracted private ambulance EMS transport provider a nominal per-call fee for first responder services.
- In order to improve service delivery quality, Boulder Rural Fire department should continue to evaluate how to better maintain singular control of service delivery.
- Boulder Rural Fire Department should consider entering into JRA style agreements with neighboring volunteer fire/EMS agencies to the west. This could allow for additional transports and the resulting revenue to help defray the cost of providing sole-source fire-based EMS transport.
- The current model is sufficient and provides for adequate response times. Boulder Rural Fire Department should continue to monitor EMS transport response times to determine if they are improving or declining due to increased pressure on the current EMS transport partnerships from outside agencies.

- Boulder Rural Fire Department needs to evaluate its EMS program. The coordination of the in-house program needs to be strengthened, and given the status of Boulder Rural in relation to its EMS partners, the department should take a leadership role in EMS CQI through QA and CE.
- Boulder Rural Fire Protection District should not build in the western portion of the district due to the low number of calls and the low population density.

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Appendix A

JRA Accounting – January 1 through November 30, 2010

Jeff Webb

January 3, 2011

Introduction

This document provides the accounting of the JRA from January through November of 2010. Included are a set of spreadsheets documenting the accounting of the JRA through inception and the outstanding balances owed the district for transports that have not been paid by Mountain View.

Accounting

As with previous years, we base this analysis on the data provided by the Mountain View Fire Protection District and their medical billing agency. Run reports are forwarded to the billing agency, after QA by the Mountain View EMS staff, who codes the procedures as ALS, BLS, Medicare, etc. Bills are then generated to the patients or their insurance. Bills that age out are transferred to a collection agency, although the collection rate on those is very low.

One of the biggest reductions in the amount billed is Medicare/Medicaid write-offs. The Medicare/Medicaid system fixes the prices it will pay for its insured at an extremely low rate. While the average trip bill for a privately insured patient may average \$900, Medicare or Medicaid may only pay a couple hundred dollars.

Additionally, in April of this year, the Boards agreed to change the split of monies collected from 75/25 to 50/50. This reduced our income anticipated income from \$127k per year to \$93k.

Some of the analysis columns that are included are:

Billed ITD

The amount billed in the JRA since the inception of the program

Collected ITD

The amount collected on JRA transports since the inception

Collected per Billed

The collected amount divided by the billed amount on a month by month basis

W/O ITD

The amount written of for Medicare/Medicaid patients since the inception of the JRA

W/O per Billed

The ratio of amount written off for Medicare/Medicaid patient transports to the billed amount on a monthly basis

Collection Efficiency

A measure of how good the system at collecting available billed amounts.

$$\text{Collection Efficiency} = \frac{\textit{Collected}}{\textit{Billed} - \textit{MedicareW/O}}$$

12 Avgs

A number of columns with 12 rolling averages of previously defined amounts

Tx per Mo Avg

The 12 month rolling average number of transports in a month

Avg Bill Per Avg Tx

The 12 month rolling average amount billed divided by the 12 month rolling average of transports.

Diagrams

Attached are three graphs presenting the data from the spreadsheet in a graphical format.

MONTHLY
SUMMARYInception
- DateJOINT
OPERATING
AREA

MONTH	Charges Billed	Amt Collected	Medicare W/O	TRANS	ALS	BLS	#
April-07	\$26,557.00	\$0.00	\$0.00	26	24	2	
May-07	\$21,262.00	\$10,709.46	\$8,275.38	22	18	4	
June-07	\$19,235.00	\$15,060.15	\$4,111.87	20	15	5	
July-07	\$22,068.00	\$9,861.34	\$5,400.23	23	19	4	
August-07	\$28,930.00	\$13,257.35	\$7,732.23	27	25	2	
September-07	\$21,328.00	\$15,752.69	\$11,233.91	21	20	1	
October-07	\$29,109.00	\$13,506.49	\$13,836.23	29	27	2	
November-07	\$22,882.00	\$11,437.46	\$4,264.29	23	21	2	
December-07	\$18,122.00	\$11,707.50	\$8,415.12	18	15	3	
January-08	\$19,218.00	\$16,383.63	\$8,541.84	19	18	1	
February-08	\$24,754.00	\$15,705.89	\$16,922.70	26	22	4	
March-08	\$26,529.00	\$11,304.11	\$4,809.01	28	22	6	
April-08	\$17,320.00	\$11,223.45	\$5,534.49	18	13	5	
May-08	\$29,187.00	\$7,870.37	\$4,944.34	28	26	2	
June-08	\$31,710.00	\$19,375.02	\$6,863.60	32	28	4	
July-08	\$29,111.00	\$18,374.33	\$11,422.85	29	23	6	
August-08	\$27,353.00	\$9,982.17	\$14,280.42	29	23	6	
September-08	\$25,197.00	\$20,585.25	\$14,044.15	27	17	10	
Oct-08	\$22,144.00	\$15,315.03	\$9,823.50	23	18	5	
Nov-08	\$14,470.00	\$15,121.91	\$9,120.88	15	13	2	
Dec-08	\$36,666.00	\$13,027.31	\$7,107.77	37	31	6	
Jan-09	\$26,407.00	\$15,104.59	\$10,798.17	29	20	9	
Feb-09	\$20,550.00	\$17,127.21	\$11,690.93	22	18	4	
Mar-09	\$26,884.00	\$16,993.08	\$6,020.61	27	26	1	
April-09	\$23,435.00	\$16,727.69	\$6,624.33	22	20	2	
May-09	\$13,877.00	\$13,687.62	\$16,479.77	14	13	1	
Jun-09	\$19,490.00	\$11,141.59	\$4,563.57	21	16	5	
Jul-09	\$41,656.00	\$11,555.58	\$9,744.29	43	36	7	
Aug-09	\$41,782.00	\$25,361.23	\$17,406.73	42	34	8	
Sep-09	\$30,483.00	\$21,438.99	\$7,455.11	32	27	5	
Oct-09	\$26,076.00	\$18,303.65	\$10,117.23	28	20	8	
Nov-09	\$29,829.00	\$19,745.64	\$13,004.90	31	26	5	
Dec-09	\$26,039.00	\$12,500.22	\$14,531.36	27	23	4	
Jan-10	\$19,818.00	\$15,254.51	\$8,850.17	21	16	5	
Feb-10	\$29,222.00	\$11,343.66	\$13,396.49	31	23	8	
Mar-10	\$32,004.00	\$21,662.85	\$13,036.51	30	27	3	
4/1/10	\$39,371.00	\$2,940.56	\$16,805.12	33	30	3	
04/19/10		\$13,077.26					
May-10	\$32,757.00	\$16,113.61	\$16,793.80	29	22	7	
Jun-10	\$32,683.00	\$16,695.96	\$14,947.47	28	22	6	
Jul-10	\$24,510.00	\$17,149.42	\$15,469.07	20	19	1	

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Aug-10	\$42,640.00	\$18,072.18	\$19,586.45	34	28	6
Sep-10	\$39,594.00	\$16,330.29	\$14,081.02	34	27	7
Oct-10	\$27,719.00	\$16,519.36	\$11,395.80	24	17	7
Nov-10	\$33,493.00	\$17,478.84	\$14,095.25	29	21	8
Dec-10	\$32,126.00	\$19,284.88	\$11,657.35	27	19	8
Jan-11	\$30,588.00	\$18,402.47	\$17,586.62	27	19	8
Feb-11	\$22,449.00	\$15,909.09	\$15,514.01	27	19	8
Mar-11						
Apr-11						

Totals Since Inception	\$1,278,634.00	\$711,482.94	\$508,336.94	1252	1026	226
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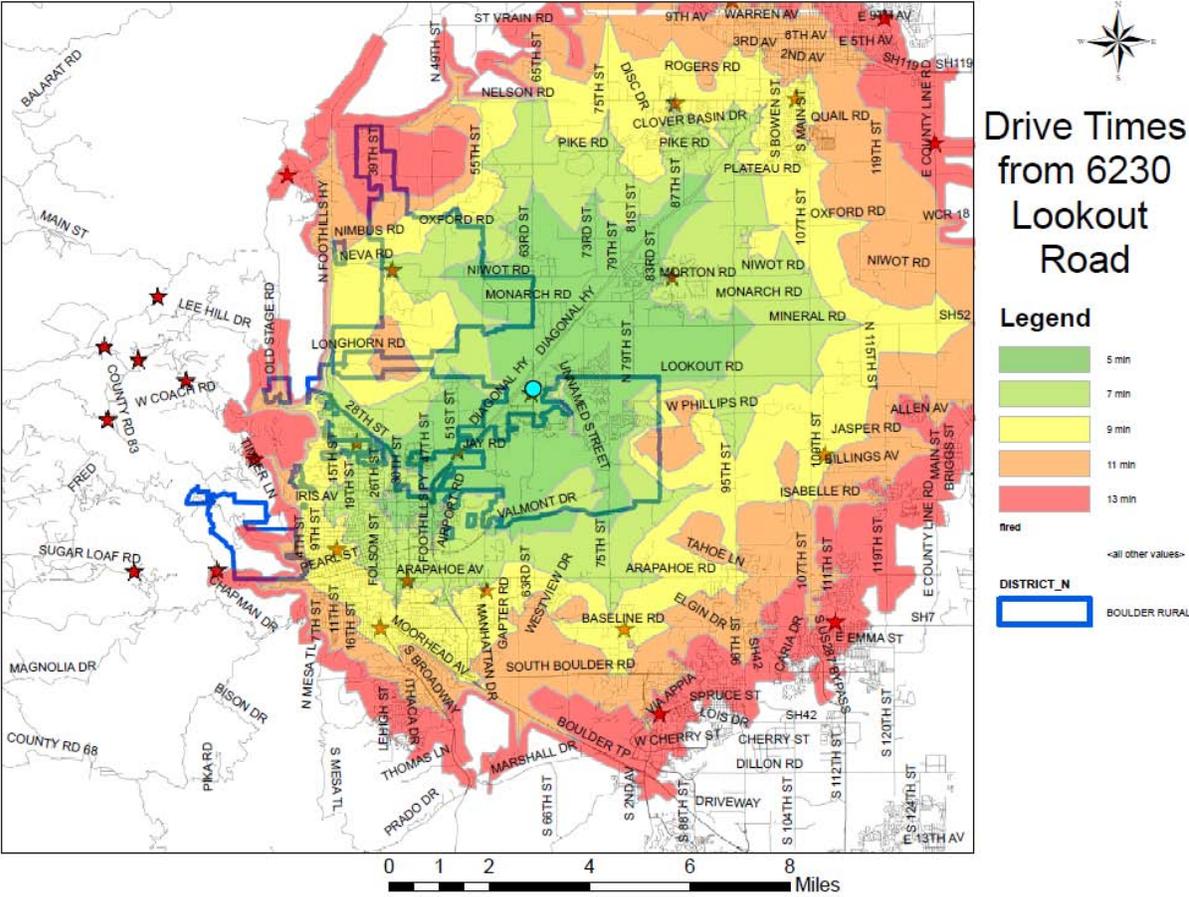
Distribution: (Calculated on a Monthly Basis)

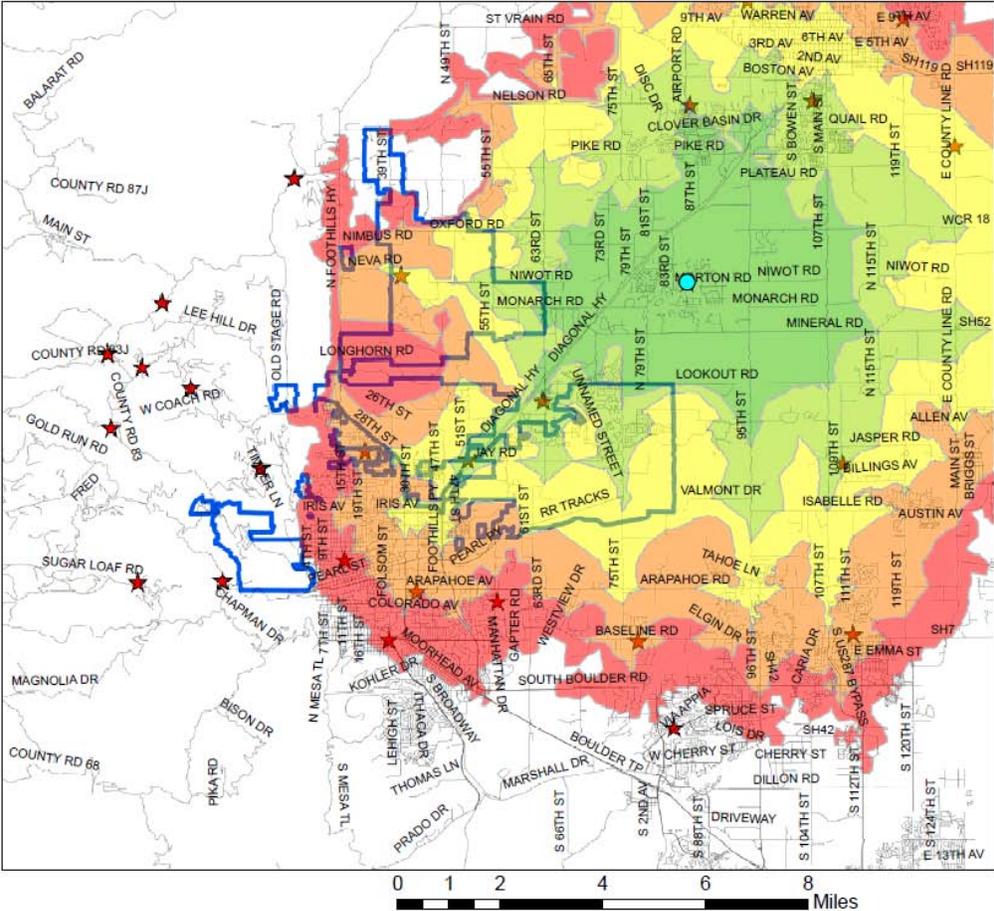
	TOTAL COLLECTED	LESS BILLING FEES (6%)	TOTAL TO BE DISTRIBUTED	MVFPD 25%	BRFD 75%
April-07	\$0.00	\$0.00		\$0.00	\$0.00
May-07	\$10,709.46	\$642.57	\$10,066.89	\$2,516.72	\$7,550.17
June-07	\$15,060.15	\$903.61	\$14,156.54	\$3,539.14	\$10,617.41
July-07	\$9,861.34	\$591.68	\$9,269.66	\$2,317.41	\$6,952.24
August-07	\$13,257.35	\$795.44	\$12,461.91	\$3,115.48	\$9,346.43
September-07	\$15,752.69	\$945.16	\$14,807.53	\$3,701.88	\$11,105.65
October-07	\$13,506.49	\$810.39	\$12,696.10	\$3,174.03	\$9,522.08
November-07	\$11,437.46	\$686.25	\$10,751.21	\$2,687.80	\$8,063.41
December-07	\$11,707.50	\$702.45	\$11,005.05	\$2,751.26	\$8,253.79
January-08	\$16,383.63	\$983.02	\$15,400.61	\$3,850.15	\$11,550.46
February-08	\$15,705.89	\$942.35	\$14,763.54	\$3,690.88	\$11,072.65
March-08	\$11,304.11	\$678.25	\$10,625.86	\$2,656.47	\$7,969.40
April-08	\$11,223.45	\$673.41	\$10,550.04	\$2,637.51	\$7,912.53
May-08	\$7,870.37	\$472.22	\$7,398.15	\$1,849.54	\$5,548.61
June-08	\$19,375.02	\$1,162.50	\$18,212.52	\$4,553.13	\$13,659.39
Jul-08	\$18,374.33	\$1,102.46	\$17,271.87	\$4,317.97	\$12,953.90
Aug-08	\$9,982.17	\$598.93	\$9,383.24	\$2,345.81	\$7,037.43
Sep-08	\$20,585.25	\$1,235.12	\$19,350.14	\$4,837.53	\$14,512.60
Oct-08	\$15,315.03	\$918.90	\$14,396.13	\$3,599.03	\$10,797.10
Nov-08	\$15,121.91	\$907.31	\$14,214.60	\$3,553.65	\$10,660.95
Dec-08	\$13,027.31	\$781.64	\$12,245.67	\$3,061.42	\$9,184.25
Jan-09	\$15,104.59	\$906.28	\$14,198.31	\$3,549.58	\$10,648.74
Feb-09	\$17,127.21	\$1,027.63	\$16,099.58	\$4,024.89	\$12,074.68
Mar-09	\$16,993.08	\$1,019.58	\$15,973.50	\$3,993.37	\$11,980.12
April-09	\$16,727.69	\$1,003.66	\$15,724.03	\$3,931.01	\$11,793.02
May-09	\$13,687.62	\$821.26	\$12,866.36	\$3,216.59	\$9,649.77

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Jun-09	\$11,141.59	\$668.50	\$10,473.09	\$2,618.27	\$7,854.82
Jul-09	\$11,555.58	\$693.33	\$10,862.25	\$2,715.56	\$8,146.68
Aug-09	\$25,361.23	\$1,521.67	\$23,839.56	\$5,959.89	\$17,879.67
Sep-09	\$21,438.99	\$1,286.34	\$20,152.65	\$5,038.16	\$15,114.49
Oct-09	\$18,303.65	\$1,098.22	\$17,205.43	\$4,301.36	\$12,904.07
Nov-09	\$19,745.64	\$1,184.74	\$18,560.90	\$4,640.23	\$13,920.68
Dec-09	\$12,500.22	\$750.01	\$11,750.21	\$2,937.55	\$8,812.66
Jan-10	\$15,254.51	\$915.27	\$14,339.24	\$3,584.81	\$10,754.43
Feb-10	\$11,343.66	\$680.62	\$10,663.04	\$2,665.76	\$7,997.28
Mar-10	\$21,662.85	\$1,299.77	\$20,363.08	\$5,090.77	\$15,272.31
4/1/10	\$2,940.56	\$176.43	\$2,764.13	\$691.03	\$2,073.09
Change to 50-50 split					
04/19/10	\$13,077.26	\$784.64	\$12,292.62	\$6,146.31	\$6,146.31
May-10	\$16,113.61	\$966.82	\$15,146.79	\$7,573.40	\$7,573.40
Jun-10	\$16,695.96	\$1,001.76	\$15,694.20	\$7,847.10	\$7,847.10
Jul-10	\$17,149.42	\$1,028.97	\$16,120.45	\$8,060.23	\$8,060.23
Aug-10	\$18,072.18	\$1,084.33	\$16,987.85	\$8,493.92	\$8,493.92
Sep-10	\$16,330.29	\$979.82	\$15,350.47	\$7,675.24	\$7,675.24
Oct-10	\$16,519.36	\$991.16	\$15,528.20	\$7,764.10	\$7,764.10
Nov-10	\$17,478.84	\$1,048.73	\$16,430.11	\$8,215.05	\$8,215.05
Dec-10	\$19,284.88	\$1,157.09	\$18,127.79	\$9,063.89	\$9,063.89
Jan-11	\$18,402.47	\$1,104.15	\$17,298.32	\$8,649.16	\$8,649.16
Feb-11	\$15,909.09	\$954.55	\$14,954.54	\$7,477.27	\$7,477.27
Mar-11					
Apr-11					
Totals Since Inception	\$711,482.94	\$42,688.98	\$668,793.96	\$210,681.33	\$458,112.63
				Avg after 50-50 split	\$7,905.97
				Yearly, based on Avg	\$94,871.65

Appendix B

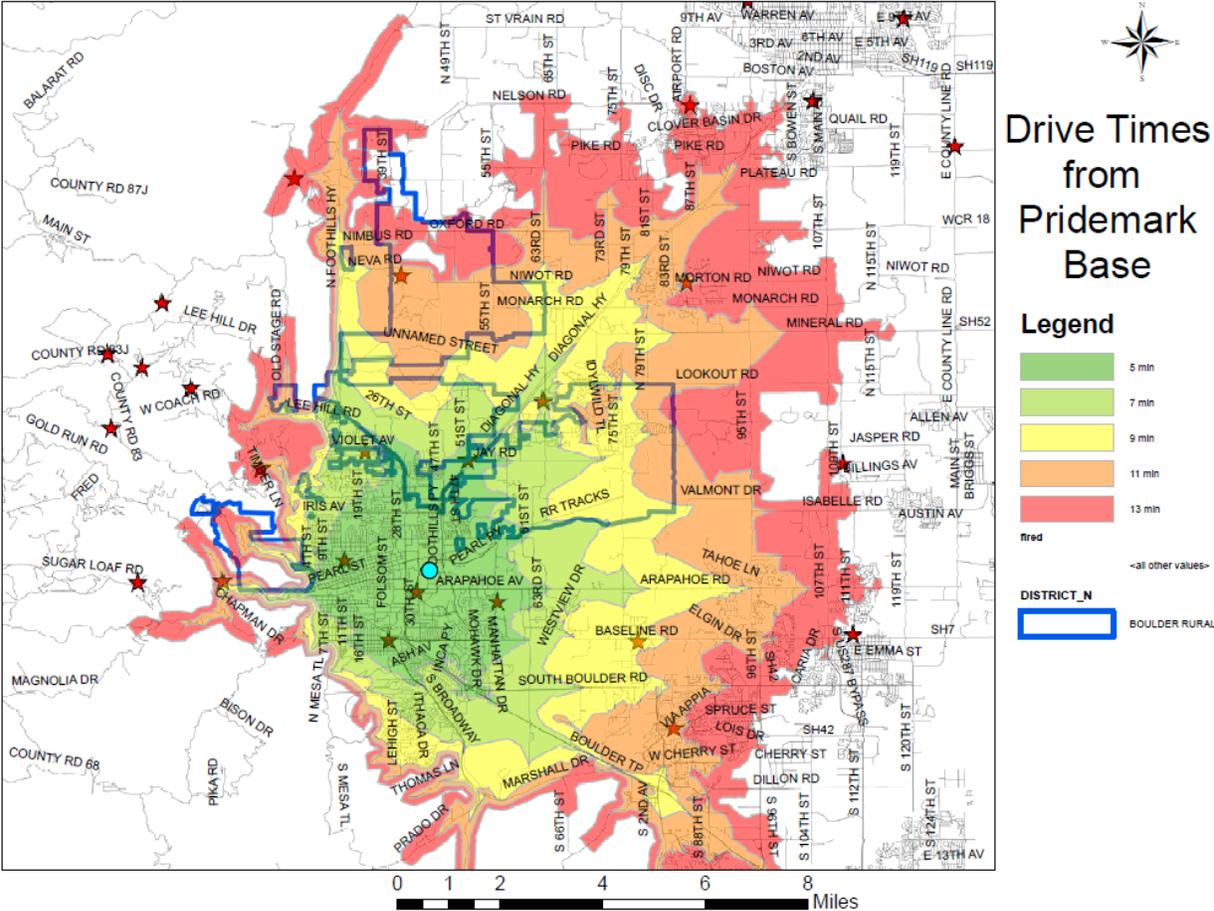




Drive Times from Mountain View 4

Legend

- 5 min
- 7 min
- 9 min
- 11 min
- 13 min
- fred
- all other values-
- DISTRICT_N
- BOULDER RURAL



Appendix C

56-hour Firefighter/EMT-IV Salary

The 56 hour Firefighter/EMT-IV was set to be comparable to the center of the peer department’s ranges for 2nd through 4th year Firefighters. The data is very weak since only three departments reported 2nd year firefighter salaries, and only two reported 4th year salaries. None reported 3rd year firefighter salaries. The peer departments are averaging \$42,394 for 2nd year firefighters and \$47,309 for 4th year firefighters.

As a comparison, Mountain View reports 2nd year salaries of \$47,779, 3rd year salaries of \$52,735, and 4th year salaries of \$58,871.

The middle of our salary band in 2009 was \$44,643, and the current employees will average \$1289 in certification pay at the end of the year. The total of these is \$46,664.

It is proposed that the salaries be increased to place the median + cert pay average amount to \$52,735.

Grade	Base Fire Certifications	2009 Base Salary	2010 Base Salary	Percent Increase
Grade 1	FFI	41,454	47,672	15
Grade 2	FFII	44,643	51,446	15
Grade 3	BRFD Engineer	47,832	55,007	15

Appendix D

EMS Quality Assurance/Quality Improvement Program

Purpose

The Quality Assurance and Quality Improvement (QA/QI) program of the District is responsible for ensuring that patients receive appropriate medical treatment. This program is designed to detect and correct any problems or potential problems with patient care within our District. The goal is to improve medical care, not to punish members for making mistakes. This program follows the Boulder County Protocol, and has been approved by the District's Physician Advisor.

Below is a general description of the program details. Patient reports must be written for all primary patient care done by BRFD members while on calls. If District personnel perform ALS procedures, the attending paramedic should write the report, even if he or she did not make first contact with the patient. If the ambulance arrives first, and the crew did not administer any patient care, you do not need to write an additional patient care report, simply document a medical assist and that there was no patient care by BRFD members in the NFIRS incident narrative.

Roles and Responsibilities

The EMS Coordinator is primarily responsible for the QA/QI program. He or she shall review, or designate the review of, all EMS reports. The EMS Coordinator shall also forward reports to the EMS Director who will decide on the procedure to be followed when patient care is found to be sub-standard. The EMS Coordinator shall maintain a close working relationship with the Physician Advisor to ensure the QA/QI process maintains our medical care at the level the Physician Advisor desires.

Compliance with HIPAA Regulations

As a provider of health care services, BRFD is a "covered entity" under the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"). All BRFD members shall comply with all rules, policies and procedures established by the BRFD Board or the Fire Chief or his or her designee to maintain the confidentiality of protected health information or otherwise comply with HIPAA, the Privacy Rule and the Security Rule promulgated by the U.S. Department of Health and Human Services, and any applicable State law.

Procedure

Every patient shall have a Patient Care Report generated and stored in Firehouse. The EMS Coordinator shall review and divide the reports for QA/QI among the 3 shift paramedics in such a fashion that each medic will review a portion of the reports from the other medics and no

medic will review their own reports. QA/QI can be done in Firehouse, and documented through the report authorization field.

The evaluators review the report and evaluate it based on several filters given to BRFD by the Physician Advisor utilizing the QA/QI form approved by the Physician Advisor. Some filters are for internal review and some are for Physician Advisor review. Reports that require an internal review will be reviewed thoroughly by the EMS Director prior to any action taken on the report. The EMS Director, prior to submission to the Physician Advisor, will review all reports requiring a Physician Advisor review.

If no filters are found on the report no further review takes place. If filters are found in the report, one of the following events could take place:

1. The patient care is found appropriate, and no action is taken
2. The patient care is found appropriate, although the patient may have a negative outcome, in which case action may or may not be taken.
3. The patient care is found non-routine although the patient suffered no negative outcome, in which case action will be taken.
4. The patient care is found to be inappropriate, and there was potential for a serious negative outcome, although the patient did not sustain a negative outcome, in which case action will be taken and the Physician Advisor will become involved.
5. The patient care is found inappropriate and unacceptable. The patient had a negative outcome, in which case action will be taken, and the Physician Advisor will become involved.

Once a report is given to the Physician Advisor, he/she will review the report and discuss it with the EMS Director. The decision made by the Physician Advisor and the EMS Director is final and cannot be appealed to the Chiefs. If a member disagrees with the Physician Advisor and EMS Director, they may schedule a time to meet to discuss the decision.

Actions that may be taken are as follows:

1. Verbal reprimands
2. Written reprimands
3. Training requirements
4. Suspension of medical privileges
5. Revocation of medical privileges

Actions will vary depending on:

1. Severity of the incident. This is based on the breach of standard of care and the patient's outcome.
2. Circumstances surrounding the incident. The surrounding environment often dictates levels of care.
3. Previous history of incidents involving the individual.
4. Any other mitigating factors.