Highway and Roadway Risk Management Techniques for Emergency Responders

By

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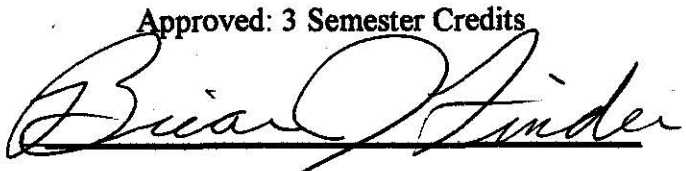

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ABSTRACT

While motor vehicle crashes are a common sight for members of society, it is not likely that the general public understands the dangers faced by emergency service workers. Some emergency service agencies take the necessary precautions to limit the occurrence traffic related incidents. It is the observation of the researcher that a lack of organizational policies and procedures regarding preferred driving behaviors are a major cause of work-related injuries and/or deaths among emergency responders throughout Wisconsin, including the Chippewa Valley.

The purpose of the study is to identify the extent that a lack of policies and procedures influences the occurrence of substandard behaviors for Chippewa Valley-based emergency

service personnel. A review of literature provided information that will aid in identifying root causes of traffic related injuries, deaths and near misses.

The safety and success of anyone working at the scene of a highway / roadway incident depends upon the policies and practices of all involved. It is recommended by this researcher that all organizations working at the scene of highway / roadway incidents follow standard practices for these types of incidents and train accordingly. This consistency will likely reduce the occurrence of injury or death to those involved.

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TABLE OF CONTENTS

Chapter I: Introduction

It is likely that most experienced adult drivers in the United States understand that the haphazard operation of a motor vehicle on this nation's highways can contribute to the occurrence of an injury-producing crash. Motor vehicle crashes are a common sight on today's roadways. The history of highway-related incidents and crashes started to become well known with the beginning of the interstate system in the 1950s. According to the National Transportation Safety Board (NTSB), highways were originally designed for maximum speeds of only 60 miles per hour (2005). Unfortunately many states have posted speed limits well beyond the original 60-mile per hour maximum. In many states, interstate highway speeds can be 70-75 miles per hour. It is a well-known fact that speed kills. Based on physics, it is well known that the faster that a vehicle is traveling; the more likely it is that someone will die should a motor vehicle crash occur. Understanding the physics of speed will aid emergency services workers in the prevention of work-related injuries and deaths while operating emergency service apparatus on highways.

While motor vehicle crashes are a common sight for members of the community, it is not likely that the general public understands the dangers faced by emergency medical service workers. Emergency services vehicles are not exempt from the physics of motor vehicles traveling at high rates of speed. Any highway with high rates of speed, high traffic movement and limited access pose great threat to emergency service personnel. In fact more emergency service workers are killed on limited access highways than any other type of roadway (Moore, 2007). In 2004, a Chippewa Valley crew of paramedics was injured when their ambulance was struck by a van that had run a red light. This occurred while transporting an injured child to the hospital, causing a delay in patient care, injury to emergency service workers and potential for

additional injury to the patient. Therefore whatever the emergency service departments can do to limit the hazards from highway traffic must be done. It is likely that a lack of organizational policies and procedures regarding preferred driving behaviors are a major cause of work-related injuries and/or death among emergency responders throughout the state of Wisconsin, including the Chippewa Valley.

Purpose of the study

The purpose of the study is to identify if strategies such as policies and procedures are lacking among Chippewa Valley-based emergency medical service organizations.

Goals

The goals of this study will be to:

- Determine the extent policies and procedures that address preferred driver behavior are present among Chippewa Valley-based emergency service organizations.
- Identify the extent that sub-standard driving related behaviors exist among Chippewa Valley-based emergency service personnel.

Background and Significance

On average, annual deaths to firefighters in the United States range between 100 -125. Motor vehicle crashes are the second leading cause of work-related deaths for firefighters in the United States (Dunn, 1992). According to the United States Fire Administration, in 2006, 106 firefighters were killed due to work related activities. Fifteen of the 2006 deaths occurred while responding to or returning from an incident. 2007 statistics show that as of October 8, 2007, 97 firefighters had died in the United States. United States Fire Administration statistics indicate that 22.88% of the 2007 deaths were a result of responding to and returning from incidents. A

significant decrease in human pain and suffering as well as financial losses to employers could be realized if highway-related deaths and injuries could be reduced. Although the human loss is immeasurable, losses can be counted in numerous other ways. Some of these loss areas could also include the loss of emergency service response, financial losses, loss of time and productivity, a reduction in the emergency support organization's public image, and legal losses.

Providing emergency medical care to the community is the primary concern of emergency medical service organizations in the Chippewa Valley. When motor vehicle crashes occur resulting in the injury or death to an emergency services worker and/or damage to equipment, those personnel and that particular equipment is no longer available to deal with the original emergency to which they were responding. This results in a reduction of service. Other emergency service personnel and equipment will need to be dispatched to deal with the original emergency as well as deal with secondary crash, which may have injured the emergency responders and damaged apparatus. Therefore, prevention of loss to personnel and equipment results in increased ability to provide emergency medical care to the community.

Motor vehicle crashes involving emergency personnel cause financial losses to the agency for which the responders are employed and to the community which they serve. Some of these losses include: medical evaluation, initial and long term hospital and rehabilitative care, replacement cost for equipment, workers compensation payments to the employees, as well as overtime payment to fill hourly schedules. As many municipal entities are self-insured, these costs can be seen as direct costs for these agencies.

Emergency responders have additional responsibilities beyond that of simply responding to emergencies. A highway related injury or death often can result in a loss of time and productivity regarding the traditional responsibilities of emergency responders. For instance, an

employee who is injured while responding to a highway related incident might be the same person who normally manages the vehicle fleet for that organization. The loss of that particular individual may very well increase the time it takes to reintroduce needed apparatus to the agencies fleet resulting in a decrease in productivity.

As motor vehicle crashes are a highly litigated issue; legal costs to an agency and/or its community can easily lead to losses in the thousands or even millions of dollars. Regardless of who is considered to be at fault for a motor vehicle crash, public entities are seen as having "deep pockets" and will often be the defendants in a long legal battle.

As a result of wide media coverage, emergency responders are always in the public eye. This is especially true when things go wrong. When someone is injured or killed, or when damage is incurred to publicly owned equipment, a negative viewpoint may be formulated about that public agency. This negative public image can be attributable to a loss of support from the citizens of a community. Considering all of the potential loss due to the significant potential for highway related incidents, organizational policies and procedure regarding driving behaviors among emergency responders in the Chippewa Valley should be created and monitored throughout each emergency service organization.

Assumptions of the study

It is assumed that all parties involved with the agencies represented in this study have similar education, training and experience. There will always be variations in levels of education, training and experience from person to person. Therefore, it is not realistic to expect that all parties involved have exactly the same background.

Definition of Terms

Apparatus – A tool or vehicle used for a specific purpose. (IFSTA, 1999)

Chevron – V-shaped reflective striping placed on apparatus to increase visibility for other drivers. (United States Fire Administration, 2007)

Don – To put on clothing or equipment. (IFSTA, p. 57)

Global positioning system (GPS): An electronic device that uses satellites to find positions and locations. (Butters, 2001)

Mobile Data Terminal (MDT): A device installed in emergency vehicles to store and transmit data. (Butters, 2001)

Opticom: A device used to control intersections, giving emergency vehicles the right of way. (IFSTA, p. 69)

Privately owned vehicle (POV): A vehicle owned by a person who responds to an emergency that is not owned by the agency to which the person is a member. (Moore, 2007)

Chapter II: Literature Review

The purpose of the study is to identify the extent that a lack of fleet-oriented organizational policies and procedures influences the occurrence of substandard driving behaviors for Chippewa Valley-based emergency medical service personnel.

It is likely regarded by the general population that firefighting and emergency medical services are dangerous occupations. However, it may not be well known that many more emergency service personnel are killed in traffic related incidents than by the act of fighting a fire. A letter from the Volunteer Firemen's Insurance Services (VFIS) regarding firefighter accidental deaths quotes the United States Fire Administration, stating that 20-25% of accidental deaths are the result of traffic related injuries (2007). Traffic related deaths are second only to heart attacks for firefighters annually in the United States (Dunn, 1992). Primed with this data, a further review of literature has provided information from many other sources that will aid in the process of identifying root causes of traffic related injuries. The literature will also aid in providing recommendations to reduce the number of traffic related injuries among emergency services personnel. The review of literature will include the following:

1) Emergency response/incident management strategies
    a) Interagency cooperation
    b) Intersection control
    c) Responding to the scene of an emergency
    d) Operating at the scene of a motor vehicle crash or fire
    e) Apparatus placement
    f) Scene marking
2) Vehicle technology advancements
3) Administrative loss prevention approaches

a) Incident Management

b) Policies and procedures

c) Public education

Emergency response/incident management strategies

The need for a coordinated effort by all agencies (i.e., fire, ambulance and law enforcement) who respond to a given emergency scene cannot be overemphasized. Properly orchestrated efforts could mean the difference between saving and losing and individual's life. Following is a summary of successful traits that have been identified among the various agencies that may respond to a loss-producing incident:

Interagency cooperation. Many incidents require the need for multiple organizations to combine efforts and provide additional resources. One problem that sometimes exists is the lack of consistency and competencies among the personnel from various agencies (Austin & Brenner, 1999, p. 4). This inconsistency may include the manner in which responders operate at a variety of incidents, including highway events. Members of various emergency service organizations often do not appreciate the dangers and seriousness of operating in highway conditions (Austin & Brenner, 1999, p. 4). When there is not cooperation among agencies at an incident, the incident is not handled safely or efficiently (McFall, 2001). It is not uncommon for there to be a lack of cooperation or an inability to communicate strategies. Often priorities are different among agencies. While fire department personnel are dealing with the emergency, police agencies may be concerned about keeping traffic moving. This difference in priorities can prove fatal for emergency service personnel. Cooperation among agencies is essential to ensure that safety on scene is prioritized by shutting down lanes of traffic when necessary (McFall, 2001). Working together as a cooperative team will decrease dangers to all emergency services

personnel at a highway incident. The Wisconsin DOT (Department of Transportation) in a May 2008 publication entitled *Emergency Traffic Control and Scene Management Guidelines* advises the use of staging areas for all responding agencies as a best practice for responders.

Intersection control. Some particular points in a highway or roadway are more prone to crashes occurring. Most motor vehicle crashes that result in deaths happen at intersections (Dunn, 1992). Many intersections are uncontrolled, which lead to greater potential for crashes. Drivers must operate with extreme caution at uncontrolled intersections due to the likelihood of traffic coming from other directions (VFIS, 2002). The Wisconsin DOT warns against approaching traffic by stating "Never trust approaching traffic" (WI DOT, 2008). Thus, maximizing safety at intersections may alleviate many crashes and reduce the likelihood of injury and death to emergency workers. Forms of intersection control exist to minimize crashes at intersections involving emergency vehicles. According to the International Fire Service Training Association (IFSTA), in many municipalities devices called opticom have been installed at intersections that have traffic lights (IFSTA, p. 69). These systems change the lights green in the direction that emergency vehicles are responding. They, in turn, change the lights red in the opposite direction. However, it is not recommended that emergency vehicle drivers rely on these devices as the system has been known to fail and other drivers cannot be counted upon to stop (VFIS, 2002). When responding to emergencies all visible and audible warning devices should be utilized to request the right of way (VFIS, 2002). Intersection control devices can serve as a tool for preventing crashes at intersections involving emergency vehicles.

Responding to the scene of an emergency. Operating on roadways and highways can be one of the most dangerous operations faced by emergency service personnel. According to the United States Fire Administration, 27 firefighters were killed in 2007 as a result motor vehicle crashes. Firefighters and other emergency service workers do not always consider the fact that responding to incidents on highways is statistically more dangerous than entering burning buildings (McFall, 2001). The safe transportation and operation of emergency apparatus places a great amount of responsibility on the person driving the vehicle. Not only is the driver of an emergency vehicle responsible to himself/herself and the rest of the crew, the driver is responsible for the general public and for those in which they are responding to for help. The Wisconsin DOT suggests that information related to traffic conditions should be available through dispatch centers to aid apparatus drivers while responding to an emergency scene (2008). Statistics have shown that responding to and returning from an emergency scene result in the second leading cause of death to firefighters (Dunn, p.1). One way in which emergency service workers are killed is while responding to emergencies due to being involved in crashes with other vehicles. For example, in 2007 a fire captain was killed in New Orleans when the apparatus he was riding in swerved to miss a semi and struck a minivan causing a rollover (Philbin, 2007). Therefore, drivers must constantly be monitoring all traffic and road conditions in order to reduce the potential for loss due to a traffic related incident (VFIS, 2007). Thus, the dangers encountered by emergency service personnel on highways and roadways must be controlled.

If emergency service workers do not arrive safely at the scene of an incident, it seems probable that property and people related losses will only increase. With this in mind the Volunteer Firemen's Insurance Service (VFIS, 2000) recommends that all drivers perform a

complete "circle of safety" prior to starting any emergency response (VFIS). The circle of safety includes a complete walk around of the entire vehicle to ensure that everything is, as it should be prior to starting the vehicle. Thus, effective risk control for emergency personnel begins before ever leaving the station for the emergency incident.

Since the rate of speed can make a difference in the survivability of a motor vehicle crash, the VFIS has recommended that agencies have a response policy, which includes a maximum response speed (2000). During emergency responses, apparatus would never travel more than 10 mph over the posted speed limit (VFIS, 2002). Response speeds will be affected by many factors such as road conditions, weather, visibility, traffic congestion and topography (VFIS, 2002). Given these risk factors, it would seem reasonable that speed control of emergency apparatus is a factor to be monitored by the emergency vehicle operator as well as his/her management.

The type of incident often determines response levels to emergency incidents. Mike Wilbur states in an article entitled *Negligence and the emergency vehicle operator*, that a true emergency is "a situation in which there is a high probability of death or serious injury to an individual or significant property loss and action by the emergency vehicle operator may reduce the seriousness of the situation" (2007). In any given situation, emergency service organizations have to determine what is considered an emergency. Any failure of apparatus drivers to follow such standard operating guidelines (SOGs) and applicable traffic laws can result in lawsuits based on negligence. Drivers must operate with due regard for the general public, although whether or not the emergency vehicle driver acts with due regard is how civil courts will determine cases (Wilbur, 2007). Therefore, the safety of emergency responders and the general public can be affected by the response level for a given incident.

Injury prevention can begin with properly securing personnel in the emergency vehicle apparatus prior to leaving the station. The Volunteer Firemens Insurance Service recommends a riding policy that states that "the driver and/or the person riding in the officer position shall verify that all personnel are properly seated and in seat belts before the vehicle is moved" (VFIS, 2000). In many cases people are killed in motor vehicle crashes when they are ejected from the vehicle because they were not properly secured with a seatbelt. Emergency service personnel have often been guilty of not wearing seatbelts due to a perceived need to don protective equipment during a given response. Therefore properly securing personnel within the vehicle reduces the likelihood of serious injury should a crash occur.

Apparatus maintenance may represent areas in which risk can be reduced for emergency services workers. Something as simple as proper tire inflation may prevent incidents leading to injury or death to responders (Daly, 2007). Improper maintenance of emergency vehicles has resulted in firefighter deaths as well (Daly, 2007). In fact, the Bridgestone/Firestone Company conducted a study of emergency medical vehicles and found that only 13% of tires in the study were inflated correctly (Daly, 2007). Daly suggests a regular preventative maintenance schedule for all vehicles because of how improper maintenance of apparatus may lead to crashes resulting in death or serious injury to emergency service workers (2007).

Operating at the scene. It appears that numerous risks related to traffic control cause a high potential for danger to emergency workers upon arrival at the scene of an incident. Although road closures are not always possible, the safest thing to do at the scene of an emergency is close the road (Casner, p. 94). Often other safety measures must be implemented, especially if the time on scene is going to exceed 30 minutes. These measures include; notifying the highway department, establish transition areas for traffic, establish advanced warning

notification, and place flaggers upstream of the incident (Moore, 2007). It is recommended to limit time on scene as much as possible and thus do the job properly in the minimum amount of time (Volunteer Firemen's Insurance Services, 2002). The less time spent on the highway will decrease the likelihood of injury or death to responders (Volunteer Firemen's Insurance Services). Measures taken at the scene may decrease the likelihood of secondary incidents occurring that involve emergency workers. In order to prevent secondary crashes from occurring, the Wisconsin DOT recommends the use of transition and termination areas as part of the measures utilized on scene for traffic management (Wisconsin DOT, 2008).

Apparatus placement. Apparatus placement can be a key factor when preventing serious injury or death to emergency service personnel operating on highways and roadways. The place in which apparatus' are parked on emergency scenes can prove crucial in the prevention of scene related crashes. The primary concern is potential for secondary incidents. The first apparatus on the scene at an incident should be placed in such a way that will protect those operating on the scene (Thompson, 2007). A truck that is placed between the emergency response personnel and oncoming traffic has the potential of saving many emergency service personnel. It is always recommended that emergency vehicles be positioned uphill, upwind and upstream of traffic (McFall, 2001). It is also preferred that a second apparatus (such as a ladder truck) be dispatched to protect the scene and the initial responding apparatus (Moore, 2007). Additional apparatus should be parked 150 to 200 feet behind the primary apparatus to act as a safety barrier (IFSTA, p. 100). There have been incidents in which even large apparatus have been driven as much as 100 feet when struck by oncoming traffic (Faugh, 2007). The additional apparatus should be one in which equipment will most likely not be needed. This alleviates personnel having to walk between the vehicle and oncoming traffic. It is even recommended that additional apparatus be

parked upstream of the incident by as much as a half-mile to slow and/or stop traffic (Moore, 2007). Vehicles such as ambulances, heavy rescue units and first arriving engine companies should not be used as barriers. These vehicles should be parked downstream of the scene to allow easy access to the vehicles (Moore, 2007). All vehicles should be parked at an angle towards the curb or shoulder (Faugh, 2007). Proper placement of vehicles can be a useful tool when operating on highways and roadways.

Some emergency service organizations allow for personnel to drive their personal vehicles to the scene of emergencies. A study by the National Institute for Occupational Safety and Health (NIOSH) recommends that agencies restrict the use of personally owned vehicles (POVs) (Moore, 2007). The use of POVs often creates an additional challenge for volunteer organizations. The fact that responders in POVs are often the first to arrive means that there is not an emergency vehicle on scene to be placed between the crash scene and oncoming traffic. POVs can also lead to congestion at emergency scenes due to the number of vehicles present. Therefore, agencies should require that all unneeded vehicles such as POVs be parked or staged off the street or highway whenever possible (McFall, 2001). Level two staging in which all unneeded vehicles are parked at least one block away from the scene has proven most successful (IFSTA, p. 98). Thus, control of personal vehicles at emergency incidents can minimize the level of risks to emergency responders and the general public. In fact, the Wisconsin DOT strongly discourages the use of personally owned vehicles at the scene of roadway and highway incidents due to the lack of appropriate markings and lighting (Wisconsin DOT, 2008).

Some emergency service organizations staff stations, and therefore allow personnel to respond with emergency vehicles. The creation of regular duty crews can alleviate the need for responders to use POVs (VFIS, 2000). Duty crews can even be used by volunteer organizations

on an on-call basis. On-call personnel can staff the station and respond with apparatus (VFIS, 2000). Utilizing emergency vehicles for response to incidents reduces the need for personally owned vehicles on scenes.

Traffic control can present problems on highways and roadways. If police have not yet arrived on scene, it may be necessary for firefighters to control traffic before dealing with the emergency (McFall, 2001). Whenever possible, emergency service personnel should position themselves out of the way of oncoming traffic in a secure area. However, this is not always possible when operating at a vehicle fire or a motor vehicle crash (McFall, 2001). Some jurisdictions have personnel trained as fire police (Austin & Brenner, 1999, p. 3), a trend that appears to occur more in the eastern states. Fire police work primarily as traffic control and crowd control, and various emergency response agencies have become aware of the need for personnel to act in this position as there was an increase in traffic-related injuries and deaths to emergency service personnel (Austin & Brenner, 1999). As traffic levels increase across the United States, it may be necessary to assign additional personnel to positions that focus attention on reducing risks by controlling traffic when operating on highways and roadways.

Scene marking. The ability for other drivers to see emergency vehicles can be a factor in preventing crashes on highways and roadways. In New York State each year an average of 80 vehicles are struck while all emergency lights are operating (Faugh, 2007). Recent studies provide statistics that show that too much emergency lighting can be detrimental to personnel working at emergency scenes. Statistics show that emergency lighting can blind motorists, attract impaired drivers, and cause drivers to not see emergency personnel due to the emphasis on the apparatus (Austin & Brenner, 1999, p. 8). The blinding light has been seen as a distraction to drivers (Faugh, 2007). In fact, Illinois State Police and the California Highway patrol conducted

studies which showed that collision were rates two and one half times greater for emergency vehicles displaying emergency lighting than for non-emergency vehicles for the same 100,000 miles driven (Faugh, 2007). Therefore, it seems that emergency lighting may be detrimental when over utilized.

Instead of strictly using high amperage lighting, there are other devices that have proven beneficial when operating on highways. Other devices include: retro reflective striping and chevrons, fluorescent paints, passive lighting, and reflectors (United States Fire Administration, 2007). Chevrons have provided for a simple means of traffic control as they can be seen without the use of lighting due to their reflective abilities. Using reflective markings inside vehicle compartments and doors is recommended by the United States Fire Administration (United States Fire Administration, 2002). When used in combination with amber arrow sticks and reflective cones, these devices offer an increased level of safety to personnel (Moore, 2007). Amber colored arrow sticks should be installed on the rear of vehicles and be large enough to be seen from a significant distance (Faugh, 2007). Amber lighting has been shown in studies to send the message to drivers to stay away, while red lights may attract drivers (Faugh, 2007). Additionally, the use of amber lighting on the rear of emergency vehicles has shown to be successful. The Phoenix Fire Department has recommended using hazard flashers and amber lighting on parked vehicles to make the scene safer (Faugh, 2007). Using alternative lighting and reflective devices may serve as the most effective means of protecting emergency responders on roadways more effectively than other practices.

Providing reflective wear for emergency personnel can increase the likelihood that personnel are seen while operating on highways and roadways. The International Safety Equipment Association recommends that all personnel wear a Class III reflective garment such

as vests as well as helmets at all times when operating at highway related incidents (Moore, 2007). When operating outside of vehicles, it is necessary that personnel wear PPE (personal protective equipment) with reflective striping. The U.S. Department of Transportation (DOT) Manual on uniform traffic control devices states that workers shall wear bright, reflective clothing while operating near traffic (Moore, n.d.). While proper clothing can significantly reduce the risk of personnel being struck while operating on highways and roadways, there are other forms of equipment and devices that may also have a significant effect on protecting emergency responders.

Various devices are available as tools to slow traffic and increase visibility at emergency scenes. The Volunteer Firemen's Insurance Services recommends using signage, cones, flaggers, vehicles, and anything else to bring attention of the presence of emergency vehicles (Moore, 2007). Ultimately, the goal is to give plenty of warning to other drivers (Volunteer Firemen's Insurance Services, 2002). Utilizing devices that slows or stops traffic can reduce the potential of secondary crashes. The Wisconsin DOT recommends the use of buffer zones which separates emergency vehicles and personnel from traffic that is moving nearby and using advance warning signs that indicate that there is an emergency scene ahead (Wisconsin DOT, 2008).

Vehicle Technology Advancements

Technology exists that may aid emergency responders while responding to incidents. Many emergency service organizations utilize computer-aided dispatch systems, mobile data terminals and wireless telephone and radio systems to assist apparatus in responding to emergencies (Butters, 2001). Technology has and continues to provide benefits to emergency service organizations in regards to traffic safety. In many cases, the emergency service industry

has been able to adopt technology that has been used by the highway construction industry and trucking industry. An item recommended by the Wisconsin DOT that is often used by other industry is the Highway Advisory Radio (Wisconsin DOT, 2008). One item that has been used by other industries for years that has been adopted by emergency services in recent years is global positioning systems (GPS). GPS units aid emergency vehicles in finding the location of incidents more quickly and efficiently (Butters, 2001). Other types of technological advancements have been under trial programs in recent years. Some of the trials include automatic crash notification systems, automatic transponders on commercial vehicles, and real time traffic information to emergency vehicles (Butters, 2001). Often, emergency service organizations are at the mercy of local government budgets that inhibits the purchase and use of new technology, therefore, requiring them to use antiquated equipment (Butters, 2001). The fore-mentioned technological advancements can serve as a tool to aid emergency service workers and minimize risk from motor vehicle crashes while responding to incidents, however, they may demand a greater degree of training among those who are required to use such tools.

Administrative loss prevention approaches

The practice of controlling the occurrence of loss from an administrative standpoint means that an organization employs certain practices or procedures to accomplish its intended goal. Following is a summary of approaches that are often referred to as being administrative in nature:

Incident management. Incidents involving highways and roadways present organizational challenges to emergency workers. As with any emergency situation, having an incident command system in place could minimize risk and maximize the level of safety

(McFall, 2001). The incident command system (ICS) provides for a much more organized and controlled incident scene. Regardless of the situation, the incident command system provides the same components. These components include common terminology, a modular organization, integrated communications, a unified command structure, consolidated action plans, a manageable span of control, designated incident facilities, and comprehensive resource management. These are specific components that are utilized in all situations. Just like all emergency situations, ICS is used in all highway related incidents regardless of the size or extent of the emergency. In this way the operation runs efficiently due to the fact that personnel are well trained and practiced (Austin & Brenner, p. 7). ICS can be used for emergency incidents of all types (Mcfall, 2001). Incident management systems are therefore intended to maintain order and provide a well organized incident scene. According to the Wisconsin DOT, the incident command system should be used at all incidents (Wisconsin DOT, 2008).

Incident management systems such as NIMS (National Incident Management System) promote smooth running incident scenes. Unfortunately, not all emergency services personnel are always trained in the Incident Command System or any other incident management system (Volunteer Firemen's Insurance Services, 2002). While police and fire agencies are typically trained in incident command, private ambulance service providers have been reluctant to comply. With this being the case, all agencies should routinely train together to ensure that ICS is understood and properly utilized by all agencies involved. (Volunteer Firemen's Insurance Services.) When all involved understands incident management, it is highly likely that most/all of the response-based activities that are associated with the incident will operate smoothly.

Policies and procedures. If personnel are to follow best practices for operational activities, guidelines should be in place in the form of policies and procedures. Policies and

procedures along with associated training should cover a minimum of the following: traffic hazards, positioning of apparatus, establishing a temporary work zone, lane closure and detours, exiting apparatus, lighting and signage (McFall, 2001). While it is a common occurrence for emergency service workers to operate on highways, agencies should have policies and procedures in place for these types of operations. All training should incorporate correct and incorrect actions (Volunteer Firemen's Insurance Services 2002). The National Institute for Occupational Safety and Health also offers suggested topics for policies and procedures (McFall, 2001). NIOSH suggests the following: positioning apparatus, closing traffic lanes, securing a work area, appropriate PPE, and returning work area to normal after an incident (McFall, 2001). Thus, it is likely that many organizations have ample opportunities for the implementation of policies and procedures to the above practices.

An area often overlooked by organizations is pre-planning. Pre-plans are developed by emergency service organizations for possible structure fires, hazardous materials incidents and law enforcement activities. However, rarely are pre-plans written for specific locations on highways. According to the *White Paper* disseminated by the Cumberland Valley Volunteer Firemen's Association, pre-plans should account for detours, anticipate hazardous materials, understand the need for traffic flow continuity, minimize potential for secondary incidents, and utilize adjacent jurisdictions (Austin & Brenner, 1999, p. 6). Preplans should be developed for areas that show a high rate of motor vehicle crashes (McFall, 2001), and therefore play a pivotal role in helping agencies be prepared well in advance of an incident. The Wisconsin DOT recommends that emergency service organizations take hazardous materials, towing and recovery, traffic conditions and the need for additional resources into consideration (Wisconsin DOT, 2008). These considerations can be made during the pre-planning phase.

Standard operating guidelines (SOG's) provide specific task oriented steps to take in certain situations. The Volunteer Firemens Insurance Service suggests that SOG's should include: routes of travel for response, apparatus placement, and traffic diversion (VFIS, 2000). SOG's can benefit agencies for various situations, however it may be best if all of the associated personnel are closely involved with their development as well as enforcement.

Public education. Often, the public is unaware of what is expected of them when encountering highway and roadway incidents. Legislative efforts will help in the education and enforcement of for highway safety (Austin & Brenner, 1999, p. 7). Even with the many steps that can be taken by emergency service organizations to maximize safety at highway incidents, it continues to take the cooperation of the general public driving on highways to keep everyone safe. The public must also be educated as to what is expected from them during these incidents (Austin & Brenner, 1999). The Wisconsin DOT recommends utilizing the media to communicate with the general public (Wisconsin DOT, 2008). This can be accomplished by setting up media centers and appointing a public information officer to communicate with them. Emergency service organizations will benefit from educating the public as to the dangers that are present for emergency service employees at highway incidents.

Therefore, with this information in mind, a study will be conducted to collect data regarding the comparison between what is considered to be the best practices in and what is currently being done by Chippewa Valley Ambulance providers.

Chapter III: Methodology

Purpose of the study

The purpose of the study is to identify if traffic loss prevention-based strategies such as policies and procedures are lacking among Chippewa Valley-based emergency medical service organizations.

Goals

The goals of this study will be to:

- Determine the extent that policies and procedures which address preferred driver behavior are present among Chippewa Valley-based emergency service organizations.
- Identify the extent that sub-standard driving related behaviors exist among Chippewa Valley-based emergency service personnel.

Subject Selection and Description

Ambulance services within the Chippewa Valley have been identified as the subjects of this study. Each of these agencies provides emergency medical services and transportation of the sick and injured to a hospital of the patients' choice. All ambulance services in Chippewa, Eau Claire, Dunn, Pepin, Buffalo, and Trempealeau Counties are being used as the subjects for this study.

Instrumentation

The instrumentation chosen for this study is in the form of a survey. The survey was developed in a manner where the subjects were asked to answer a series of questions with either a yes or no type answer and will rate the importance of various questions using a scaled rating system on a 1-5 scale of importance with 1 being not important and 5 being very important.

Organizations will also be asked to provide specific written answers for certain questions that may not be able to be answered with a yes or no. Using information that is considered to be the "best practices" for the industry and information taken from a Wisconsin Department of Transportation packet entitled *Emergency Traffic Control and Scene Management Guidelines*, a survey was developed to gather data from the ambulances services in the Chippewa Valley.

Data Collection Procedures

Data will be collected using the following procedure:

1. A packet containing a survey and a self-addressed and stamped envelope will be sent to each chosen ambulance service via the United States Postal Service.
2. A representative from each organization will then complete the survey and return the survey using the self-addressed and stamped envelope.
3. An identification placed in the upper right hand corner of the first page of each survey will be utilized to ensure confidentiality and that all surveys have been returned.
4. After the return of the surveys, the information will be analyzed and measured against the Wisconsin Department of Transportation packet entitled *Emergency Traffic Control and Scene Management Guidelines.*
5. All analyzed data will be shared with the University of Wisconsin – Stout and any participating agencies who have requested the results.

The survey was sent to each of nineteen Chippewa Valley Ambulance services, and the associate questions are as follows:

Highway / Roadway hazards Survey

Please return by November 7, 2008

In which of the following ways would you categorize your organization?

- o Volunteer
- o Paid-On-Call
- o Combination
- o Career

Please answer these questions by checking yes or no.

Does your organization operate on highways or interstates?

- o Yes
- o No

Does your department have written policies and procedures or Standard Operating Guidelines in place regarding:

Driver selection

- o Yes
- o No

Operating on highways and roadways?

- o Yes
- o No

Educating EMS personnel regarding operating on highways and roadways?

- o Yes
- o No

Conducting diver background checks?

- o Yes
- o No

Apparatus placement at highway / roadway scenes

- o Yes
- o No

Emergency lighting and markings used

- o Yes
- o No

Is your organization interested in finding out more about operating at highway incidents?

- o Yes
- o No

Would your organization be interested in training that would describe and demonstrate best practices for emergency services operating on highways and roadways?

- o Yes
- o No

Are you aware of the number of highway related injuries and deaths that occur annually to emergency workers?

- o Yes
- o No

Do you have policies and procedures in place for positioning apparatus at highway related scenes?

- o Yes
- o No

Is this done at every highway incident?

- o Yes
- o No

Are personnel trained in apparatus placement?

- o Yes
- o No

Is this placement enforced?

- o Yes
- o No

Is the technique for apparatus placement practiced during non-emergency training situations?

- o Yes
- o No

Are your personnel trained in:

EVOC (emergency vehicle operations course)?

- o Yes
- o No

Certified driver / operator?

- o Yes
- o No

Commercial driver's license?

- o Yes
- o No

Are personnel that respond outside your jurisdiction protected by the same procedures and equipment as they would be in their primary response area?

- o Yes
- o No

Is there a testing process in place within your organization to determine the qualifications for those who will drive emergency vehicles?

- o Yes
- o No

Does your organization follow Wisconsin Department of Transportation guidelines for operating on highways and roadways?

- o Yes
- o No

Do you feel that everything possible is being done to minimize risk and maximize safety for personnel operating on highways and roadways?

Within your agency?

- o Yes
- o No

Within the EMS industry?

- o Yes
- o No

Does your organization have a policy requiring the wearing of seatbelts?

Anytime that a vehicle is moving?

- o Yes
- o No

While in a vehicle on a highway scene?

- o Yes
- o No

Is there a financial benefit to your organization regarding hiring personnel who have already been trained in response to highway and roadway incidents – using uniform techniques and procedures?

- o Yes
- o No

Does your organization have the financial and other resources available to adequately handle roadway incidents safely?

- o Yes
- o No

Does your organization have policies in place to eliminate drivers with a history of?

Speeding

- o Yes
- o No

Operating under the influence of drugs or alcohol

- o Yes
- o No

Motor vehicle crashes

- o Yes
- o No

Please rate the questions on a 1 – 4 scale based on how your organization regards the level of importance for policies and procedures and/or Standard Operating Guidelines.

1 = Very important

2 = Important

3 = Somewhat important

4 = Not important

N/A = Not applicable

Use of Incident Command System	1	2	3	4	N/A
Arrival and positioning of emergency vehicles	1	2	3	4	N/A
Scene size-up	1	2	3	4	N/A
Request for public works / highway department	1	2	3	4	N/A
Communications with dispatch center	1	2	3	4	N/A
Initial Traffic Incident Management	1	2	3	4	N/A
Advanced warning areas	1	2	3	4	N/A
Advanced warning signage	1	2	3	4	N/A
Message signage	1	2	3	4	N/A
Dynamic message signage	1	2	3	4	N/A
Transition areas and tapers	1	2	3	4	N/A
Flaggers and spotters	1	2	3	4	N/A
Upstream buffer spaces	1	2	3	4	N/A

Incident spaces	1	2	3	4	N/A
Termination areas	1	2	3	4	N/A
Level One Staging	1	2	3	4	N/A
Level Two Staging	1	2	3	4	N/A
Helicopter Landing-zone	1	2	3	4	N/A
Scene breakdown and demobilization	1	2	3	4	N/A
Responder visibility	1	2	3	4	N/A
Awareness of the current situation	1	2	3	4	N/A
Emergency Response vehicles	1	2	3	4	N/A
Positioning	1	2	3	4	N/A
Cancellation of responding vehicles	1	2	3	4	N/A
Illumination of the scene	1	2	3	4	N/A
Emergency vehicle lighting	1	2	3	4	N/A
Emergency vehicle markings	1	2	3	4	N/A
Use of privately owned vehicles	1	2	3	4	N/A
Post -crash investigations	1	2	3	4	N/A
Alternate routes to be used during emergencies	1	2	3	4	N/A
Media coverage	1	2	3	4	N/A
Post incident debriefings	1	2	3	4	N/A

Please answer the following questions by writing the appropriate answer in the blanks that follow each question:

- What is the standard response to highway and roadway incidents (every incident)? What units respond?
    - # of ambulances _____
    - # of engines _____
    - # of other emergency vehicles _____

- What is the number of highway related incidents your organization responded to in 2007? _____

- Are vehicle checks done on each vehicle: (check all that apply)
  - Daily
  - Weekly
  - Monthly

- Your organization is located in the following county:
  - Chippewa
  - Eau Claire
  - Dunn
  - Pepin
  - Buffalo
  - Trempealeau

- How many ambulances does your organization staff full-time? _____

- How many ambulances does your organization have in reserve (back-up)? _____

Thank-you for taking time to take part in this survey!

Data Analysis

After the collection of data, it will be analyzed to categorize each agency as volunteer, paid-on-call, combination and career. The answers will be analyzed to show the percentage of answers for each question to be yes or no. The numerically rated questions will be analyzed to show the average rating in each category for the questions rated using the 1- 4 scale.

After the answers to the questions have been analyzed, the averages for all answers will be placed in a table which compares the ratings for the information to the "best practices" for the industry. The May, 2008 Wisconsin Department of Transportation publication entitled *Emergency Traffic Control and Scene Management Guidelines* will be used as a measure for best practices. All analyzed data will be shared with the University of Wisconsin – Stout and any participating agencies who have requested the results.

Limitations of the Study

This particular study is limited to the number of ambulance services in the Chippewa Valley. At the time that information was gathered for this study the number of chosen agencies providing ambulance service in the Chippewa Valley is nineteen. This study is limited to ambulance services in Eau Claire, Chippewa, Dunn, Pepin, Buffalo, and Trempealeau Counties in western Wisconsin.

Summary

Information gathered through this survey may be utilized to better serve the emergency service organizations and beyond by creating awareness of hazards on highways and roadways, training for emergency service personnel, and education for the general public who use highways and roadways.

Chapter IV: Results

It is likely that the general public does not understand the dangers faced by emergency responders who are working on highways and roadways. Motor vehicles traveling at high rates of speed present a significant danger to emergency responders. Any highway with high rates of speed, high traffic movement and limited access pose great threat to emergency service personnel. For these reasons, it would appear important for emergency departments to minimize the risk to responders who are working at highway and roadway related incidents.

Purpose of the study

The purpose of the study was to identify the extent that traffic loss prevention-based strategies (such as policies and procedures) are present among Chippewa Valley-based emergency medical service organizations.

Goals

The goals of this study were to:

- Determine the extent policies and procedures that address preferred driver behavior are present among Chippewa Valley-based emergency service organizations.
- Identify the extent that sub-standard driving related behaviors exist among Chippewa Valley-based emergency service personnel.

Overview of Methodology

Ambulance services in Chippewa, Eau Claire, Dunn, Pepin, Buffalo, and Trempealeau Counties were used as the subjects for this study. Each of these agencies provides emergency medical services and transportation of the sick and injured to a hospital. These ambulance services may be staffed in one of the following categories: career, combination, paid-on-call or volunteer.

The instrumentation chosen for this study was in the form of a survey which can be observed on page 28 of this document. The survey was developed in a manner where the subjects were asked to answer a series of questions with either a yes or no answer and l rated the importance of various questions using a scaled rating system on a 1-4 scale of importance with 1 being very important and 4 being not important. Organizations were also asked to provide specific written answers for certain questions that may not be able to be answered with a yes or no. The data collected from the survey will be measured against information that is considered to be the "best practices" for the industry and information taken from a Wisconsin Department of Transportation packet entitled *Emergency Traffic Control and Scene Management Guidelines.*

Presentation of Collected Data

Of the nineteen organizations that were surveyed, a total of ten completed the surveys and returned them to the researcher. Based on the returned and completed surveys, the organizations answered the questions as follows:

In which of the following ways would you categorize your organization?

Volunteer	-	30%
Paid-On-Call	-	30%
Combination	-	10%
Career	-	30%

Your organization is located in the following county:

Chippewa	-	4
Eau Claire	-	1
Dunn	-	1
Pepin	-	1
Buffalo	-	0
Trempealeau	-	2
Not stated	-	1

Please answer these questions by checking yes or no.

Does your organization operate on highways or interstates?

Yes	-	10	100%
No	-	0	0%

Does your department have written policies and procedures or Standard Operating Guidelines in place regarding:

Driver selection

Yes	-	50%
No	-	50%

Operating on highways and roadways?

Yes	-	60%
No	-	40%

Educating EMS personnel regarding operating on highways and roadways?

Yes	-	60%
No	-	40%

Conducting diver background checks?

Yes - 90%
No - 10%

Apparatus placement at highway / roadway scenes

Yes - 70%
No - 30%

Emergency lighting and markings used

Yes - 80%
No - 20%

Is your organization interested in finding out more about operating at highway incidents?

Yes - 90%
No - 10%

Would your organization be interested in training that would describe and demonstrate best practices for emergency services operating on highways and roadways?

Yes - 90%
No - 10%

Are you aware of the number of highway related injuries and deaths that occur annually to emergency workers?

Yes - 70%
No - 30%

Do you have policies and procedures in place for positioning apparatus at highway related scenes?

Yes - 70%
No - 30%

Is this done at every highway incident?

Yes - 50%
No - 50%

Are personnel trained in apparatus placement?

Yes - 60%
No - 40%

Is this placement enforced?

Yes - 60%
No - 40%

Is the technique for apparatus placement practiced during non-emergency training situations?

Yes - 70%
No - 30%

Are your personnel trained in:

EVOC (emergency vehicle operations course)?

Yes - 70%
No - 30%

Certified driver / operator?

Yes - 50%
No - 50%

Commercial driver's license?

Yes - 0%
No - 100%

Are personnel that respond outside your jurisdiction protected by the same procedures and equipment as they would be in their primary response area?

Yes - 50%
No - 50%

Is there a testing process in place within your organization to determine the qualifications for those who will drive emergency vehicles?

Yes - 50%
No - 50%

Does your organization follow Wisconsin Department of Transportation guidelines for operating on highways and roadways?

Yes - 90%
No - 10%

Operating under the influence of drugs or alcohol

Yes - 90%
No - 10%

Motor vehicle crashes

Yes - 60%
No - 40%

Please rate the questions on a 1 – 4 scale based on how your organization regards the level of importance for policies and procedures and/or Standard Operating Guidelines.

1 = Very important

2 = Important

3 = Somewhat important

4 = Not important

N/A = Not applicable

	Average response
Use of the Incident Command System	1.2
Arrival and positioning of emergency vehicles	1.3
Scene size-up	1.1
Request for public works/highway department	2.3
Communications with dispatch center	1.2
Initial Traffic Incident Management	1.5
Advanced warning areas	1.5
Advanced warning signage	1.6
Message signage	1.7
Dynamic message signage	1.5

Transition areas and tapers	1.6
Flaggers and spotters	1.5
Upstream buffer spaces	1.3
Incident spaces	1.1
Termination areas	1.6
Level one staging	1.2
Level two staging	1.4
Helicopter landing-zone	1.5
Scene breakdown and demobilization	1.6
Responder visibility	1.0
Awareness of the current situation	1.0
Emergency response vehicles	1.1
Positioning	1.0
Cancellation of responding vehicles	1.4
Illumination of the scene	1.4
Emergency vehicle lighting	1.0
Emergency vehicle markings	1.1
Use of privately owned vehicles	1.9
Post crash investigations	1.2
Alternate routes to be used during emergencies	1.8
Media coverage	2.3
Post incident debriefings	1.6

Please answer the following questions by writing the appropriate answer in the blanks that follow each question:

- What is the standard response to highway and roadway incidents (every incident)? What units respond?

# of ambulances	80% - 1
	10% - 2
	10% - 3
# of engines	70% - 1
	30% - 0
# of other emergency vehicles	30% - 1
	10 % - 2
	20% - 3
	40% - 0

- What is the number of highway related incidents your organization responded to in 2007?

Total of all agencies participating - 573
Average – 57.3

- Are vehicle checks done on each vehicle: (check all that apply)

Daily -	40%
Weekly -	30%
Monthly -	50%

- How many ambulances does your organization staff full-time?

Average -	1.1
1 ambulance -	50%
2 ambulances -	0%
3 ambulances -	20%
0 ambulances -	30%

- How many ambulances does your organization have in reserve (back-up)?

Average –	1.5
1 ambulance -	30%
2 ambulances -	10%
3 ambulances -	10%
0 ambulances -	40%
7 ambulances -	10%

Discussion

Emergency response/incident management strategies. Data presented in Chapter II of this study indicated that when agencies cooperate while working at highway and roadway related incidents, safety can be maximized and the risk of injury or death can be minimized. Yet the survey indicates that only 50% of personnel responding outside of their normal response jurisdictions are protected by the same procedures and equipment as would be the standard practice in their primary response area. The collected data also indicates that only 50% of the organizations who chose to participate in this study have a testing process in place to determine qualifications for personnel who are driving emergency vehicles. This may indicate that no cooperative effort is being made to standardize the testing process to determine qualifications among Chippewa Valley based ambulance services.

From a driving law compliance standpoint, 90% of the participants indicated that they follow Wisconsin DOT guidelines for operating on highways and roadways. The average response by organizations for apparatus placement on highway and roadway incidents was shown to be very important, while 30% of the agencies do not have an engine on scene and 40%

do not have any other emergency vehicles on scene with the exception of an ambulance. This would indicate that a current Wisconsin DOT guideline for vehicle placement and interagency cooperation is not taking place in a substantial number of jurisdictions. Fortunately, 90% of the participants have indicated that they would be interested in finding out more about operating at highway incidents, which may provide an opportunity for greater interagency cooperation and standardization among agencies when working at highway and roadway incidents. It should also be noted that, 90% of participants indicated that they would be interested in training that would demonstrate best practices for emergency services operating on highways and roadways. This information may show a great potential for future interagency cooperation and standardization of incident management practices.

Vehicle technology advancements. With regard to promoting visibility in emergency situations, 80% of participants indicated that policies are in place regarding emergency lighting and marking systems. Almost unanimously, agencies indicate that lighting, marking and visibility were considered to be very important for their organization. Yet only 50% indicated that they feel they have the financial resources to adequately handle highway and roadways incidents safely. This indicates that there are perceived opportunities for making vehicle technology advancements among Chippewa Valley ambulance services.

Administrative loss prevention approaches. From a risk control standpoint, administrative approaches may provide the best means of minimizing risk and maximizing safety. When asked about administrative policies, many organizations showed weakness in the policy and standard operating guideline areas. Only 50% of the responding agencies indicated the presence of a policy for driver selection. While 60% did indicate the presence of a policy for operating on

highways and roadways. Only 60% have policies regarding the education of its drivers as it relates to operating on highways and roadways.

There are also some positively identified practices in the survey data, such as the fact that 70% have policies for apparatus placement at highway and roadway scenes. However, only 50% of the responding agencies indicate that this is being practiced at every highway incident. Also, 80% have policies for the use of emergency lighting and markings at scenes. Of the agencies surveyed, 60% stated that personnel are trained in apparatus placement and this placement is only being enforced by 60% of the agencies.

The area of training reveals an area where practices may be improved upon. While 70% of participants indicated that apparatus placement is practiced during non-emergency training situations, only 50% of the participants train personnel as certified driver/operators. Only 70% of the agencies train personnel in emergency vehicle operations and 0% have personnel with commercial driver's licenses.

It appears to be well known among the general public that the use of seatbelts in vehicles will reduce the risk of injury and death from the result of a collision. However, only 80% of the participants indicated that a policy is in place requiring the use of seatbelts anytime the vehicle is moving, and only 50% indicated the requirement for seatbelts while working inside a vehicle at the incident scene.

It is encouraging to note that 90% of the participating agencies have policies for conducting driver background checks. Yet only 60 % have policies in place to eliminate drivers with a history of speeding, as well as motor vehicle crashes. Furthermore, 90 % of the

participants have policies in place for eliminating drivers with a history of operating under the influence of drugs or alcohol.

As perceptions and organizational culture tend to play a significant role with the administration of implemented policies and procedures, only 50% of the participants indicated that they felt everything is being done within their agency to minimize risk and maximize safety while working at highway and roadway incidents. Based a survey question, 80% of the participants indicated that they felt that everything was not being done within the emergency medical services industry.

It is conceivable that each of these issues might be alleviated or at the very least reduced with policies and procedures implemented by the organizations management staff followed by appropriate training to aid personnel in the success of safety practices while working at highway and roadway incidents.

Summary

As it is noticeable that efforts are being made to provide for safety to emergency responders working at highways and roadways, there still appears to be room for improvement regarding emergency response strategies, vehicular technologies and administrative loss prevention approaches. With standardization and interagency cooperation and partnerships, improvements can be made to minimize risk and maximize safety practices for emergency workers.

Chapter V: Conclusions and Recommendations

Purpose of the study

The purpose of the study was to identify the extent that traffic loss prevention-based strategies (such as policies and procedures) are present among Chippewa Valley-based emergency medical service organizations.

Goals

The goals of this study were to:

- Determine the extent policies and procedures that address preferred driver behavior are present among Chippewa Valley-based emergency service organizations.
- Identify the extent that sub-standard driving related behaviors exist among Chippewa Valley-based emergency service personnel.

Overview of Methodology

Ambulance services in Chippewa, Eau Claire, Dunn, Pepin, Buffalo, and Trempealeau Counties were used as the subjects for this study. Each of these agencies provides emergency medical services and transportation of the sick and injured to a hospital. These ambulance services may be staffed in one of the following categories: Career, combination, paid-on-call or volunteer.

The instrumentation chosen for this study is in the form of a survey as indicated on page 28 of this paper. The survey was developed in a manner where the subjects were asked to answer a series of questions with either a yes or no answer and will rate the importance of various questions using a scaled rating system on a 1-4 scale of importance with 1 being very important

and 4 being not important. Organizations will also be asked to provide specific written answers for certain questions that may not be able to be answered with a yes or no. The data collected from the survey will be measured against information that is considered to be the "best practices" for the industry and information taken from a Wisconsin Department of Transportation packet entitled *Emergency Traffic Control and Scene Management Guidelines.*

As highway and roadway related risks have been identified, as well as the analysis of practices and procedures for various emergency service organizations in western Wisconsin. It was found that there are improvements which can be made to increase the level of safety for emergency service workers. Through the development and implementation of policies and procedures along with associated training, the risk to emergency service personnel can be reduced.

In Chapter 1 of this paper, some of the basic trends in the emergency medical service industry were discussed as well as various risks that exist for responders working at the scene of highway and roadway incidents. Chapter 2 provided a review of literature that offered substantial information regarding incidents that have occurred which result in injury or death to emergency responders. Chapter 2 also identified areas of interest and in need of attention from the perspective of the author. Chapter 3 stated the purpose and goals of this study and discussed the methodology to be used for this study, indicating precisely how it is to be performed. This would allow for this same study to be performed again at another time or by another individual. In Chapter 4, the results and findings were shown in both the form of average responses among participants as well as percentages of participants answering in a specific way. Chapter 5 provides the conclusions from the study and a list of recommendations to be followed to reduce

the likelihood of risk to emergency responders when such individuals are working at highway and roadway incidents.

Conclusions

Following are reasonable conclusions that can be drawn from the data which was collected as part of this study:

- The study results indicated a wide array of organizational structures, such as 30% of participants identified their organization as having a career, volunteer or paid-on-call structure and 10% identified their organization as having a combination of career and volunteer personnel.
- With the purpose of the study focusing on highway and roadway incident practices and procedures, the fact that 100% of participating organizations stated in the survey that they work at highway and roadway incidents demonstrates true significance of this study.
- Many organizations are lacking in the implementation of policies and procedures that directly affect emergency service personnel working at highway and roadway incidents. Specifically, the following information provides an example regarding how organizations have some type of policies in place for:
    - Working at highway scenes – 60%. However almost all (90%) of participants indicated that they follow Wisconsin guidelines for operating on highways and roadways. However many do not
    - Ninety percent of the participants stated that they have policies in place for background checks for drivers. While at the same time the indications

showed that only 60% have policies to eliminate candidates with a history of speeding. 90% had policies to eliminate candidates with a history of driving under the influence of drugs or alcohol, and 60% indicated elimination of those with a history of motor vehicle crashes.

- Seventy percent of the respondents indicated the presence of apparatus placement policies and procedures

Information presented in the literature review indicated that a lack of policies and procedures will not only potentially result in injury and/or death to emergency responders, but will also result in criminal charges and civil negligence for both the driver and the organization he/she represents.

- Half of the participants stated that there is a testing process in place for determining the qualifications for drivers

In order for any policies and procedure to be successful, they must practice on a regular basis. As indicated in the literature review, when using the incident command system style of scene management, the system should be understood by all agencies involved. The results of the survey portion of this study showed:

- Only 60% of participants indicated that personnel have been trained in apparatus placement at scenes
- The survey showed that 70% of participants have trained personnel in emergency vehicle operations and only 50% are trained as certified driver/operators of emergency vehicles
- Almost all participants (90%) expressed an interest in training regarding working at highway and roadway incidents.

This information shows that not all participating agencies are handling training as it pertains to highway and roadway safety in a consistent and universal manner. A uniform means of training personnel for highway and roadway response would likely increase the level of safety for personnel working at these incidents.

Recommendations

It is recommended by this researcher that Chippewa Valley emergency service organizations develop and implement policies and procedures for the following areas:

- Operating at highway and roadway incidents. The specific areas which should be addressed would follow the Wisconsin Department of Transportation *Emergency Traffic Control and Scene Management Guidelines* and include employing the following strategies/activities:
- Use of the Incident Command System
- The number and type of apparatus responding
- Request for additional resources (example: highway department), as well as cancellation of resources deemed as not needed by the incident commander
- Communications with dispatch
- Initial traffic management
- Advanced warning areas and signage
- Use of transition areas and tapers
- Use of spotters
- Use of buffer areas
- Apparatus spacing at highway incidents
- Termination areas

  - Staging areas and helicopter landing zones
  - Responder visibility
  - Apparatus visibility including lighting and markings
  - Use of privately owned vehicles
  - Post crash investigations
  - Alternate routes to be implemented at scenes
  - Post crash investigation
  - Media coverage
  - Post incident debriefings
- Apparatus response to highway and roadway related incidents.
- Apparatus placement at highway and roadway incidents which is uniform with the practices of other emergency service organizations with which this organization may work.
- A selection process for potential drivers of emergency vehicles that includes:
  - A testing process (knowledge and skill)
  - Background investigations which checks for a history of speeding, motor vehicle crashes, and operating under the influence of controlled substances
- It is recommended that the emergency response workers training program be uniform and consistent with other emergency service organizations with which an organization will be working. It is also recommended that the training program be consistent with the Wisconsin Department of Transportation *Emergency Traffic Control and Scene Management Guidelines.* It is highly recommend by this author that emergency service

organizations develop and implement a training program which includes the following areas:

- Operating on highways and roadways
- Apparatus response to highway and roadway related incidents.
- Apparatus placement at highway / roadway scenes
- Emergency lighting and markings used
- EVOC (emergency vehicle operations course)
- Certified driver / operator
- The wearing of seatbelts
- Use of the Incident Command System
- The number and type of apparatus responding
- Request for additional resources (example: highway department), as well as cancellation of resources deemed as not needed by the incident commander
- Communications with dispatch
- Initial traffic management
- Advanced warning areas and signage
- Use of transition areas and tapers
- Use of spotters
- Use of buffer areas
- Apparatus spacing at highway incidents
- Termination areas
- Staging areas and helicopter landing zones
- Responder visibility

- Apparatus visibility including lighting and markings
- Use of privately owned vehicles
- Post crash investigations
- Alternate routes to be implemented at scenes
- Post crash investigation
- Media coverage
- Post incident debriefings

If all organizations working together were to utilize a training plan which is consistent with Wisconsin Department of Transportation *Emgergency Traffic Control and Scene Management Guidelines,* it would reduce the likelihood of highway and roadway related incidents resulting in injury or death to emergency responders.

Areas of Further Research

It is recommended that the following topics be explored to help minimize the additional risks that currently exist within the organizations processes:

- Emergency vehicle maintenance and repair
- Purchasing of emergency vehicles and the application of vehicle specifications for highway and roadway incidents
- Utilization of aircraft practices for highway and roadway incidents
- The specific role of law enforcement at highway and roadway incidents
- The evolving conditions of road surfaces and the effects weather plays during highway and roadway emergency incidents

Summary

It has primarily been the focus of this study to review the policies and practices of ambulance services in the Chippewa Valley when such entities operating on highways and roadways. However, when operating on highways and roadways ambulance services are normally not working alone. Other agencies present at emergency scenes often include but are not limited to law enforcement, fire departments, first responders, highway departments and towing companies. The safety and success of anyone working at the scene of a highway / roadway incident depends upon the policies and practices of all involved.

It is also critically important that all organizations train their employees according to the policies and procedures that have been developed and implemented. This training should also be conducted at regular intervals and involve all agencies that may have the opportunity to work together. This uniformity and consistency in practices will reduce the likelihood of injury or death to those involved.

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