

Reducing The Risk From Red Lights And Siren Response In Watertown, South Dakota

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Abstract

Watertown Fire and Rescue (WFR) is a career fire department located in northeastern South Dakota. The department is responsible for fire and emergency medical services (EMS) to the residents of the City of Watertown, as well as EMS response for 717 square miles of the encompassing Codington County. Emergency response modes to 911 calls within this jurisdiction are currently unregulated, as the department has no formal policies. The problem was that the civilian drivers of Watertown are put at potentially significant risk whenever a WFR unit responds to an emergency call. The purpose of this research was to identify methods that will reduce risk to all civilian drivers on the roads of Watertown when fire department units respond to emergencies. Descriptive research was used to answer the following questions: (a) What dangers and liabilities does the fire department face by responding to all calls with red lights and siren?, (b) What impact will changing the emergency response policies have on response times given the rural nature of Watertown?, (c) What policies or procedures have other fire departments enacted to address the issue of emergent response?, (d) What resistance or support might be expected from firefighters and the citizens of Watertown if the department changes the emergency response policies? Interviews, surveys, personal communications, and first person research were utilized as the primary source of information. The information gathered in the literature review included research and opinion from fire service leaders. The research revealed an increased liability and personal danger from responding to all calls using lights and siren, and indicated a lack of significant timesavings from using such devices. Several ideas for policies and guidelines were identified. Based on the information gathered, implementation of new policies and procedures regulating the appropriate use of lights and siren was recommended.

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Introduction

Watertown Fire and Rescue (WFR) is a career fire department located in northeast South Dakota. Created in 1909, the department is responsible for fire and emergency medical services (EMS) to the residents of the City of Watertown, as well as EMS response for 717 square miles of the encompassing Codington County. The response area of the department is mostly rural in nature, but also includes a business district, industrial area, and a regional airport with commercial service. The department also provides interfacility ambulance transports from the Watertown hospital to hospitals as far as 300 miles away (Watertown Fire and Rescue, 2009). Emergency response modes to calls within this jurisdiction are currently unregulated, in that it is up to the individual apparatus driver to determine the best method of getting to the caller's location.

The problem was that the civilian drivers of Watertown are put at potentially significant risk whenever a Watertown Fire and Rescue unit responds on an emergency call. The department has no formal emergency response guidelines. As a result, nearly 100% of emergency calls are responded to using red lights and sirens (RLS). The city attorney of Watertown has expressed concern that the lack of risk reduction strategies and policies related to emergency response are increasing the liability exposure to the city. WFR command staff has expressed concerns about dangers to department personnel, as well as the public. The purpose of this research was to identify methods that would reduce risk to all civilian drivers on the roads of Watertown when fire department units respond to emergencies.

Descriptive research was used to answer the following questions: (a) What dangers and liabilities does the fire department face by responding to all calls with RLS?, (b) What impact

will changing the emergency response policies have on response times given the rural nature of Watertown?, (c) What policies or procedures have other fire departments enacted to address the issue of emergent responses?, (d) What resistance or support might be expected from firefighters and the citizens of Watertown if we change our emergency response policies?

Background and Significance

Watertown Fire and Rescue provides response for structure fires within the city of Watertown and through contract services to various county townships that lack volunteer fire departments, EMS response for the entire encompassing Codington County, hazmat response to several thousand square miles, and interfacility transfer services to regional hospitals. The population protected by WFR is in excess of 20,000 people over 717 square miles (U.S. Census Bureau, 2009). The department responds to approximately 2,500 calls for service each year. Nearly 80% of those responses are for EMS (Watertown Fire and Rescue, 2009).

By South Dakota Codified Law (SDCL) 32-31-4, emergency vehicles in the state are given very wide latitude in the response mode they use when receiving an emergency call. SDCL 32-31-4 states that licensed emergency vehicles may exceed the speed limit and ignore other driving laws so long as they do it in a “safe and prudent” manner and are using their lights and sirens. Unlike many other states, there are no maximum speed limits for emergency vehicles prescribed under this section (Emergency Vehicles, 1939).

WFR itself has never had an emergency response policy, nor has there been any effort to conduct a risk reduction assessment as it applies to red lights and sirens response. The department has likely been responding using red lights and sirens since the agency was formed as an all career department in 1909. An attempt was made by the current fire chief of WFR to restrict maximum apparatus speed to no more than 10 mph over the posted speed limit, but this

effort was reversed by the city's insurance pool. The reasoning provided was that the department could not be allowed to adopt an emergency response policy that superseded state law (S. Fox, personal communication, February 15, 2011). Because of the lack of guidelines and policies, department personnel respond to nearly all emergencies with red lights and sirens. The maximum speed used in these responses is limited only by the comfort level of the person driving the apparatus. Ambulance response speeds have been noted to be in excess of 90 miles per hour when gauged by the pacing of following fire department support vehicles.

The city attorney of Watertown, while rebuffing the attempts to change the maximum speed limit of fire department vehicles, has expressed ongoing concern that WFR's lack of policies or guidelines related to red lights and sirens response is increasing the city and department's level of legal exposure should a vehicle crash ever occur (S. Fox, personal communication, 2011). While the department has never had a known vehicle crash occur that could be tied to the use of red lights and sirens, the fact that there are no policies addressing the issue is of deep concern to the city's legal authorities. The command staff of WFR also shares concerns that the continued lack of developing policies that address the issue could place the lives of firefighters and civilians at risk.

The significance of this issue to the civilians living in Watertown, and for those who drive through its boundaries cannot be overstated. Fire department vehicle crashes are responsible for a significant amount of injuries and deaths in the United States every year. One Center for Disease Control report found that over 82 EMS workers and 275 other people were killed in ambulance crashes just between 1991 and 2002 (Centers for Disease Control, 2003). Just a single loss of life in Watertown from a fire department vehicle crash could have a

devastating legal and financial impact on the department and the city. Developing guidelines to address this issue is therefore of vital importance to the community.

This research project was intended to satisfy the requirements of the Executive Fire Officer Program's Executive Analysis of Community Risk Reduction (Federal Emergency Management Agency, 2011), and to improve the safety and reduce risk in the city of Watertown. This research satisfies two of the four operational objectives of the United States Fire Administration (United States Fire Administration, 2009). The successful completion of this research will help "reduce risk at the local level through prevention and mitigation" by implementing guidelines that govern emergency response of fire department vehicles. This research will also seek to "improve the fire and emergency services' capability for response to and from recovery from all hazards" (United States Fire Administration, 2009, p. II-2). If fire department vehicles are involved in crashes while responding to emergency calls, their ability to mitigate the emergency is diminished, if not eliminated altogether.

Literature Review

The purpose of this review of literature was to critically analyze the available published materials related to the topic of reducing the risk from red lights and siren response in Watertown, South Dakota.

The dangers WFR faces by responding to all calls with lights and sirens are numerous and well recognized. O'Neal (2008) found that 82% of surveyed fire departments had experienced crashes with their apparatus while utilizing lights and sirens. Between 15,000 and 25,000 ambulance crashes occur every year, a statistic that caused one author to comment that our profession was facing a "public health epidemic" (Clawson, 2002, p. 13). This danger is echoed in other sources such as various papers and reports published by the National Fire

Protection Association (NFPA). In 2005, the NFPA noted that more firefighters die in vehicle crashes than by any other method. This number seems to have lowered since 2005, as the most recent 2009 statistics published by the NFPA show that vehicle accidents were the second most common cause of death for firefighters (National Fire Protection Association, 2009). Maguire, Hunting, Smith, and Levick (2002) found that the fatality rate from ambulance crashes was double the national average for passenger vehicle crashes. The CDC (2003) likewise describes 300 fatal ambulance crashes between 1991 and 2002 that killed not only 82 EMS workers, but also 275 civilians (p. 154-156). In May of 2004, the National Fallen Firefighters Foundation became concerned enough that they identified lowering firefighter deaths from vehicle crashes as one of their most important 16 initiatives. Part of the emphasis on addressing firefighter vehicle crashes so heavily, comes from the fact that such incidents have been identified as the single most preventable way to reduce firefighter fatalities (Markley, 2009).

While the literature and statistics seem to paint a picture of the dangers of emergency response for firefighters, ambulance workers, and the civilians on the roads around them, it would seem necessary to tie this to the actual use of lights and sirens. In examining the statistics on firefighter deaths, Fahy, LeBlanc, and Washburn (1999) noted that unsafe speed and failure to yield were some of the strongest factors in vehicle crashes, which can be common indications of the use of lights and sirens. The well described, “wake effect,” is also believed to be a strong factor in accidents involving emergency vehicles using lights and sirens. This is a phenomenon where emergency vehicles using lights and sirens create a type of wave reaction in civilian vehicles as they attempt to get out of the way. As they pull off to the side of the road or try to pull back in to traffic, vehicle accidents become more common (Anderson, 2004). Waldron (2008) found through a survey that 77.2% of fire departments in New Hampshire were

responding to all calls using lights and sirens. Another author found that 35% of the departments in their state were responding to all calls using lights and sirens as well (Williams, 2005).

Wolfberg (1996) found that fatal ambulance crashes were twice as likely to have been using lights and sirens. Indiscriminate lights and sirens use have also been found to statistically increase the risk of injury (Clawson, 2002), as well as increase the potential for vehicle crashes (Patterson, 2003). Not only are the constant use of lights and sirens not supported by any current research (Clawson, 2002), but the use of any RLS is noted by one researcher as posing a “grave” risk to not only firefighters, but also the civilians on the roads around them (Brown, Whitney, Hunt, Addario, & Hogue, 2000, p. 72). Finally, Fitch (2005) noted that utilizing lights and sirens for every call was dangerous, and comparable to ordering a CT scan for every person who walks in to a hospital.

There was extensive literature available that described the potential legal liabilities WFR faces by responding to all calls using lights and sirens. While WFR has never experienced a vehicle crash that could be tied to the use of lights and sirens, Carrizzo (2000) noted that departments risk an immense liability in waiting for an accident to occur rather than taking proactive steps. Crashes involving emergency vehicles can be very expensive for cities and cause citizens to lose confidence in their own fire department (O’Neal, 1998). The expense of vehicle crashes is perhaps the most widely noted factor in the liabilities of responding to all call using lights and sirens. There are significant financial liabilities that can quickly add up for a department (Waldron, 2008). This monetary payout can approach millions of dollars for every crash that an emergency vehicle is involved in (Clawson, 2002). The unregulated use of lights and sirens was noted to be a huge liability for cities and departments, and perhaps one of the single largest sources of lawsuits against public safety agencies (Wolfberg, 1996). Markley

(2009) commented that a department's risk of lawsuits increases exponentially if it utilizes lights and siren on every call. Even though South Dakota has an immunity law (General immunity from liability for emergency care, 1968), liability can also extend beyond the city and department as well. Peters (1998) discussed a case where the officer of a fire department vehicle, as well as the fire chief, were held partly liable in a lawsuit involving a crash due to no lights and siren policy being in place. In a similar case, an ambulance driver was charged with vehicular homicide when he drove through a stop sign with lights and siren activated and caused a fatal crash (Dicken, 2011). An insurance industry insider noted that the single largest payouts his company makes under EMS policies are for vehicle crashes involving vehicles using lights and siren (Wolfberg, 1996).

The lack of existing policies regulating the use of lights and siren were a common theme in the literature that increased liabilities to fire departments involved in an emergency vehicle crash. NFPA (2007) guidelines call for all fire departments to have formal policies in place that regulate emergency response. This includes policies that require vehicle to come to a complete stop, as well as setting maximum response speeds. Howell (2007) found that 36% of fire departments in the state of Texas had no emergency response policy, which may have contributed to a subsequent finding that 31% of the departments in the state had faced lawsuits directly related to the use of lights and siren. State laws may also increase liability simply by their wording. While often affording certain legal exemptions for emergency vehicles using lights and sirens, these laws offer no protection to drivers who are found guilty of gross negligence or disregard for public safety (Wolfberg, 1996). The state laws of South Dakota also offer various driving exemptions for emergency vehicles, but note that drivers are required to use due regard (Yielding right-of-way to emergency vehicles, 1939). The best way to ensure "due

regard” is through the establishment of formal written policies and training (S. Fox, personal communication, February 15, 2011).

The dangers and liabilities WFR faces by responding to all calls using lights and siren was well described in the literature. The danger of injuries and fatalities to both firefighters and members of the public were discussed by several sources. The legal liabilities the department faces included not only significant monetary payouts, but also substantial personal liability by drivers of emergency vehicles.

Response times are an often-reported statistic in fire departments. This may be due to the belief that patient outcomes can be improved with “predictable” response times (Fitch, 2005). Some authors even believe that response time is a critical component in advanced life support interventions (Ho & Lindquist, 2001). There have also been cases where fire departments have been held to response time standards during litigation due to standards like NFPA 1710 (National Fire Protection Association, 2010), which sets standards for response times for fire apparatus (Fey, 2010). Due to literature like this, it is important to ascertain how response times will be impacted by changing Watertown’s emergency response policy, given the rural nature of the community (U.S. Census Bureau, 2009).

There seemed to be a disagreement between some literature sources as to the general question of whether lights and siren use can affect response times. These two schools of thought debate whether the use of lights and siren truly influences response time. Clawson (2002) argues that the use of lights and sirens does not routinely save significant response time. This opinion is echoed by Wallace (2007) who agrees that response time is not typically impacted by the use of lights and siren. Carrizzo (2000) agrees with both in noting that if fire departments are concerned about response time, lights and siren should be used as often as possible. The other

side of the debate has more numerous literature sources. In a research study conducted by Frazier (2000), it was reported that the use of lights and siren saved up to 3 minutes, depending on the distance responded. Bledsoe (2003) also highlights research that likewise showed a timesavings of 3 minutes by using lights and siren. In two separate research studies by the same author, “significant” timesavings were found by using lights and siren (Ho & Casey, 1998, p. 585). In a study on lights and siren usage in an urban environment, Ho & Casey (1998) found that up to 3 minutes was saved by using the emergency devices. In a similar study in a rural environment, Ho & Lindquist (2001) found that up to 14 minutes was saved by using lights and siren. Wolfberg (1996) agrees that many studies have indeed shown faster response times from using lights and siren. While these various authors all noted a faster response time by using lights and siren, the impact of this timesavings while also a matter of some debate.

Ho & Casey (1998) believed that the timesavings of 3 minutes in an urban environment was significant. In a subsequent study on lights and siren usage in a rural environment, Ho & Lindquist (2001) found that the average timesavings of nearly 14 minutes was likewise significant and was very important to improving patient outcomes. Frazier (2000) commented that, while there was a recognized decrease in response time using lights and siren, that it was highly questionable whether this was significant in improving patient outcomes. It is also questioned whether this relatively small timesavings is worth the overall risk that agencies assume when using lights and siren (Olson, 2008). Schrage (2009) likewise agrees that the time saved by using lights and siren is clinically insignificant. Brown et al. (2000) found in their study a small response time decrease by using lights and siren, but at the same time found that this would have been relevant to only a small number of patients. Finally, Al-Shaqsi (2010)

questions the entire notion of response times as being important, citing a lack of evidence that shorter response times actually improve patient outcomes.

The literature on how response times would be impacted by changing our emergency response policy given the rural nature of Watertown was significant in that a majority of researchers and authors stated that response times could indeed increase. However, the majority of the available literature subsequently questioned whether this timesavings was significant to patient outcomes.

It appears that a substantial number of fire departments have addressed, or are addressing, the issue of the use of lights and siren in responding to emergency calls as there were several published articles and research papers on the topic. In some cases, what was discovered were recommendations for changes as opposed to cases of actual implementation and subsequent evaluation.

In Missouri, the Southern Platte Fire Protection District developed a policy that proposed specific guidelines when units respond using lights and sirens and when they will respond without. In this department, the responding company officers were given the authority to determine whether a lights and siren response was needed, based on the initial call information or updates received enroute (Carrizzo, 2000).

In Portsmouth, Virginia, a recommended policy required using lights and siren to nearly all ambulance calls and confirmed fires. Once on scene, the command officer could “downgrade” other responding units. For automatic fire alarms, the proposed policy called for only the first responding unit the use lights and siren. All other units would respond without lights and siren. The proposed policy also described conditions where lights and siren were not

to be used. This included calls such as dumpster fires, gas smells, and fluid spill from automobile crashes (O'Neal, 1998).

In Hutchinson, Kansas, a proposed policy took the approach of crash pre-emption by focusing on safe-driving practices as opposed to times when lights and siren could or could not be used. This includes reminders about maximum speed limits in emergency mode, slowing or stopping at all intersections, and the approved use of traction devices in inclement weather. Still, the policy recommends responding to all reported fires and medical emergencies with lights and siren. However, in most cases only the first responding unit would use emergency devices while subsequent units would respond in a quiet mode unless asked to elevate their response (Frazier, 2000).

At Rowlett Fire and Rescue in Rowlett, Texas, a draft policy focused entirely on driver and occupant safety as opposed to addressing when to use lights and siren. The draft described maximum speed limits allowed by vehicles using lights and siren, emphasized compulsory seat belt use, prohibited exceeding the speed limit in school zones, and coming to complete stop at red lights or stop signs, regardless of whether lights and siren are being used (Howell, 2007).

A one month trial study at the Anchorage Fire Department in Alaska required all units other than first due apparatus to respond without lights and siren. Second due officers were given full control to upgrade their response if they felt it was needed. A survey conducted following the one-month trial found that most officers felt responding without lights and siren was safer and most recommended permanently implementing the policy (Schrage, 2009).

In Ann Arundel, Maryland, a research study resulted in the development of a detailed list of calls that would be responded to using lights and sirens. This included utilizing lights and sirens to calls such as confirmed fires or chemical spills, and using no lights or siren to calls such

as smoke detector sounding, dumpster fires not threatening a structure, and the smell of gas in an outdoor space (Williams, 2005).

O'Neal (1998), Williams (2005), and Waldron (2008), found that emergency medical dispatching (EMD) was one of the best methods for a fire department to determine whether to use lights or siren. Anderson (2004) echoed this in stating that a major consideration of EMD is that not all calls require the use of lights and siren. A unique recommendation found in the literature included the advocacy of the installation of more traffic pre-emption devices. These devices allow emergency personnel to change traffic signals from red to green, negating the necessity to go through an intersection against a red light (Frazier, 2000).

In addressing the question about what other fire departments are doing to address this issue, the literature proved extensive and wide ranging in its recommendations and implementations. There were, however, few instances of implemented policies that had been fully evaluated and approved. Most were recommendations to implement policies or specific steps to guide the use of lights and siren response.

The literature review suggested that significant resistance might be encountered from the firefighters and citizens of Watertown if an attempt were made to change the department's response policy. The literature also discusses, however, that support for new policies may be found as well.

Perhaps one of the first challenges that the department would face in changing the emergency response policies would be resistance from firefighters. Responding to all calls in an urgent manner, utilizing lights and siren, is a part of the fire service culture that could be difficult to change (Kline, 2006). This can be complicated by the fact that many people working in emergency medical services develop a "mindset" that their own personal safety is not as

important as getting to a patient as quickly as possible who has requested help (Garrison, 2002, p. 634). Firefighters likewise may have trouble accepting any change to the use of lights and siren (O'Neal, 1998). Another complication can be that the use of lights and siren can draw a certain psychological type of employee. Such employees may actually resign if changes are made to lights and siren policy (Waldron, 2008). There has even been at least one case of a firefighter's union threatening legal action to stop changes to the usage of lights and siren (Waldron, 2008).

Part of the resistance from internal staff may come from the belief that there is an increased liability if the department does not use lights and siren on all calls (Johnson, 2006). Other studies have shown that many firefighters do not believe there is a significant risk from using lights and siren (Waldron, 2008). There are also firefighters that believe that saving even one minute on response time using lights and siren can have an affect on the mitigation of fire (Schrage, 2009).

The literature indicated that the public may oppose a change in how the fire department responds and must be carefully considered. Chief among this potential opposition is that most of the public expects a response to their call for help as if it were a life-threatening emergency (Brunacini, 1996). While the definition of "emergency" may differ from person to person, the public in general expects the fire department or EMS to arrive in an expeditious manner (Frazier, 2000). This may be bolstered by the fact that a majority of community members have the belief that the use of lights and sirens indeed results in a significantly faster response time (Tiffany, 2009). Fitch (2005) notes that some patients may even perceive a lower quality of care if the fire department has an extended response time, even if their care would not have changed. One

author argues that patients will think the fire department does not care about them if lights and siren are not used, and that complaints will subsequently increase (Wallace, 2007).

Literature sources also pointed out that support for changing the usage of lights and siren may be found as well. In a community survey used to gauge public opinion on the use of lights and siren, Williams (2005) found that the majority of citizens participating were not overly concerned about response policies being changed. A similar community survey conducted by Tiffany (2009) discovered that 87% of public respondents supported a policy of using no lights or siren on calls that were determined to be non-emergency. The literature also indicated that support might be found from the firefighters themselves. An internal fire department survey conducted by Waldron (2008) found that 40% of the respondents favored using lights and sirens for all calls. This meant that a majority acknowledged that lights and siren were not necessary for all responses. Tiffany (2009) wrote that 100% of survey respondents felt that the use of lights and siren was dangerous and that most would support a policy that regulated when to use lights and siren.

Methods and advice on how to counter or address potential resistance to a change to a response policy was also a frequent theme in the literature. To address concerns that may be raised from citizens, a solid public education program should be started before any changes are implemented (Carrizzo, 2000). This suggestion was echoed by (Fey, 2010). This program can include educating the public on the increased danger that comes from the usage of lights and siren or informing them of literature that questions whether the time saved by using lights and siren is even significant to patient outcomes (Wolfberg, 1996), or studies that show that it's not (Brown et al., 2000).

According to several articles, training is a significant aspect to addressing resistance from firefighters. Annual emergency driving courses to stress safety for all employees, as well as having a solid written policy on when to use lights and siren, was recommended by O'Neal (1998). Schrage (2009) recommended that officers be given discretion in any written policies to change the response mode if they felt it was necessary. On the same topic, Markley (2009) recommended that any such policies should have a non-punitive clause that protects officers from discipline should they decide to elevate a response to the use of lights and siren. This may be helpful in gaining support from wary staff.

Finally, the literature notes that addressing some forms of resistance will require a significant change in a firefighting and EMS culture that stresses response time. In reality, there is no national standard for ambulance response (Al-Shaqsi, 2010), and there is only a recommendation of a response time when it comes to fire apparatus (Fey, 2010). While there have been some rare published cases of fire departments being sued for not meeting recommended response times (Al-Shaqsi, 2010), these times themselves are difficult to validate since there is no fully recognized standard (Fitch, 2005).

The literature reviewed to address what resistance or support might be expected if the department changed response policies highlighted a variety of responses that may be encountered. Some firefighters may display significant resistance to this change in culture while others may already recognize the dangers that they face by using lights and sirens on all responses. The citizenry trends more towards a lack of concern about internal department policies so long as they feel their needs are being met and their complaints are being treated seriously. The literature noted that resistance might be addressed by taking a proactive approach

to educating the public on the dangers of lights and siren and consistently training firefighters with an emphasis on safety.

Procedures

Several informational gathering methods were used to develop the results of this ARP. The procedures used were judged the best to answer the original research questions and to help provide a solution for the problem.

A telephone interview was held with Stanton Fox, city attorney for the City of Watertown, to discuss the legal aspects and liabilities involved in the use of lights and sirens (S. Fox, personal communication, February 15, 2011). Fox provided a detailed legal opinion that will be utilized to answer the first research question. The notes from this interview are available from the author.

The author utilized a retrospective emergency response time study to establish what impact a change in response policies might have on response times. This procedure involved identifying 10 random ambulance calls and 10 random fire calls that had occurred during calendar year 2010. The author then drove to each of these addresses using a command vehicle, moving with the flow of traffic and adhering to all driving laws. A stopwatch was used to compare this non-emergency response time to the original response time listed in dispatch records for the call in question. Ambulance response addresses were listed only by street name to avoid any potential violation of The Health Insurance Portability and Accountability Act of 1996 (U.S. Department of Health and Human Services, 2003).

As the President of the South Dakota Fire Chief Association, the author contacted 322 of the state's fire chiefs to ask them if their department was addressing or had addressed regulating the use of lights and siren in their departments (Appendix E). If they were addressing the issue

and had already developed policies, what were they and did they have any resistance in implementing them? Six fire chiefs from around the state of South Dakota responded to this query (D. Hartmann, personal communication, February 7, 2011), (R. C. Gustad, personal communication, February 8, 2011), (R. Koan, personal communication, February 14, 2011), (P. Smith, personal communication, February 7, 2011), (D. Hill, personal communication, February 11, 2011), (T. Mohr, personal communication, February 14, 2011). Four personal e-mails were also sent out to fire chief and assistant chief colleagues personally known by the author to ask them how their department handled or regulated the use of lights and siren (M. Winters, personal communication, February 18, 2011), (M. Hempel, personal communication, January 31, 2011), (K. Noffsinger, personal communication, February 17, 2011), (A. Stowers, personal communication, February 17, 2011). These four people were interviewed by e-mail to discuss exactly how they addressed lights and siren use and if they have encountered resistance from any personnel or members of the public. Copies of these communications are available from the author.

Another source of information was to personally measure the resistance or support from firefighters and the public that might be experienced in changing the use of lights in siren. It was believed this data would be very useful in answering the last research question on what resistance or support might be expected from firefighters and the citizens of Watertown if the department changes the emergency response policies. This information was gathered by using four different methods. First, the state fire chiefs were contacted by utilizing the electronic mail contact list maintained by the author as President of the South Dakota Fire Chiefs Association. This list enables immediate contact with 322 of the state's 350 fire chiefs. While not all of the chiefs could be contacted, 92% were reachable using this method. The second research element

was interviewing four chief officers personally known by the author from around the United States to gauge what support or resistance they encountered in trying to regulate the use of lights and siren (M. Winters, personal communication, February 18, 2011), (M. Hempel, personal communication, January 31, 2011), (K. Noffsinger, personal communication, February 17, 2011), (A. Stowers, personal communication, February 17, 2011). The third research element was asking all employees of Watertown Fire and Rescue to participate in an online survey to gauge their beliefs and expectations related to the use of lights and siren. A survey was set up through the website Surveymonkey.com, and all employees were invited to participate. Out of 33 uniformed employees of the fire department, 25 participated in the anonymous survey (Appendix B). This response represents approximately 76% of the uniformed department members (Appendix C). The fourth data collection method was in asking all citizens of Watertown and the surrounding Codington County to participate in an anonymous online survey to gauge their beliefs and expectations related to fire department response to their emergencies (Appendix D). This survey was also set up through the website Surveymonkey.com. Participation in this survey was encouraged through an advertisement in the local newspaper, The Public Opinion, and through two radio promotional discussions the author participated in at local radio stations KXLG and KWAT. Out of the 25,000 people who live in Codington County and Watertown, 52 participated in this anonymous online survey.

There were several limitations contained in the results of this ARP. The first pertains to the response time study conducted by the author. Due to the author's work schedule and WFR's call volume, a retrospective response time study was performed on emergency calls that had already taken place. While driving routes to calls that had occurred in the past were typically standardized from the fire station, there was no way of confirming this exact route was followed.

There was also the possibility that weather or road conditions could have been different during the original emergency response. An attempt was made to minimize this aberration by conducting follow up non-emergency drive times near the same time of day and with the same road conditions that were believed to have existed during the original call. The use of a command vehicle to time response using no lights or siren may also affect accuracy of data. This is because a command vehicle likely does not have the same control or operational characteristics of a fire pumper or ambulance. The second limitation pertains to the results gathered from the community survey highlighted in Appendix D. Only 52 of the 25,000 people who live in Codington County and Watertown participated in this survey. This limited response was likely because not all of these people subscribe to The Public Opinion newspaper and likewise not all of them listen specifically to radio stations KXLG or KWAT. Thus, the results of this survey do not represent a valid sample size, and no scientifically accurate inferences were made from this data. This lack of information may be tempered, however, by combining these anecdotal responses with similar survey results found in the published literature. There was also an inherent limitation from the data received from the members of the South Dakota Fire Chiefs Association. While the author's electronic mail contact list reaches 92% of the state's fire chiefs, there was no way to verify whether a non-response means that the department, in fact, has not addressed the usage of lights and siren. It is certainly possible that not all of the chiefs on this list check their e-mail on a regular basis, or perhaps have abandoned the electronic mail address the author has in the system. This data would thus also have to be considered as anecdotal, since there was no verifiable basis for treating it as scientific. This data, while unscientific, was used to draw reasonable inferences to answer the original research questions.

Results

The results of this study were defined below. The findings of all procedures were discussed and were utilized to answer the original research questions.

The first research question asked, “What dangers and liabilities does the fire department face by responding to all calls with lights and siren?” Stanton Fox (2011) is the city attorney for the City of Watertown. He is a member of the bar associations of South Dakota, Alaska, and Illinois. Fox was interviewed on February 15, 2011, to obtain his legal opinion on the use of lights and siren at WFR, and what legal liability the department faces by using such devices on a regular basis. Attorney Fox stated that the city, department, and the individual driver, could all be held liable under South Dakota Codified law if an accident occurred due to the unregulated use of lights and siren and it could be proven in a court of law that the driver exhibited willful or reckless disregard for safety. Fox went on to state if such a case were ever taken to court, the plaintiff’s attorney would ask if a reasonable person in the exact same circumstances would have acted the same way. If not, the liability for the city and the fire department significantly increases. Attorney Fox also noted that formal established policies on the appropriate use of lights and siren could help protect the city, department, and individual, from liability, and that if the department did not currently have such policies they should establish them immediately. Fox also offered the opinion that operators of fire department vehicles in South Dakota do enjoy a higher level of “Good Samaritan” immunity than are present in many other states. This is due to the requirement of proving “willful, wanton, or reckless acts of commission or omission,” before a provider can be held liable in civil court. Fox explained that this standard is much higher than the typical negligence language found in other state’s laws (S. Fox, personal communication, February 15, 2011).

South Dakota Codified Law (General immunity from liability for emergency care, 1968) was examined to confirm the veracity of City Attorney Stanton Fox's opinion. SDCL 20-9-4.1 states that a fire department member, whether paid or volunteer, cannot be held liable for any civil damages that occur during the course of their normal duties at an emergency, so long as they are acting in "good faith." The protection in this law extends to the operation of any vehicle used in connection with the delivery of emergency care (General immunity from liability for emergency care, 1968). The rest of the SDCLs are silent as it relates to the use of lights and sirens by emergency vehicles. SDCL 32-31-4 simply states that an emergency vehicle using lights and siren does not have to follow the same traffic laws as other passenger vehicles as they relate to right-of-way, stopping at traffic signals or signs, or obeying posted speed limits, among others. This section likewise does not set any maximum speed limit for emergency vehicles that are using lights and siren (Emergency Vehicles, 1939).

The research results for this question showed that personal and department liability increases if the department responds to all calls using lights and siren. The results also point to an increased liability for the department if no formal policies exist that regulates the use of lights and siren. However, an unexpected finding of this research was that South Dakota fire departments might enjoy a greater level of protection from the wording of South Dakota Codified Law relating to civil immunity for emergency responders.

The second research question asked, "How will response times be impacted by changing our emergency response policy given the rural nature of Watertown?" A retrospective study was conducted by the author on fire and ambulance calls at WFR over the previous 12 months to answer this question. A retrospective study was necessary due to the author's work schedule and the call volume at WFR. This negated the ability of the author to carry out research whereas a

chase vehicle would follow fire and ambulance apparatus to various calls in a no lights or siren mode.

For this retrospective study, 10 fire calls and 10 ambulance calls were chosen from the previous 12-month period from the department's electronic database. Incidents selected were not random, in that it was felt necessary to choose calls that occurred during daylight hours and during the same road conditions that were available for the author to conduct a follow up response time analysis. A fire department command sports utility vehicle (SUV) was used to drive to the exact location shown in the database for both fire and ambulance calls, using no emergency lighting or siren, and obeying all traffic laws. The use of this vehicle was necessitated by the fact that department currently has no backup fire pumper available until June of 2011, and not enough ambulances in reserve, to conduct the timing study with the exact vehicles used in the initial response shown in the database. Doing so would have required taking critical first response vehicles miles outside of the downtown area of Watertown where most emergency calls historically take place.

The retrospective analysis of fire responses is listed in Appendix A. Calls selected for analysis were as close as .25 miles from the main fire station, as in the case of 218 Kemp Avenue West, or as far as 4 miles away, as was the case with the intersection of Golf Course Road and 37th Street Northwest. As exhibited in Appendix A, a timesavings from using lights and siren was noted in the case of all but one response. These timesavings ranged from 40 seconds, to as long as 1 minute and 53 seconds. The longest response measured was 4 miles to the intersection of Golf Course Road and 37th Street Northwest. However, the original response time saved just 5 seconds from the cold response time. The roads to this call location were nearly all straight and involve only one traffic light. The most time saved from the use of lights and siren was 1

minute and 53 seconds to the response at 310 13th Street Southeast. While this location was only 1.5 miles from the main fire station, it involves traveling through three traffic lights, and numerous uncontrolled intersections, which necessitated the command vehicle to slow significantly or stop completely. The average time saved from the use of lights and siren for all calls was shown to be 41 seconds.

The ambulance response time research, listed in Appendix A, also showed a timesavings from the use of lights and siren versus the retrospective study conducted without. Calls selected for analysis were as close as .7 miles, as was the case with 4th Avenue Northeast, or as far away as 25.1 miles, as was the case with 5th Avenue Southeast in Wallace, South Dakota. These timesavings ranged from 12 seconds, to as long as 2 minutes and 52 seconds. The longest response measured was 25.1 miles to 5th Avenue Southeast in Wallace, South Dakota. The time saved by using lights and siren to this location was 2 minutes and 27 seconds. The most time saved from the use of lights and siren was 2 minutes and 52 seconds to 173rd Street in Goodwin, South Dakota. The average time saved from the use of lights and siren for all calls was shown to be 1 minute and 44 seconds. The three longest mileage responses measured were all rural locations with long stretches of straight two lane highways between the fire station and the calling party. The rest of the responses measured were all within the city limits of Watertown and contained several traffic lights or stop signs between the fire station and the calling party.

The research results pertaining to this question showed that response times could increase if the department changes its emergency response policy. In fact, with the exception of one studied fire call, all response times measured without the use of lights and siren were indeed longer. The variation of this difference led to a significantly unanticipated finding. Prior to conducting this research, it was presumed by the author that the addresses located the farthest

distance from the main fire station would show the most significant timesavings from using lights and siren. The results did not support this theory. For example, in the fire responses measured, the most significant timesavings found from the use of lights and siren was to an address only 1.5 miles from the main fire station. The time saved to the fire response located the farthest distance away, measured at 4 miles, was only 5 seconds.

The third research question asked, “What policies or procedures have other fire departments enacted to address the issue of emergent responses?” Two informational gathering methods were used to answer this question. In the first method, a query electronic mail (Appendix E) was sent to 322 of South Dakota’s 350 fire chiefs to ask if their departments were addressing, or had addressed, the usage of lights and siren. In all, six fire chiefs from around the state responded that their departments regulated the use of lights and siren.

Fire Chief Paul Smith of the Rockerville Fire Department in South Dakota stated that his department had adopted a simple response policy as it pertained to the use of lights and siren. Rockerville’s policy states that the first vehicle to respond on a fire or medical emergency runs “hot,” meaning that they utilize lights and siren. All other responding units will respond “cold,” unless the first arriving unit indicates a need for an expedited response from support personnel and equipment (P. Smith, personal communication, February 7, 2011).

Deadwood Volunteer Fire Department in Deadwood, South Dakota adopted a similar policy. In Deadwood, the first responding fire unit responds with lights and siren while all other support units respond in a quiet mode unless requested to speed up their response (T. Mohr, personal communication, February 14, 2011).

At the Brookings Fire Department, Fire Chief Darrell Hartmann noted that while his department does, in a sense, regulate the use of lights and siren, the power to make this decision

is vested completely in the company officer. Such officers are expected to use discretion in not using lights and siren when responding to calls that they deem to be of low importance or non-emergency in nature (D. Hartmann, personal communication, February 7, 2011).

Fire Chief Rick Gustad replied that his department in Platte, South Dakota has a rather detailed policy that regulates the use of lights and siren when responding to emergency calls. Platte responds without lights and siren to a specified list of what are deemed non-emergency calls. These call types include carbon monoxide investigations, oil and gasoline spill cleanups, and automatic fire alarm activations if the owner/occupant is on scene and does not report fire or smoke. Additionally, all vehicles are prohibited from breaking any traffic laws when traveling through a school zone, when near city parks, or whenever near a known daycare center. This prohibition is enforced regardless of the nature of the call being responded to (R. C. Gustad, personal communication, February 8, 2011).

Sioux Falls Fire and Rescue (SFFR) is located in Sioux Falls, South Dakota. SFFR is the state's largest department. The department's policy states that no emergency vehicle will ever be driven at more than 10 miles per hour over the posted speed limit, regardless of the nature of the call. The policy also prohibits tender trucks from exceeding the posted speed limit at any time. While the responsibility for determining the necessity of using lights and siren was given to the company officer, the policy requires such officers to notify other responding units to "downgrade" their response if they find the situation is not an emergency. This also applies to all responding units if dispatch provides updated information indicating the call may not be a critical situation before fire department units arrive on scene (D. Hill, personal communication, February 11, 2011).

Finally, Sturgis Fire Department responded that their department utilizes a detailed list of what call types require the use of lights and siren and what calls types do not. This 12 page list shows that call types such as abdominal pain, lift assists, lacerations, superficial burns, and intention overdose with no symptoms, get a response with no lights and siren. Unconscious patients, cardiac arrest, strokes, and any motor vehicle accident with injuries, result in a response using lights and siren (R. Koan, personal communication, February 14, 2011).

In addition to the electronic mail that was sent out to the South Dakota Fire Chiefs Association, the author personally contacted four other fire chiefs from around the country to find out how their departments had addressed the use of lights of siren. Out of the four chiefs contacted, one responded that his department had not addressed the issue and had no immediate plans to discuss it in the future (K. Noffsinger, personal communication, February 17, 2011). The other three chiefs contacted replied by electronic mail, and these communications are available by request from the author.

Fire Chief Mike Winters from Cheney, Washington replied that his department's use of lights and siren is regulated by dispatch procedures. The county dispatch center has established four different priority categories based on the reported severity of the 911 call. The categories are alpha, bravo, charlie, and delta. Alpha calls are considered the lowest and priority and lights and siren are not used to these call types. Lights and siren were used on all other call types. Alpha calls in this system include calls such as fire alarm activations with no smoke or fire showing, non injury vehicle crashes, small trash fires, minor fluid leaks, service calls, and odor investigations (M. Winters, personal communication, February 18, 2011).

In Merrimack, New Hampshire, the fire department has established detailed policies dictating when lights and siren may be used. Assistant Chief Anthony Stowers stated that calls

to reports of wires down, smoke investigations, carbon monoxide alarms when no symptoms are present, and patient lift assists, are responded to with no lights or siren. If the call includes commercial fire alarms, brush fires, or motor vehicle fires, the first responding unit utilizes lights and siren while all subsequent units follow all traffic laws. If an incident involves building fires, smoke visible in buildings, or motor vehicle accident with injuries, all fire department units will respond using lights and siren (A. Stowers, personal communication, February 17, 2011).

Finally, the Evesham Fire Department in New Jersey was contacted. Lieutenant Matt Hempel responded that his department had established two response modes in their formal policies. The first response mode requires the utilization of all emergency lights and the sounding of the vehicle siren. The second response mode prohibits the use of and warning lights or siren and requires the responding apparatus to observe all traffic laws. Responses requiring the use of lights and siren include brush and building fires, water rescues, vehicle crashes, gas leaks, and aircraft crashes. Call types where lights and siren were not allowed include fluid washdowns, evacuations due to flooding, smoke investigations, vehicle lockouts, and transporting of patients with non-life threatening conditions (M. Hempel, personal communication, January 31, 2011).

The research showed several departments that had developed policies and procedures to regulate the use of lights and siren within their respective departments. The types of policies and procedures varied slightly with each department that responded. Some departments, like Brookings Fire Department in South Dakota, chose simple methods such as allowing the company officer to make the determination whether lights or siren were needed in a response. Others, like Sturgis Fire Department in South Dakota, established detailed and lengthy policies describing specific medical or fire conditions that required the use of lights and siren and those

that did not. All respondents expressed in their personal replies that increasing safety and reducing the risk of injuries to personnel and citizens were among the primary reasons their policies were created.

The fourth research question asked, “What resistance or support might be expected from firefighters and the citizens of Watertown if we change our emergency response policies?” The research discovered that both support and resistance from firefighters and citizens might be encountered if the department changes its emergency response policies.

Out of the six respondents from the electronic mail distributed to 322 of South Dakota’s 350 fire chiefs, none indicated any notable resistance from either firefighters or citizens when their policies were implemented. Fire Chief Rick Gustad from the Platte Fire Department indicated that his personnel “enthusiastically” support the policies that regulate when lights and siren can be used. He went on to state that he believes this support comes from his department’s emphasis on safety and that the citizens of Platte have embraced their policy. Chief Gustad noted that he has even received complaints from the public on occasion when a fire apparatus is observed driving too fast with lights and siren activated. Chief Gustad said that the only personnel he has problems with when it comes to the department’s emergency driving policy are young and new personnel who have a lot of “adrenaline” during their first few responses while driving (R. C. Gustad, personal communication, February 8, 2011). Fire Chief Paul Smith of the Rockerville Fire Department also echoed this opinion, stating that occasionally adrenaline “overrides the brain,” but that such incidents were few and far between (P. Smith, personal communication, February 7, 2011).

Four chief officers personally known by the author were interviewed by electronic mail to discuss whether their departments had experienced support or resistance when attempting to

change their department's use of lights and siren. One of these chiefs noted his department had not addressed the use of lights and siren and had no plans to do so in the immediate future (K. Noffsinger, personal communication, February 17, 2011). Out of the remaining three chief officers interviewed, only one noted any particular support or resistance from personnel. Assistant Chief Anthony Stowers of the Merrimack Fire Department in New Hampshire commented that his department experienced "significant" resistance from their personnel when they attempted to regulate the use of lights and siren. Chief Stowers stated that resistance came from not only many firefighters, but even some officers, who felt that people needed to "hear" them to know the department was working. Chief Stowers went on to report that the more progressive members of the department eventually helped change the culture, but that it was not immediate. While the department recognized that some people might never agree, the important part was that they were complying with the new order (A. Stowers, personal communication, February 17, 2011).

To measure potential support or resistance from the citizens of Watertown, an anonymous survey was created on the website SurveyMonkey.com. The survey (Appendix D) asked five questions that were designed to establish the belief system and expectations of the citizens when it comes to emergency response, and whether they were open to new policies at the fire department that regulated the use of lights and siren. The survey was completed by 52 of Watertown's estimated population of 25,000. The results of this survey (Appendix D) showed that a majority of the respondents did not understand or believe that there was an increased liability to the community from the use of lights and siren at the fire department. There was also an overwhelming belief that the use of lights and siren saves a significant amount of time when responding to an incident. Finally, only a slight majority of 51.7% of survey respondents

indicated that they would support policies that regulated the use of lights and siren. However, another 31% indicated they were open to the idea, but wanted to know more details about such a program first (Appendix D).

A second survey was created on the website Surveymonkey.com to determine the belief system of firefighters, and to establish whether they would support or resist changes to the use of lights and siren (Appendix B). This survey was more detailed than the one created for the community, and included 15 questions that were answered anonymously. Out of 33 uniformed employees at the fire department, 25 participated in this internal survey. An analysis of the survey results (Appendix C) showed that nearly 79% of personnel felt they had received enough drivers' training. A majority of firefighters also felt that responding to emergency calls in the safest possible manner was important. While 78.9% of respondents expressed some measure of disagreement with using lights and siren for all calls, 94.7% were against responding to all emergency calls without lights and siren. Another 89.4% of firefighters showed some measure of agreement that there are certain emergency calls that do not require the use of lights and siren. Employees expressed less conviction when it came to question six, which was designed to determine who the firefighters felt was in the best position to determine the use of lights and siren. Just 63.1% felt that the best person to make this determination was the company officer responding to the emergency call. The results also showed that a majority of firefighters either do not believe or understand that they face a higher personal risk when responding to a call using lights and siren. Only a slight majority of 55.5% of firefighters agreed that the department and the city faced a higher level of liability from the use of lights and siren. When it came to theoretical policies that would regulate the use of lights and siren, firefighters seemed to have wide-ranging opinions. A majority of 73.7% indicated they would support such a policy so long

as the officer or paramedic had the ability to elevate the response if they felt it was needed. Questions 11 through 14 were designed to measure the belief system of the firefighters when it came to response times and the use of lights and siren. A majority of firefighters in each question believed that the use of lights and siren saved time when responding to a call. Finally, the last two questions were written to determine if firefighters felt the use of lights and siren improved patient outcomes and the mitigation of fires. A majority of respondents in both questions indicated they believed the use of lights and siren improved both patient outcomes and the mitigation of fires.

The results of the research methods to determine potential resistance or support from citizens and firefighters if emergency response policies were changed were widely varied. Interviews held with other chief officers from around South Dakota and the United States indicated that some support might be expected from the community and firefighters. In the case of Platte, South Dakota, this was reported as an “enthusiastic” support. Others, however, like Chief Anthony Stowers in New Hampshire, reported significant resistance from personnel and warned that in his department acceptance was not immediate (A. Stowers, personal communication, February 17, 2011). The community survey data showed that while a majority of respondents were open to new department policies that regulated the use of lights and siren, a majority also believed that the use of such equipment was safe and led to significantly shorter response times (Appendix D). The internal survey given to WFR employees likewise showed a belief that the use of lights and siren significantly decreased response times, and improved patient outcomes and fire mitigation. However, a majority of employees did indicate that they were open to policies that might regulate the use of lights and siren (Appendix C).

Discussion

The results of this ARP research were similar in many ways to the published literature, but also varied in some aspects. The differences between the two were discussed in this section.

When considering the dangers that WFR faces by responding to all calls utilizing lights and siren, the research results were similar to the published literature. Watertown City Attorney Stanton Fox noted that the department certainly faced increased liability if it did not differentiate between calls that required an emergent response and those that did not. He was especially concerned to discover that WFR currently has no policies regulating the use of lights and siren or emergency driving. Fox noted that formal policies on the use of lights and siren could help the department and the city decrease liability (S. Fox, personal communication, February 15, 2011). The literature also discusses this danger. Fahy et al. (1999) noted that high driving speeds and failure to yield were among the strongest factors in crashes involving emergency vehicles. Likewise, Clawson (2002) commented that the unregulated use of lights and siren statistically increased the odds of being involved in a crash. He further noted that there was simply no supportive research that showed that the constant use of lights and siren benefited the public. Similarly, Wolfberg (1996) stated that the unregulated use of lights and siren is a significant liability to departments.

The research results and published literature seem to be clear on this point. The use of lights and siren for all responses is unnecessary and unproven, and results in a significantly increased legal liability and personal danger for employees and civilians. It is apparent from the review of South Dakota Codified Laws that emergency responders in the state enjoy a higher level of civil immunity than in most other states (General immunity from liability for emergency care, 1968). However, this does not excuse putting the community and our firefighters in harm's way any more than is necessary. Jay Fitch may have said it best by commenting that using lights

and sirens for all calls was “the same as ordering a CT scan for every patient that came to a hospital.” There is simply no evidence that supports doing so (Fitch, 2005, p. 50).

The importance of response times is often discussed in the fire and EMS industries. Thus, it was important to measure how much the department’s response times would be impacted, if at all, by changing the emergency response policies. The research results indicated that response times could, and likely would, increase if certain calls were responded to without the use of lights and siren. The research found an average time of 41 seconds was saved by using lights and siren during fire response, with a maximum time saved of 1 minute and 43 seconds. The research also found an average of 1 minute and 44 seconds was saved by using lights and siren for ambulance response, with a maximum time saved of 2 minutes and 52 seconds (Appendix A). The literature sources also discussed research that showed that the use of lights and siren could decrease response time. Frazier (2000) presented data that showed that the use of lights and siren saved up to 3 minutes, depending on the distance being driven. Another research study conducted by Ho & Casey (1998) found that up to 3 minutes could be saved by using lights and siren on urban ambulance calls. The same author in a different study utilizing a rural environment found that up to 14 minutes could be saved by using lights and siren (Ho & Lindquist, 2001).

What was interesting for discussion purposes are the varying amounts of time saved shown in the research from the use of lights and siren. This timesavings often seemed to be independent from the distance that was responded. This was an unexpected finding as the author had assumed that the farthest distances would show the most timesavings from using lights and siren. This discrepancy may have resulted from the fact that some of the farthest distances studied were long and straight rural highways with very few, if any, traffic signals or stop signs.

The command vehicle used in the retrospective response time study thus would have had few driving impediments. Responses within the city limits of Watertown also showed some significant timesavings, but this is likely because there are many traffic lights, stop signs, and uncontrolled intersections in this response zone. The command vehicle used for the retrospective response time study was frequently delayed at stoplights and other intersections. The original emergency vehicles that made these responses would not have experienced these delays since they all have traffic pre-emption devices to change traffic lights to green for the direction they are traveling. Indeed, Frazier (2000) recommended that increased use of traffic pre-emption devices might not only decrease response time, but also decrease crashes. The smaller average timesavings shown in the fire responses was likely due to using a smaller command vehicle to measure responses originally made by a full sized fire truck. Fire trucks are big and heavy, and have less maneuverability, than an SUV does. It is reasonable to assume that if a fire truck had been used to gauge fire responses, the average timesavings would have increased.

While Wallace (2007) states that response times are not typically improved by the use of lights and siren, the author's research as well as the research of others discussed above, showed that some timesavings could be expected. Where it becomes difficult is determining whether this timesavings is significant to the overall patient or emergency scene outcome. Schrage (2009) noted that, while using lights and siren may decrease response time, this time saved is likely clinically insignificant to the patient. Brown et al. (2000) likewise found that the small timesavings found in their study would have been relevant to only a few patients. To be fair, one author (Ho & Lindquist, 2001) felt that the timesavings showed in their study was important to improving patient outcomes. This was the only study discovered, however, where an author made such a proclamation. The author discussed the emergency calls used for the retrospective

response time study used in this ARP with several members of the fire department command and line staff. While anecdotal in nature and certainly subjective, all staff agreed that the timesavings shown in Appendix A likely would most likely have had no impact on patient outcome or fire scene mitigation.

The research showed several fire departments in South Dakota and around the United States that had established policies and procedures to regulate the use of lights and siren. The literature review also found numerous fire departments who have implemented similar control measures. In many cases, the policies and procedures utilized between the research and the literature were very similar.

Among the fire departments researched, several had implemented basic policies and procedures to minimize the use of lights and siren. Rockerville Fire Department in South Dakota instituted a policy that stated the first responding unit would activate lights and siren, while all subsequent units would respond in a quiet mode (P. Smith, personal communication, February 7, 2011). Platte Fire Department in South Dakota implemented a detailed list of what call types required the use of lights and siren (R. C. Gustad, personal communication, February 8, 2011). This approach was also being used in Sturgis, South Dakota, where the department created a detailed 12-page list differentiating between “hot” and “cold” responses (R. Koan, personal communication, February 14, 2011). In Brookings, South Dakota, the department gives the ultimate responsibility of determining response mode to the company officer (D. Hartmann, personal communication, February 7, 2011). In Merrimack, New Hampshire, the department also created a list of call types and whether lights and siren would be used. In most cases, the first responding unit would respond with lights and siren, while all subsequent units would

respond in a quiet mode unless requested to expedite their response (A. Stowers, personal communication, February 17, 2011).

These efforts were very similar to the published literature. Southern Platte Fire Protection District in Missouri developed a policy that specifies when lights and siren will be used. The company officer has the authority to determine whether to elevate a response (Carrizzo, 2000). In Portsmouth, Virginia, only first responding units utilize lights and siren for incidents like commercial fire alarms. The policy went on to require a quiet response to calls such as dumpster fires, gas smells, or fluid spills (O'Neal, 1998). This type of policy was also used in Hutchinson, Kansas, where in most cases only the first responding fire unit utilizes lights and siren (Frazier, 2000). Other departments in the literature were utilizing emergency medical dispatching (EMD) to determine whether a call required the use of lights or siren (O'Neal, 1998), (Williams, 2005).

When comparing the research results to the published literature, it became clear that a common theme emerged. Departments that have chosen to address the use of lights and siren typically establish detailed policies that spell out what call types require the use of lights and siren and those that do not. One of the most often used tactics to control the use of lights and siren was to allow first responding units to use the emergency devices, while all subsequent units responded adhering to all traffic laws. Some departments even allowed the company officer to make the final decision on whether lights and siren use was necessary. Given the common structure of the policies sampled between the research and the literature, it may not be overly complicated to replicate such efforts at WFR. While several literature sources discussed the appeal of using EMD to determine the necessity of lights and siren, this tactic will likely not work well in Watertown in the immediate future. There has been a longstanding resistance from

fire department command staff to allow dispatchers to make this determination, and dispatch personnel are just as likely to resist taking on this role due to liability concerns.

The research and literature were similar in some ways when it came to discussing what resistance might be encountered if the department were to change its emergency response policies. The six interview respondents from within South Dakota all reported an absence of any notable resistance from either firefighters or citizens within their jurisdictions when policies regulating the use of lights and siren were implemented. Out of the four other interviews conducted with fire chiefs from around the country, only Assistant Chief Anthony Stowers of Merrimack, New Hampshire stated that his department experienced significant resistance from their personnel. He noted that it took significant time and effort for the department personnel to “come around” to this new way of responding to calls (A. Stowers, personal communication, February 17, 2011). While not scientific, the anonymous surveys conducted by the author also failed to show any significant resistance from the public or firefighters when asked if they would support a policy that regulated the use of lights and siren. These surveys did show, however, a tendency of both the public and firefighters to believe that the use of lights and siren saves significant time (Appendix C). The published literature discussed more hypothetical resistance than actual documented resistance in changing emergency response policies. Kline (2006) noted that changing the lights and siren culture within the fire service could be a difficult proposition. O’Neal (1998) and Waldron (2008) repeated this opinion in stating that firefighters would likely have trouble accepting new policies that regulated their use of lights and siren. Interestingly, both the research and published literature showed that employees might resist policies that regulate lights and siren use because they believe that they face an increased liability if they do

not use the equipment. This was a belief held by the majority of WFR employees (Appendix C), and was noted in the literature by Waldron (2008).

Support for policies that regulate the use of lights and siren was noted in both the research and the literature. The community (Appendix D) and fire department surveys (Appendix C) conducted by the author found that a majority of respondents would support such policies. Williams (2005) likewise conducted a community survey that found that a majority of the residents were not concerned about response policies being changed. Tiffany (2009) also found that 87% of public respondents supported such policies if calls were deemed to be non-emergency. The same author conducted an internal department survey and found that a majority favored a policy that would regulate the use of lights and siren.

While the surveys used in the research seem to indicate a lack of significant resistance from firefighters or the community, these results can be misleading. Not only do the results not have scientific backing, but also firefighters and members of the community could easily change their mind if such policies were implemented haphazardly. Waldron (2008) commented about a firefighter's union that threatened legal action to stop policies that regulated the use of lights and siren. This result is certainly not unrealistic in other cities if firefighters and community members are not part of the process that develops such policies. Carrizzo (2000) comments that addressing this resistance is best done by educating the public with a comprehensive public education program. Resistance from firefighters may also be mitigated by highlighting safety in annual driving courses as well as developing policies that spell out when lights and siren can be used (O'Neal, 1998). Schrage (2009) also suggests that resistance may be minimized if officers are given the ultimate discretion to determine response mode.

Implementing changes to the response policies of WFR will likely result in both resistance and support. While the research surveys seem to indicate a majority of support for new policies and procedures, any such efforts must still be considered carefully. Input from staff in developing policies will be key to gaining buy-in and ownership. Keeping the public informed of possible changes before they occur, and educating them on the dangers of constant lights and siren use, will be instrumental in obtaining and maintaining their support. It will also be important in helping eliminate resistance before it starts.

Recommendations

Based on the research gathered in this ARP, it was recommended that WFR create and implement policies and procedures to reduce risk and liability to the civilians and firefighters in Watertown by regulating the use of lights and siren in emergency response. This recommendation is multi-faceted, and would require several steps to avoid potential resistance from the community and firefighters.

The first recommendation of this ARP is that the author appoints a committee of stakeholders to create a draft policy that regulates the use of lights and siren at WFR. It is anticipated that these stakeholders will include the fire chief, an additional member of the senior command staff, at least two members of the line staff, the union president, city council member, and community member at large. This committee will investigate and collect formal written policies from other fire departments that address the use of lights and siren. These policies may serve as a template for a new WFR policy.

After the committee creates a draft policy that is approved by administration, the second recommendation of this ARP is to restructure the department's emergency vehicle operations course to emphasize the new policy and to provide a primary focus of safety. Detailed statistics

on the dangers of lights and siren use and the importance of prioritizing response will be integral to this new course.

The third recommendation of this ARP is to create a comprehensive public relations campaign that should begin before any new policies are implemented. The purpose of this campaign will be to educate the public on the dangers of indiscriminate use of lights and siren. The department must then explain the proposed policy changes and how they might or might not influence emergency response. Methods for delivering this public relations campaign may include newspaper columns written by the fire chief, radio interviews, and integration with scheduled fire prevention programs.

The final two recommendations are long-term goals, but should nonetheless be described. The department should look closer at utilizing emergency medical dispatch protocols that may be available through the county dispatch center. While the department and dispatch center have expressed previous resistance to this type of program, it should be investigated further to find if attitudes have changed. The department should also make an effort to obtain more traffic pre-emption devices for controlled intersections within the city. These devices are expensive and will require budget planning, but the literature indicates they may significantly reduce the risk of accidents.

The general recommendations for future researchers are to investigate in detail what other fire departments are doing to address the appropriate use of lights and siren. These departments may have time-tested policies in place that will make the process of creating a new policy much simpler. Researchers should also involve their personnel in the process of the creation of new policies and procedures as early as possible. This will help provide buy-in and ownership on any new policies that are created. Finally, researchers should be prepared to conduct response time

studies in their own department. Some personnel will be initially hesitant to believe that the use of lights and siren does not save significant time until they are presented with direct research that supports the change.

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Appendix A

Retrospective Response Time Study

Fire Response Address	Original Time	Cold Time	Time Saved	Distance
180 6th St. NE	2 min 10 sec	2 min 50 sec	40 seconds	.8 miles
2920 Kelly Ave	5 min 15 sec	6 min 30 sec	1 min 15 sec	3.8 miles
218 Kemp Ave W	1 minute	1 minute	0	.2 miles
525 13th St. NW	2 min 5 sec	3 min 4 sec	59 seconds	1.2 miles
909 1st Ave SE	3 min 22 sec	3 min 40 sec	18 seconds	1 mile
609 4th St. SE	3 minute	3 min 31 sec	31 seconds	1.2 miles
310 13th St. SE	2 min 50 sec	4 min 43 sec	1 min 53 seconds	1.5 miles
Intersection of Golf Course Rd and 37th NW	7 min 1 sec	7 min 6 sec	5 seconds	4 miles
220 10th St. NW	2 min 8 sec	2 min 22 sec	14 seconds	.8 miles
Hwy 81 & 14th Ave NE	3 min 42 sec	4 min 0 sec	18 seconds	1.6 miles
Average Time Saved			41 seconds	
Maximum Time Saved			1 min 53 sec	
Minimum Time Saved			0	
Ambulance Response Address	Original Time	Cold Time	Time Saved	Distance
173rd St, Goodwin	18 min 8 sec	21 minutes	2 min 52 sec	15 miles
165th St., Watertown	15 min 28 sec	13 min 30 sec	1 min 58 sec	13.3 miles
5th Ave. SE, Wallace	22 min 33 sec	25 minutes	2 min 27 sec	25.1 miles
28th Ave SE, Watertown	5 min 46 sec	7 min 50 sec	2 min 4 sec	3.2 miles
14th Ave. NE	2 min 22 sec	5 minutes	2 min 38 sec	2 miles
8th Ave NE	4 min 3 sec	5 min 1 sec	58 seconds	1.4 miles
4th Ave. NE	2 min 5 sec	3 min 29 sec	1 min 24 sec	.7 miles
S. Maple	3 min 48 sec	4 minutes	12 seconds	.4 miles
E. Kemp	3 min 31 sec	5 min 5 sec	1 min 34 sec	.9 miles
8th St. SE	2 min 25 sec	3 min 41 sec	1 min 16 sec	1.2 miles
Average Time Saved			1 min 44 sec	
Maximum Time Saved			2 min 52 sec	
Minimum Time Saved			12 seconds	

Appendix B

Internal Firefighter Survey (Adapted from electronic version)

1. I feel I receive or have received sufficient driver training
2. WFR should respond to all incidents in the safest manner possible
3. It would be in the best interest of our patients/citizens to respond to all incident WITH lights and siren
4. It would be in the best interest of our patients/citizens to respond to all incidents WITHOUT lights and sirens
5. There are some incidents that we respond to that clearly do not require the use of lights and sirens
6. The officer in charge of an apparatus (or in the case of an ambulance - the tech) should have sole discretion on the level of response needed
7. I feel a great amount of personal risk when responding using lights and sirens
8. The city and/or department are exposed to greater liability when units respond using lights and siren
9. The city and/or department would face a greater liability if units did NOT use lights and siren
10. I would support some basic policies that regulated when to use lights and siren, so long as the officer or paramedic had the choice to "elevate" response if they felt it was needed
11. I believe using lights and siren decreases response time to calls INSIDE the city limits
(AMBULANCE)
12. I believe using lights and siren decreases response time to calls OUTSIDE the city limits
(AMBULANCE)

Appendix B

Internal Firefighter Survey (continued)

13. I believe using lights and siren decreases response time to calls INSIDE the city limits
(FIRE)
14. I believe using lights and siren decreases response time to calls OUTSIDE the city limits
(FIRE)
15. I believe using lights and siren improves patient outcomes
16. I believe using lights and siren improves mitigation of fire incidents

Appendix C

Internal Firefighter Survey Responses

	Strongly Disagree	Disagree	Agree	Strongly Agree
Question 1	0%	16% (n=4)	80% (n=20)	4% (n=1)
Question 2	0%	0%	28% (n=7)	72% (n=18)
Question 3	32% (n=8)	44% (n=11)	12% (n=3)	12% (n=3)
Question 4	52% (n=13)	44% (n=11)	4% (n=1)	0%
Question 5	0%	12% (n=3)	36% (n=9)	52% (n=13)
Question 6	0%	36% (n=9)	52% (n=13)	12% (n=3)
Question 7	16% (n=4)	48% (n=12)	28% (n=7)	8% (n=2)
Question 8	16% (n=4)	28% (n=7)	44% (n=11)	12% (n=3)
Question 9	0%	48% (n=12)	32% (n=8)	20% (n=5)
Question 10	12% (n=3)	16% (n=4)	52% (n=13)	20% (n=5)
Question 11	12% (n=3)	28% (n=7)	48% (n=12)	12% (n=3)
Question 12	12% (n=3)	28% (n=7)	48% (n=12)	12% (n=3)
Question 13	12% (n=3)	28% (n=7)	52% (n=13)	8% (n=2)
Question 14	12% (n=3)	36% (n=9)	36% (n=9)	16% (n=4)
Question 15	4% (n=1)	36% (n=9)	44% (n=11)	16% (n=4)
Question 16	4% (n=1)	20% (n=5)	60% (n=15)	16% (n=4)

Appendix D

Watertown Community Survey and Results

1. I am currently:

A business owner in Watertown:	4% (n=2)
A resident of Watertown:	69% (n=36)
Both a business owner & resident:	17.4% (n=9)
A county resident:	9.6% (n=5)

2. Do you believe that if the fire department responds with lights and sirens to a call that there is an increased liability for the fire department?

Yes: 17.3% (n=9)

No: 78.9% (n=41)

Unsure: 3.8% (n=2)

3. Do you believe that if a fire department vehicle responds with emergency lights and sirens to a call that there is an increased liability for the community?

Yes: 17.3% (n=9)

No: 69.2% (n=36)

Unsure: 13.5% (n=7)

4. Do you believe that if a fire department vehicle responds with emergency lights and sirens that this significantly reduces the travel time to an incident?

Yes: 78.9% (n=41)

No: 17.3% (n=9)

Unsure: 3.8% (n=2)

Appendix D

Watertown Community Survey and Results (continued)

5. When someone calls 911, they believe they are having an emergency. However, due to safety concerns, many fire departments respond in a non-emergency manner (no lights or sirens) to those types of calls which present little threat to life or property. Would you support a policy like this in Watertown?

Yes: 51.9% (n=27)

No: 17.3% (n=9)

Maybe, but I'd have to know more details first: 30.8% (n=16)

Appendix E

Letter to State Fire Chiefs

January 29, 2011

Fire Chiefs:

Many of you know that I am currently enrolled in the National Fire Academy's Executive Fire Officer Program. I just returned from my second class there on community risk reduction. My research paper for this class will be examining how we might improve safety by regulating the use of lights and siren through new policies and procedures. Currently we respond with lights and siren to nearly all 911 calls.

I'm writing to all of you to find out if any of your departments have policies that regulate when your personnel use lights and siren during emergency response. I'm also curious to find out if you experienced any resistance from your personnel or your community members when you implemented this policy.

If your department regulates the use of lights and siren, I would be interested to speak to you. Please reply to this e-mail, or give me a call in the office, so we can speak further.

Thank you,

Nick Swinhart
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