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Evaluation of the Tualatin Valley Fire &Rescue

Car program for non-emergency response.

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Abstract

The problem identified in the project proposal was that Tualatin Valley Fire & Rescue (TVF&R) had not completed an evaluation of data to assist in the decision making of future deployment for the car program by asking, does the program deliver the expected results? The purpose was to evaluate the data available and create recommendations to the district for the continuation of the car program. The car program consists of the deployment of non-traditional, single person apparatus to respond to pre-determined call types that typically do not require a full size engine or truck staffed by a four person crew. A descriptive research method was employed to find out how other communities had dealt with similar issues and what call types were assigned to this resource at TVF&R. Evaluative research was used to determine how often the car program utilized additional resources, if resources were more available and if there were efficiencies realized with the program. The research provided an understanding of the implementation process and what effects and benefits were created with the program. Research included literature review and the analysis of data that TVF&R has collected over the initial phases of implementation. The research also provided needed insight for the author in changing how to examine the need for heavy resources and alternative deployments to better serve our communities with greater efficiency. The recommendations that followed the research included; 1) continue the timely collection and review of data that will support effective alternate deployment models, 2) continue the car program for the timely and effective mitigation of non-emergent requests from the community and, 3) look into the possibility to "post" these resource types, in a manner similar to private EMS systems, to areas that have shown statistically higher use of our non-emergent response resources.

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Evaluation of the Tualatin Valley Fire & Rescue Car program for non-emergency response.

Tualatin Valley Fire & Rescue, located in the Portland, Oregon metropolitan area, serves a population of nearly 450,000 people and responds to approximately 33,000 requests for service annually. Of these calls, almost one-third are now categorized as non-emergent in nature when the responders report out the situation found. As population and call volume has increased over time, the leadership of the organization looked for other solutions to deliver timely and effective service for these non-emergent call types. The intent was to create increased availability of traditional, heavy resources to respond to emergent, resource and staffing dependent call types. The car program included the deployment of non-traditional response apparatus staffed by a single firefighter paramedic. The vehicles chosen for this program were Toyota FJ Cruisers that have adequate storage space to carry response equipment and are equipped with four wheel drive for all weather conditions. The term car was chosen for no specific reason other than the vehicle represented some resource type other than a typical fire apparatus type. One of the goals in the 2010 deployment changes for TVF&R's strategic plan is to "*get the right resource, with the right staffing, to the right call, at the right time*". This statement, which outlines the deployment objectives, also defines the expected results of the car program. The problem is, since the inception of the TVF&R car program, no formal evaluation of this new data has been completed to answer the question: Does the Tualatin Valley Fire & Rescue car program deliver expected results? The purpose of this project is to evaluate the information that has been collected and the response data available of the TVF&R car program to aid in the decision making process for future deployment. The project applied descriptive research to address the first question: How have other agencies addressed the issue of sending the appropriate resource to non-emergency

calls and what call types are being covered by the TVF&R car program? The project then applied evaluative research to answer the following questions: (a) What percentage of the time does the car need additional resources to mitigate the call? (b) Does the car program create more availability of resources for specified call types? (c) Does the car program create cost efficiencies in the deployment of resources? Research will include a review of development documents and incident records to determine the call types the cars are being dispatched to. The research will also involve data review and analysis available through TVF&R records system to answer the remaining research questions. Additionally, research will be conducted by the author to discover the intent and motivation behind the development and deployment of the car program. The research will also look at other attempts across fire and EMS practices to reduce the impact of non-emergent responses on emergency response needs. This applied research project may also provide TVF&R the opportunity to identify, budget for, and implement additional changes to provide an increased level of effective service in its communities without requiring a significant increase in funding for the department. These increases in service may be realized through changes in improved staffing models, fire station locations, or equipment changes to protect the community.

Background and Significance

Tualatin Valley Fire & Rescue is located in the northwest corner of the State of Oregon. The fire department serves an area of approximately 210 square miles. The area includes nine cities, and unincorporated areas of three counties. The District serves 432,909 people who live in the metropolitan area that surrounds the southern and western metro areas of Portland (TVFR, 2010). TVF&R's residents and visitors receive fire and emergency medical service (EMS) from 21 stations and nearly 500 employees. This employee count includes career line response staff,

volunteer responders, and administrative employees. The service area is divided into three types of response areas for deployment models that include metropolitan, suburban, and rural areas. These areas are primarily defined by population density and the deployment model utilized for each is based upon expected response and performance criteria defined in the TVFR Standards of Cover for Emergency Response document (TVFR, 2010a).

TVF&R regularly analyzes response data to measure its performance in the effort to reach the stated goal of "*get the right resource, with the right staffing, to the right call, at the right time*" (TVFR, 2010b). That analysis includes many data sets which include: number of calls, types of calls as dispatched, type of situation found, outcome of incident, response time, location, etc. A consistent message the District's data has shown is that the occurrence of medical and public service calls is an increasing percentage of our total call volume. The occurrence of fires is decreasing in the communities as in many areas across the United States. Over the past four years, TVF&R has looked into strategic ways to use existing resources to address some of the non-life threatening or non-emergent calls. Even some of the EMS data demonstrated that resources were being misapplied. As an example, when the District analyzed calls with the EMS chief complaint, as dispatched, of abdominal pain, allergic reaction, and headache or fall, most of these calls resulted in non-emergent care and many in non- transport outcomes (TVFR, 2010b). With both fire and EMS call response data in mind and a desire to be more efficient in the deployment of resources and staff, TVF&R looked to a single person resource that could address these non-emergency types of calls. This search landed on the creation of the car program. The car program was designed to handle specific call types at specific times of day when the existing service model was not meeting the recognized response standards in the District's strategic plan and as identified in the Commission on Fire

Accreditation International (CFAI) documents (CFAI, 2009). The existing service model included traditional 24/48 schedule, 3-4 person Advanced Life Support (ALS) engine or truck companies, and some peak activity units staffed during higher call volume. When TVF&R looked at the implementation of the car program, it was in an effort to better fulfill the goal of " *get the right resource, with the right staffing, to the right call, at the right time*" (TVFR, 2010b). As in many areas across the United States, constituents often ask responders, "we called for an ambulance, why is the fire department here?" or "does it really take four firefighters and a fire truck to help my sick neighbor?" (TVFR, 2009). Additionally, in light of the recent economic struggle many communities and government agencies have been experiencing, TVF&R decided it was important for the organization to be more effective and efficient with spending the taxpayer's dollars. Responsible deployment of resources accomplishes fiscal responsibility.

In May 2010, four cars were introduced into the response system. They were located and deployed out of stations that had identified increased call density of 23 specific call types (appendix A) that TVF&R wanted to address with this specific resource. The purpose of this applied research project is to evaluate the information that has been collected and the response data available of the TVF&R Car program to aid in the decision making process for future deployment. Additionally, this research may provide solid reasoning for one potential solution to similar issues faced by other fire service agencies in the United States.

This research project connects directly to both the terminal and enabling objectives of the Executive Analysis of Fire Service Operations in Emergency Management courses. Those objectives are to enhance the ability of the author to analyze the level of preparedness of the agency and enhance the ability to manage the operational component of a fire department effectively (FEMA, 2009). The project also connects with an objective of the United States Fire

Administration in that TVF&R applies the use of modern data and information analysis in planning and preparedness activities (USFA, 2010).

Literature Review

The literature review for this problem was partially limited to development documents from TVF&R as this program or approach is unique to Tualatin Valley Fire & Rescue. Research outside the TVF&R documents included seeking information on risk management and how similar agencies addressed the issue of non-emergency response impact on emergency service delivery. The descriptive research question being posed in this project was: How have other agencies addressed the issue of sending a more appropriate resource to certain call types and second, what call types are being covered by the car program? Evaluative research was conducted in the review and analysis of data on the three remaining questions: (a) What percentage of the time does the car need additional resources to mitigate the call? (b) Does the car program create more availability of resources for specified call types? (c) Does the car program create cost efficiencies in the deployment of resources? The literature review for this project was initiated on the TVF&R's district intranet website and printed documents from the organization. Additional research included reviews of periodicals related to the subject, research papers, and reference texts. Additionally, as a new employee with TVF&R, this research allowed the author to gain a better understanding of the process and implementation decisions for the car program within the TVFR organization.

The car program was designed to meet the goal of "*the right resource, for the right call type, with the right staff, at the right time*" (TVFR, 2010b). So, non-emergent calls that could potentially be mitigated by a single trained responder resource were identified. These included "dispatched as" call types that in the past were being assigned traditional heavy resources and

resulted in non-emergent "situation found." One example of the call type selected that plagues many fire departments across the United States is commercial false fire alarms. These calls are reported as situation found NFIRS call types; 59 service call, 64 vicinity alarm, 69 good intent, 73 system malfunction and 74 unintentional alarms (USFA, 2003). These commercial fire alarm calls have been traditionally assigned a set of resources that anticipated, upon arrival, a commercial occupancy on fire with life at risk and large values at risk. TVF&R's data has shown to the program designers that the vast majority of these commercial alarms resulted in a " situation found" of false alarm or good intent call. This data is not unlike National Fire Incident Reporting System published data. The report "Fire Department Overall Run Profile for 2007" states that nationally, less than 10 percent of fire department runs are actual fires. False alarms account for 12 percent of the call volume as well. When fires by property type are reviewed, commercial fires were only 8 percent of all fires in the United States (USFA, 2007). In a report titled False Alarm Activity in the Unites States, the National Fire Protection Association states that in 2008, fire departments responded to 982,000 unintentional alarms and to 765,000 system malfunctions (Karter, 2009). The Oregon State Fire Marshal data from 2009 also reflects similar information. Of all fire incidents, only 35 percent were in structures. Only 5 percent were in offices or stores and 3 percent occurred in storage properties (OSFM, 2009). This data supports the decision making at TVF&R. The data analyzed in the selection of the call types for the car program reflects a similar situation amongst larger data sets both on a statewide and national level. The author researched literature that communicates the attempts to reduce the impact of false fire alarms on America's fire service.

In Appleton, Wisconsin, it was suggested to implement education elements and reduce the fire department response to one apparatus that responds emergently and the balance of the

resources in a non-emergent mode (Reece, 2008). In Memphis, the recommended solution was to implement an ordinance to fine violators (Pannell, 2001). Prince Georges County, Maryland recognizes a need to reduce false alarms, but makes no adjustments to the response model (Hassan, 1999). Research into the literature that has been published regarding private ambulance systems posting of resources was completed as well. This posting, called system status management (SSM) removes EMS response vehicle from fixed facilities in an effort to reduce response times to all calls. While TVF&R was not seeking the solution of reducing response times, the author felt there may be potential insight into addressing non-emergency response. In an article published in EMS World magazine in 2003, Bledsoe states, the only numbers published relative to SSM were from the city of Tulsa, OK. Following implementation of SSM, response time dropped from 6 minutes, 46 seconds to 6 minutes, 9 seconds—a saving of 37 seconds. The article went on to state that the time savings was clinically insignificant, and furthermore, ambulance maintenance costs were increased by 46% after implementation of SSM because the ambulance fleet was constantly on the road (Bledsoe, 2003).

In 2008, TVF&R responded to 32,093 requests for service in the fire district. In an analysis of those calls, the "situation found" by responders categorized the calls as follows: (a) 1,042 fire calls, (b) 18,910 emergency medical service calls, (c) 779 hazardous condition calls and, (d) other call types were 11,362 as reported and attached in Appendix B. This call data of "situation found" is dramatically different than "dispatched for" data. As in many locations across the United States, the triage of the call type by public safety answering points and the related dispatch of resources are dependent upon information that is available from the caller or reporting party. Experienced practitioners in the fire and EMS response field understand that the cliché "garbage in, garbage out" applies to call taking, triage, and assignment of resources. One

can only evaluate the information that is provided by the caller. If that information is inaccurate, then incorrect triage decisions are made and consequently inaccurate deployment decisions. When responders arrive on the scene, they evaluate the situation at hand and then reclassify the incident in their report as a different call type or situation found. The comparison of the TVF&R data is detailed in the following table and reveals the disparity between the caller's perception of an emergency and the actual situation as defined by the provider (TVFR, 2010b).

Table 1.

Call Type data

2008	Fires	EMS	Hazardous call	Other calls
Dispatched for	4,527	25,381	502	1,683
Situation found	1,042	18,910	779	11,362

TVF&R noted this disparity and the operations section of our leadership realized that resources were potentially being misapplied to the emergency. In an article published in The Beaverton Valley Times, Assistant Chief Dustin Morrow was quoted as saying "The fire service as an industry is changing a great deal, it doesn't make sense to keep doing business the way we have done in the past" (Lenz, 2010). Non-emergency calls were the target of this program. The call type of "other" includes public service calls and false alarms. Many of the "other" calls type incidents resulted in non-emergent situations. Additionally, data review was conducted on the largest segment of TVF&R's responses, EMS calls. It was found that a number of chief complaint call types or the nature of call type was not a true medical emergency. The primary goal of an EMS system is to deliver the appropriate level of care to someone in need in a timely manner (Buckman, 2006). This appropriate level of care in a timely manner, too, was the goal of TVF&R's deployment changes and the car program. Data reviewed found that TVF&R could send one trained responder, in this case a paramedic, to deliver the appropriate care in the right

amount of time for effective resolution of the need for certain chief complaints. Many of these EMS call types indentified receive the third party ALS transport resource as well. Upon the completion of the initial program research and development, 23 call types were identified appropriate types for car response. These call types are identified in Appendix A.

The author discovered different approaches across the United States by similarly sized agencies on how they may have dealt with non-emergency call types. In Philadelphia, it was suggested to develop an alternate service delivery through city services, not using the fire department (Picozzi, 1999). Worcester, Massachusetts looked at reducing the number of agencies responding to non-life threatening medical emergencies, but not how they respond and how to identify the criteria to determine the response resources. The City of Worcester sends a fire engine, an ambulance and a law enforcement resource to every EMS call. The fire chief was quoted that "it maybe overkill at times, but, that's the nature of this game". The report suggested that the City look at a change in protocol to prevent over response (Melander, 2006). Gwinnett County, Georgia research found that their paramedics spent more time caring for non-emergent patients than emergent patients. The research completed states that the agency must develop other solutions to provide adequate care to non-emergent users of the 911 system (Myers, 2003).

The literature research also looked to the subject of risk management to verify the validity of the decision making process utilized. The National Fire Protection Association (NFPA) defines risk management in their standard setting document titled NFPA 1250 Recommended Practice in Emergency Service Organization Risk Management as: "risk management is the process of planning, organizing and directing and controlling the resources and activities of an organization in order to minimize detrimental effects on that organization" (Buckman, 2006). One of those risk management based decision processes was undertaken at

TVF&R and the question asked was, "can we send only one person to these call types when we traditionally have required the Big Red Truck (BRT) and firefighters to respond just in case those might be needed?"

The additional benefits that might be realized by TVF&R in the future deployment of alternative resources and apparatus for certain call types. One benefit would be increased approval by the community for more effective use of tax payer dollars. In a telephone conversation, one of the District's administrative assistants recalled that the customer stated "it is a real joy to see TFV&R being more aware of and taking advantage of more effective change". (S. O'Connor personal communication, Sept 1, 2010).

The second research question asked was "What percentage of the time does the Car need additional resources to mitigate the call?" This was newly determined data. The author researched the records management system utilized by TVF&R that contained response data for the 23 call types. In the initial data sets, the call volume over the first 120 calendar days and 64 active deployment days revealed consistently that the cars were the only or primary resource on 75 percent of the identified 23 call types (TVFR, 2010d). The author reviewed in excess of 10,000 calls that occurred over the first 120 days of the program. The data did not possess enough detail to verify if the cars requested additional resources to mitigate the risk or, if the additional resources were automatically assigned based upon dispatcher triage. For all non-emergent medical call types, a third service ALS provider responds non-emergently and can be cancelled by the paramedic who staffs the car if no transport or further assistance is needed. This happens frequently on non-emergency motor vehicle crash responses and chronic illness calls. As an additional example of when additional resources may be sent to non-emergent calls, TVF&R regularly sends a certified fire inspector to many of our fire alarms with the single car

resource to assist in the troubleshooting of alarm problems at commercial occupancies in the TVF&R response area. These additional non-emergent resources deployed are included in the 25 percent of the time that the car was not the sole resource (TVFR, 2010d).

Third, the researcher asked: "Does the car program create more availability of resources for specified call types?" To answer this question, the author compared over 10,000 current records of response data during the same time period of car utilization with overall response fleet data for the same call types as included in Appendix D. The car response program is currently only staffed Tuesday through Friday and 0700 to 1700 each of those days. The design of this deployment schedule was selected to meet peak call activity for these call types based upon historical data (TVFR, 2010a). Appendix E provides data with the four cars in the system for the period of May 11 through September 15, the first 64 days of service over 120 calendar days, 848 calls were responded to by a single person single resource. This represents nearly 11 responses per ten hour work shift. This also represents approximately eight percent of total call volume for the same time period in the initial four months of deployment in 2010. This data includes the following (TVFR, 2010d).

Table 2.

Car response data. First 120 days/ 64 deployment days

Car Data	False Fire alarms	Minor EMS	No injury MVC	Detector problems	False medical	Lock outs	Odor, smoke complaint	Wires down
Cars	206	163	93	29	25	23	21	15
Fleet	828	567	484	117	108	62	76	52

In the past, these same calls were responded to by a heavy resource (engine, truck or heavy rescue) and thereby, made unavailable for other calls. This fact was identified in TVF&R's reaccreditation process this past spring of 2010 (CFAI, 2010). When traditional heavy resources were unavailable on these code 1 call types, it then creates a delayed response time for a resource to respond from outside the first due area and the potential for increased loss.

Programs from across the United States that seek to improve resource availability and decrease demand on heavy resources were researched. Phoenix Fire Department has utilized a Ladder Tender vehicle that responds on EMS and non-structural fire calls in place of the ladder truck. This response program is designed to provide a full service level of a truck company, while extending the service life of the more costly apparatus (Phoenix, 2003).

The last question asked in the review was: "Does the car program create cost efficiencies in the deployment of resources?" The author utilized fleet records to examine the possible cost savings or improved effectiveness of the car program. These records disclosed a significant fiscal impact. When the author analyzed initial cost, the cars represent a significant savings as compared to traditional response resources. TVF&R solicited pricing from four local vendors for a used Toyota FJ Cruiser with specific features. The fleet department then outfitted the FJ's with emergency lighting, radios and equipment to meet the mission of the cars. For the purchase of the four cars, TVF&R spent $104,029 (TVFR, 2010e). Comparatively, TVF&R recently purchased new 2010 fire engines on a competitive bid process. Those apparatus that also respond to the same call types cost the district $630,000 each (TVFR, 2009a). One fiscal impact that does not have adequate data to be comparative is life expectancy and life-cycle cost. The District's current apparatus replacement schedule recommends ten years of front-line service and five years in reserve (TVFR, 2009). The FJs have not be in service long enough to create data to

compare this length of service cost.

Employee costs in the implementation of this program had no additional expense. No new employees were hired for this program and staffing was not reduced on any of the existing companies. Current employees both from the traditional 24/48 line staff and the reserves pool were solicited for interest in the program and the district had an overwhelming response from qualified employees. While there is not data that specifies the District is saving employee costs per call, it can be interpreted that the employee costs for responding to these 23 call types during the car response scheduled time is one quarter of the traditional apparatus staffing cost. Support from the leadership and within the local labor group, International Association of Firefighters Local 1660, was also beneficial in the success of the car program (personal communications, D. Morrow Aug. 28, 2010).

Fuel cost and maintenance cost were also examined. In fiscal year 2009/ 2010, TVF&R spent $3.41 per mile on maintenance for the Type 1 engines on average. Trucks were slightly higher at $3.61 per mile. Fuel mileage for the engines averaged 4.5 miles per gallon and trucks, 3.5 miles per gallon (TVFR, 2010a). The FJ Cruisers by comparison have been averaging 13.27 miles per gallon and maintenance costs have been 0.49 per mile over the first four months of deployment and reported on Appendix C.

Procedures

The research and data analysis for this applied research project was completed in multiple steps. Why data analysis? In the FEMA publication titled Fire Data Analysis Handbook, it is described that there are three good reasons for looking closely at the data: 1) to gain insight into problems, 2) to improve resource allocation, and 3) to identify resource and training needs (FEMA, 2004). This data research was conducted to improve the resource allocation. The first

step began with research and review of relevant literature. The author utilized both internet based research and the Learning Resource Center in Emmitsburg, MD to research how other agencies have addressed response to non-emergent call types. Additionally, information was sought from both internal documents at TVF&R and state and national data to establish relevance and credibility of the internal data sources. In other words, the author wanted to verify that data compiled from NFIRS reporting and EMS records management system at TVF&R was not unique when compared to other larger data sets. The data was compared to state and national data by call type and percentage of calls to validate the decisions made to justify a car response in lieu of a traditional heavy resource.

The second part of this research included a review of the information available through TVF&R records management for the cost factors that answer the research question in regards to cost effectiveness. Where data did not exist, questions were posed to TVF&R Deputy Chief Dustin Morrow who was the program creator and initial manager of the car program. The guide for conducting interviews as outlined in Module 3 of the National Fire Academy's Executive Development Course self-study guide was used as a reference (FEMA, 2005).

Results

Through the literature review and the personal interview process, the author was able to formulate a solid understanding of the conditions and the data that would support or refute the continuation or enhancement of the TVF&R Car program.

The first question asked in the research was, what were other agencies doing to minimize the impact of non-emergent call types and what call types are being covered by the car program? The data from TVF&R provided 23 call types that could be covered by the car program. These

were calls that historically in the community have proven to be non-emergent in nature a greater majority of the time. These call types have been reclassified as Code 1 or non-emergency responses based on historical data and are included in Appendix A. During the week when the car program is staffed, Tuesday through Friday, 0700 to 1700 each day, these non-emergency responses are assigned to the cars. These call types are non-emergent and may or may not fall into the assigned stations first due area and multiple non-emergent calls get queued in the response system. Fire service agencies across the United States have taken varied approaches to this issue. None of the agencies researched developed a response program that deployed an entirely different resource for these non-emergent calls. Most every agency utilized existing resources in a different manner. While this is an admirable approach by not increasing costs, many times the solution did not accomplish the same results as the car program. Response availability for emergent response that requires the four person crew and heavy resource are no more available. The Phoenix ladder tender model only reduces the number of calls the ladder responds to. The associated literature review validated the risk management process utilized by the TVF&R leadership to reclassify the call types and assign a non-traditional resource to respond. TVF&R completed just that process in implementing the Car program. The risk management decision to send a one person resource to these call types was based upon the data that demonstrated that inappropriate resources were being sent to these calls the majority of the time. Additional risk is avoided in this process as well. These call types are now being responded to by the cars in a non-emergency (code 1) mode, only one person is exposed to the risks of responding instead of four. Heavy apparatus are being left at the station for their intended purpose, fire response.

The research also determined that the call volume statistics used in the risk management process by the program designers was not an anomaly in TVF&R's response community. These are typical data results across the State of Oregon and the United States.

The second research question asked: What percentage of the time does the car need additional resources to mitigate the call? These were newly discovered statistics gleaned from the records management system. In the initial data sets, the call volume over the first 64 active deployment days revealed consistently that the cars were the only or primary resource on 75 percent of the identified 23 call types. The data sets were not robust enough to verify if the cars requested additional resources to mitigate the risk or they were automatically assigned based upon dispatcher triage. Additional non-emergent resources are also deployed depending upon call type or technical need, but may have impact on the remaining 25 percent of the time that the car was not the sole resource. With the four cars in the system for the period of May 15 through September 15, the first 64 days of service over 120 calendar days, 848 calls were responded to by a single person single resource. This represents nearly 11 responses per ten hour work shift. This also represents approximately eight percent of total call volume for the same time period in the initial four months of deployment in 2010.

The third question used to address the research problem was: Does the car program create more availability of resources for specified call types? Through the available data, it was discovered that the car program responds to a significant number of calls that in the past would have been responded to by traditional heavy resources and crews of three to four firefighter/ EMTs. While the author could not create a set of data that directly answered the question of more availability, the data does reveal that over eight percent of total call volume is being handled by four single apparatus each with a single responder. If staff were to look at 23 fire companies

within the system, they are responding to the balance or 92 percent of the calls. This equates to approximately 9,200 calls for the other 23 companies or 400 calls per company. While the call distribution is not that equitable across the District, it does provide a basis of comparison of effectiveness of the car program. When call volume over the same time periods is reviewed, the impact is even greater. The cars respond to and handle a greater percentage of the calls in that time frame. Therefore, it becomes obvious that when the car is in the response system, the heavy resources are effectively more available for the additional calls and consequently the correct call type. All of this is accomplished without reducing staffing on the engine, truck and rescue companies.

The last question raised and possibly the most convincing for the author was in terms of value of the program to the community and TVF&R was: Does the car program create cost efficiencies in the deployment of resources? A limitation was realized in the data sets that did not allow the author to examine cost per call. While there is adequate data for the car program, the isolation of data for the heavy resources was not possible. This data would then allow a total savings to be calculated utilizing the number of calls and cost per call when examining cars response versus engines response. Even without that data, the cars begin to allow TVF&R the realization that they are mitigating 75 percent of the 23 call types on their own while they are in service. They typically respond to and mitigate more calls over the same time frame than our traditional resources for appreciably less initial investment. Employee costs are only 25 percent of the cost compared to the traditional resources, fuel efficiency is increased from 3.5 to 4.5 miles per gallon to 13.47 miles per gallon, and maintenance costs are significantly less. The calculation of costs per mile allows the author to realize the significant savings realized by utilizing this response to the 23 call types. The only increase in cost is the acquisition of the new

apparatus. Without the cars, TVF&R would still respond to these calls with a traditional heavy resource.

Discussion

When the author initially compared the existing data and literature that provided actual context with how TVF&R approached a common fire service delivery problem, there was no clear indication of achieving significant findings. Much of the initial approach to the program design by TVF&R staff was developed around data that they had experienced with non-emergent situation found calls. They felt there had to be a better way. The 2010 deployment changes project identified the call types that could be addressed. The alternative deployment project identified that a single resource with trained and competent responders would be able to deliver effective customer service for the customer in need. The ultimate goal of "*get the right resource, with the right staffing, to the right call, at the right time*" was all part of also achieving re-accreditation for TVFR. When the author compared the data and literature review to the results sought, the initial data from the car program suggested that TVFR has possibly identified an effective and efficient solution to a common problem to our service.

There is compelling evidence of the benefits that can be obtained by continuing the car program. This evidence includes improved response availability from the traditional heavy resources to specified call types, decreased operational costs in response to the 23 non-emergent call types and like the Phoenix system, potentially increased life expectancy for heavy resources. The expansion of the program may show additional benefits with the collection and analysis of data over a longer time frame and data that will reflect additional deployment challenges in the response area. These challenges include seasonal weather changes, demographic changes and acceptance of the program by the community. All of these factors show favorable results to date.

The author is wary of over-saturation of this resource in the system. As call volume by type changes, additional units may reach a "tipping point" that renders them less efficient based upon current staffing models

Recommendations

At the onset of this project, the author's goal of this applied research project had a single purpose. That purpose was to identify if the data supported the continuation or enhancement of the TVF&R Car program.

1. The first recommendation would be to continue the timely collection and review of data that will support effective alternate deployment models such as the Car program. Today's fire service needs to embrace data and the analysis of that data to create a more professional approach to decision making when time allows. Changes in resource deployment are one of those opportunities to take the time to make informed decisions.

2. The second recommendation of this project, based upon the data collected and the efficiencies realized, is to continue the Car program for the timely and effective mitigation of non-emergent requests from the community. Deliver the right resource, with the right staffing, to the right call, at the right time. This program may be expanded in the future in an effort to address additional non-emergency call load when the data proves out an inappropriate deployment of "heavy resources" to calls that do not require that resource type.

3. The third recommendation, in an effort to further enhance the Car program, may be to research dynamic location strategies for these resource types, in a manner similar to private EMS systems, to areas that have shown statistically higher use of non-emergent response resources. This may include busy road locations, special events and places where density of certain call types occurs, and encourage pre-deployment of unique resource types.

In closing, the author's project purpose was to develop a recommendation based upon the identified problem, which was: does the Tualatin Valley Fire & Rescue Car program deliver expected results? While some communities have implemented systems that attempt to provide a solution to a certain set of issues, TVF&R has taken a giant leap in approaching the delivery of resources to a specific call set that are statistically and physically supported in the fact that it doesn't take a fire truck and four firefighters to assist a sick neighbor. By utilizing data that demonstrated specific needs and outcomes, TVF&R has made an informed decision to innovatively utilize a non-traditional resource. It has proven to be effective, cost efficient, and emotionally accepted in the communities TVF&R serves. Tualatin Valley Fire & Rescue and many other fire service agencies cannot continue to do business the same way as the community' s needs change. Looking to alternative deployment of resources is one way that, over time, an effective workforce can be sustained by demonstrating and exercising fiscal responsibility in programs like this.

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Appendix A

Call types assigned to Car program

Tuesday – Friday 0700-1700

Code	Description
AB	Abdominal Pain
AL	Allergic Reaction
BL	Bleeding Problem
BURN	Burn complaint
DOS	Confirm death on scene
DI	Diabetic
FA	Fall
ALFC	Commercial Fire Alarm
ALFR	Residential Fire Alarm
HED	Headache
LZ	Landing Zone
LOCK	Lockout
ALM	Medical Alarm
MED	Medical Alarm
MEN	Mental/Emotional/Psychological
MISC	Miscellaneous
ODOR	Odor investigation

SK	Sick Person
DETECT	Smoke Detector Problem
SINV	Smoke Investigation
MVU	Traffic Accident Unknown Injury
TR	Trauma
Wires	Wires down

Appendix B

TUALATIN VALLEY FIRE & RESCUE

Incident Summary
2008

NFPA Code		By Dispatch Call Type		By Situation Found	
1	FIRE,EXPLOSION	4,527	*13.97%*	1,042	*3.22%*
2	OVERPRESSURE	0	*0.00%*	80	*0.25%*
3	EMS/RESCUE CALL	25,381	*78.32%*	18,910	*58.35%*
4	HAZARDOUS CONDITION	502	*1.55%*	779	*2.40%*
5	SERVICE CALL	1,517	*4.68%*	1,853	*5.72%*
6	GOOD INTENT CALL	166	*0.51%*	6,623	*20.44%*
7	FALSE CALL	0	*0.00%*	2,777	*8.57%*
8	NATURAL CONDITION	0	*0.00%*	7	*0.02%*
9	OTHER SITUATION	0	*0.00%*	22	*0.07%*
TOTAL CALLS FOR SERVICE		**32,093**			